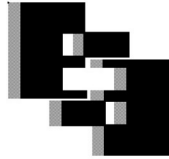


Language and Learning Across the Disciplines

A forum for debates concerning interdisciplinarity, situated discourse communities, and writing across the curriculum programs.



Special Issue: Poetry Across the Curriculum

Art Young, Guest Editor

Shawn Apostel, Assistant Editor

Poetry Across the Curriculum: Four Disciplinary Perspectives

Art Young, Patricia Connor-Greene,

Jerry Waldvogel, Catherine Paul

**Poetry's Place and the Poet's
Participation with Fields of Knowledge**

Rosemary Winslow

"Because His Shell Is Empty"

Writing Poems about Biology

Mark Richardson, Alison Morrison Shetlar, Robert Shetlar

City Confidential: On the Lyric Mapping of Urban Space

Elizabeth A. Hatmaker

**"Oh that wonderful stuff": Selected Poetry by
College and Middle School Students**

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Greater than the Sum of Parts: A Poetry/Science Collaboration

Nancy Abrams, Nadine Feiler

**"Plerk," "Plabor," and a Conventional Caper: Redefining the Work
and Play of Poetry Within the Discipline of English**

Steve Westbrook

Unsettling Knowledge: A Poetry/Science Triologue

Jonathan Monroe, Alice Fulton, Roald Hoffmann

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Language and Learning Across the Disciplines is a forum for issues concerning interdisciplinarity, situated discourse communities, and writing across the curriculum programs. The journal will publish articles dealing with issues in learning theory, discourse analysis, participation in disciplinary discourse, and the social, intellectual and political locations of WAC programs. We welcome articles seeking to make connections among several such areas of inquiry. All manuscripts will be carefully reviewed by members of the editorial board and appropriate outside readers. You may expect to hear from us in two months. When submitting a manuscript please follow the current MLA or APA style sheet; submit three copies (3,000 to 7,000 words); print your name, address, telephone number and affiliation on a cover sheet, not on the manuscripts; and enclose sufficient return postage clipped, not pasted, to a self-addressed envelope. Send manuscripts to Sharon Quiroz, Editor, *Language and Learning Across the Disciplines*, Illinois Institute of Technology, 3301 S. Dearborn, Chicago, Illinois 60616. Email submissions to quiroz@iit.edu. Major funding for *LLAD* is provided by the Academic Resource Center of the Illinois Institute of Technology. <http://aw.colostate.edu/llad>.



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Call for Proposals

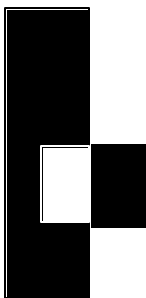
Language and Learning Across the Disciplines is now soliciting manuscript proposals (500-1000 words) for a special issue titled: "The Linguistically Diverse Student: Challenges and Possibilities Across the Curriculum." Guest editor for this issue is Ann Johns, Linguistics and Writing Studies, San Diego State University.

A remarkably diverse group of students is currently enrolled in our academic classrooms, and one aspect of this diversity is linguistic variety. Linguistic variation is so complex that researchers and practitioners employ a number of categories for student identification (ESL, EFL, ELL, ESD, ELD, bilingual, Generation 1.5), none of which can do justice to classroom diversity. How are our linguistically diverse students faring? Or, more importantly, what classroom practices and assessments in the disciplines are successful in including and motivating these students?

In this special issue, authors are asked to relate theory, research and practice in discussing pedagogy and assessment in linguistically diverse disciplinary classrooms.

Proposals due: February 1, 2004
Notification of acceptance: April 1, 2004
Manuscripts due: September 1, 2004
Publication: Winter 2005

Send proposals and inquiries to Ann Johns, Department of Rhetoric & Writing Studies, San Diego State University, San Diego, CA 92182-4452. Electronic submission preferred: ajohns@cox.net.



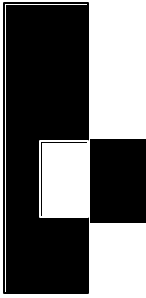
Editor's Note

Sharon Quiroz

Illinois Institute of Technology

With his usual diffidence, when Art Young suggested a special issue of *Language and Learning Across the Disciplines* dealing with Poetry Across the Curriculum, he worried that this venture might not work out. Well, it has worked out splendidly! This will be one of our favorite issues of the journal.

My own experience with poetry across the curriculum is limited to a single engineering course in heat transfer. Alas, we didn't save the poems and that teacher no longer teaches undergraduates. But trust me, their haikus on heat transfer—radiation, specifically—were wonderful! Always doing the math, every engineer in the class wrote exactly three lines of 5, 7, and 5 syllables. One student added a fifty-word title, but no one miscounted the number of syllables necessary for a traditional haiku. And if you have doubts about the disciplinary efficacy of the assignment, consider this information: the engineers rejected my own haiku, because, they said, I wrote about convection, not radiation. And a good time was had by all.



Guest Editor's Introduction

A Venture into the Counter-Intuitive

Art Young
Clemson University

This special issue of *Language and Learning Across the Disciplines* (LLAD) on Poetry Across the Curriculum (PAC) explores a function of written language that promotes learning and communication but is often neglected in discussions of Writing Across the Curriculum (WAC). Although WAC programs embrace such writing-to-learn activities as freewriting, journaling, and emailing, in addition to encouraging the drafting and revising of academic and functional prose, they usually pay little attention to creative writing as a tool for learning and for educational and cultural expression. As co-director of WAC programs for more than twenty-five years, I think I understand some of the reasons. WAC program directors expect resistance when they suggest to chemists that their students might write poetry to make personal connections, to understand technical matters, or to examine relevant social and ethical issues of course subject matter. And chemistry teachers, for that matter, are wary of the response they anticipate from their students if they require a brief poem about toxic waste or the concept of equilibrium.

Poetry's outsider status may be changing in American culture, particularly since September 11, 2001. In the days, months, and now years since the attack on the World Trade Center, poetry from many cultures and eras freely circulated with increased frequency on the Internet and in newspapers and magazines, expressing and connecting to our collective thoughts, emotions, questions, and imaginings. As Mary Louise Pratt asks in her current Modern Language Association President's Newsletter Column, "Of Poets and Polyglots" (Spring 2003), who "would have imagined in 1990 that hip-hop was going to revolutionize American popular music and carry over into language and cultural interfaces all over the

planet?" (3) *Def Poetry Jam* continues successfully on Broadway, poetry slams occur in coffee houses and pubs throughout the country, and people from all walks of life write poetry for family occasions such as births, weddings, and funerals. Self-proclaimed poets often write about temporal and pointedly political topics to audiences as multi-culturally diverse as the poets themselves, dispelling the myth that only ordained bards write meaningful poetry and that the most significant topics are the great eternal themes of love, death, courage, sacrifice, and the founding of civilizations. The World Wide Web shares its virtual and international space of established websites for canonical poets William Blake <<http://www.blakearchive.org>> and Emily Dickinson <<http://www.americanpoems.com/poets/emilydickinson/>> with not so established poets at websites like poetsagainsthewar.org and wagingpeace.org. At The Academy of American Poets and other Websites, you can find poems on numerous subjects, including "grief and consolation" in the section "Post-9/11 Poetry Resources" <<http://www.poets.org/sept11.cfm>>.

In late January 2003, Sam Hamill called upon poets to write about their opposition to the war brewing against Iraq, and by March 1, 2003, 13,000 poems had been collected and published by poetsagainsthewar.org. In response to political activity by poets, in early February 2003, the White House cancelled its symposium planned for February 12 on "Poetry and the American Voice," a gathering of poets, scholars, and critics to celebrate the work of Walt Whitman, Emily Dickinson, and Langston Hughes, for fear some of the participants would use the occasion to read poetry critical of the war against Iraq (Pollitt, par. 1). "There is nothing political about American literature," Laura Bush has said." (Pollitt, par. 5). On one hand, such activities seek to acknowledge poetry's insider role in the shaping of American culture, and on the other hand, they reinforce poetry's outsider status, even subversive status, when officials attempt to bring verse in from the cold. In planning and then canceling the White House symposium on American poetry, Laura Bush was both acknowledging that poetry makes a significant difference in our lives and culture and that poetry can be made peripheral or exterior to the most important business at hand when it clashes with other discourses and other agendas. As I write this, in April 2003, students across my campus prepare for

final examinations, mostly unaware of the “April is Poetry Month” flyer on my office door.

It should not surprise us that we encounter an analogous situation in the academy. Poetry and poets are tolerated if they keep to their place. Poetry is perceived as immaterial to the goals of the modern, corporate-connected, government-sponsored university. Attempts to place poetic discourse in conversation with other discourses about academic values and practices are often viewed as irrelevant, coddling, subversive, or silly. The poets invited to the White House symposium were in a “high stakes” situation, but student poets need to be in “low stakes” situations when they write poems in the disciplines, because many must summon the courage to imagine and to compose what others may view as irrelevant or silly. When stepping out in such a way is rewarded by hearers, viewers, and readers with surprise, delight, engagement, and even applause, platitudes about the rewards for the writer as risk taker are confirmed for many reluctant writers of poetry as well as of functional prose.

So why encourage student writers, who are outsiders to academic discourse but seeking proficiency and therefore insider status, and who likewise are not very familiar with poetic discourse, to experiment with poetic language in an academic context? Students may initially be alienated from poetic discourse even as they are alienated from disciplinary discourse, but encouraging students to write poetry about disciplinary knowledge and interdisciplinary connections, and about social, ethical, and rhetorical understandings, broadens their repertoire of language tools for thinking and communicating.

As an interdisciplinary, collaborative enterprise, WAC generates active learning and interactive teaching and runs against the grain of educational practices that primarily seek to fill up empty containers by sifting in the knowledge of the discipline a little at a time. WAC already does important work from its outsider status within the academy’s business as usual, so why should we go even further “out” and risk provoking a backlash that might jeopardize whatever success and limited insider status a WAC program enjoys? Why incorporate into WAC a commitment to both coherent communication *and* language play, to both critical inquiry *and* imaginative speculation? In an academy that values effective prose that is transparent, uncomplicated, serious, complacent, and

above all, free of errors, why introduce the writing of poetic language that often calls attention to itself as dense, intense, ambiguous, unsettling, metaphorical, ironic, playful, and resistant—making unusual demands on writers and readers?

Although an emphasis on exploratory writing in all disciplines resists education as usual, a case for the utility of poetry as a mode of discourse across the disciplines may be emerging. There is no denying that when we think about genre, particularly in the context of transferring language and problem-solving abilities from course to course and from school to work, poetry is not a genre biologists write in the academy or in the workplace. To ask future biologists to write poetry in biology courses seems counter-intuitive.

This issue of *LLAD* ventures into the counter-intuitive and explores from theoretical, programmatic, and pedagogical perspectives what happens and what might happen when we include the writing of poetry as a component of a WAC initiative. The writers in this issue introduce and develop the argument for including the poetic function of language in WAC programs and pedagogy. For you, our readers, the counter-intuitive nature of this discussion may require “a willing suspension of disbelief,” but we invite you to read, reflect, and then join our inquiry into the purposes for writing within the academy and the possibility that poetic language may help us fulfill those purposes.

The primary goal of PAC is to develop students' writing abilities, imaginative faculties, and critical capacities by engaging disciplinary knowledge and experience with poetic language. The writers in this issue suggest numerous reasons why a teacher might productively assign students to write poetry for disciplinary purposes; however, two reasons are central: 1) because poetic writing is a unique and effective tool for learning course material, or what I call a writing-across-the-curriculum rationale; and 2) because poetic writing is a tool for thinking and expression outside the discourse conventions of the discipline, or what I call a writing-against-the-curriculum rationale.

Writing-Across-the-Curriculum Rationale for Poetry Writing

Poetry can be used as a tool for learning in much the way that other genres, such as journals and discussion boards, are used. Poems share generative characteristics with these

and other writing-to-learn activities because they are brief, informal, personal, often interactive, and usually not awarded a specific grade. On the other hand, the poems can readily lead to public performance and publication in print and on the web. Poetic writing activities give students opportunities to reflect on the value of new knowledge and experiences. And when such activities are made social by sharing in groups or at public readings, they often enable students and teachers to build classroom communities based on a respect for language and on a connection to texts and to each other in which further learning and growth occurs, sometimes in surprising ways. Poetry writers and their readers forge new connections in order to create meaning in classrooms around imaginative texts written in response to disciplinary prompts and problems. In one sense, for teachers of writing-intensive courses to require their students to write poetry is to use a genre, unconventional to academic discourse, in support of conventional WAC goals.

Student poets often take unfamiliar course content and reflect, remember, empathize, discover, critique, and contextualize. Many use poetry to produce a psychic and rhetorical distance from course content in order to make anew the ordering of the world they perceive. Some student poets claim that writing poetry produces thinking that is outside the box. They say poetry provides them with a freedom to express themselves that other assignments do not offer—they write such poetry for their own sake, not for the teacher's sake, or the discipline's sake, or the grade book's sake. In developing their imagination through writing, they often find a new respect for written and oral language and for those who produce it, including, they report with surprise, themselves. In the pages that follow you will read the works of many of these students as they use poetic language to grapple with knowledge and experience in academic and disciplinary contexts. In the e-mail exchange that concludes this issue, Alice Fulton and Roald Hoffmann, two well-known scholars and poets, agree that "writing poetry is the best way to teach people to love language and words." And teaching people to love language and words is an admirable goal for a WAC program.

Writing-Against-the-Curriculum Rationale for Poetry Writing

Jonathan Monroe in this issue identifies poetry as an “anti-discipline,” which I take to mean existing in opposition to disciplinarity. Writing poetry may also be a way to temporarily step outside the discipline while being in the discipline—to use an unconventional genre in support of unconventional disciplinary goals. One such goal may be to reflect on those attributes of a discipline that are not usually critically examined within classroom contexts—a discipline’s invisible values of inclusion and exclusion, of knowledge and belief, of sanction and dissent. Poetry exists on the far margins of most disciplines and that may make it a valuable asset to WAC programs who serve undergraduate students who often feel situated similarly. To write in the discipline is to follow disciplinary conventions for the communication of information and knowledge and thus to focus and limit what can be written and how it can be written. To write against the curriculum is to choose a non-disciplinary convention, in this case poetry, to express and remake disciplinary knowledge and values in different contexts. From writing such poetry emerges the freedom of expression that comes from not being accountable to disciplinary discourse expectations. In imaginatively exploring this freedom, poets sometimes offer to classmates, their professors, and others new and unexpected insights and perspectives on disciplinary conversations.

Writing poetry about knowledge learned in academic courses creates ways for that knowledge to be in the world and to remake the writer’s world based on new information and experience. Writing poetry focuses on language and on seeing new possibilities by rearranging language. As Alice Fulton says in this volume “poems don’t exist to provide information,” thus distinguishing them from scientific articles. She continues: “perhaps they exist to provide an experience, cerebral or emotive.” In providing experiences for writers and readers in response to information, poems may suggest an accessible cross-disciplinary discourse for reflecting and imagining and for integrating and probing highly specialized informative and persuasive disciplinary discourse. Because the poetic is a unique function of language, it appears beside-the-point in an information society, and yet this same outsider status enables the poetic to function across fields of knowledge because it does not directly participate in any field’s

intellectual and social culture. Thus, several of the contributors to this collection argue for the cultural work that poetry writing might do in our classrooms and in broader social contexts, thus arguing for poetry's connection to democracy and civic responsibility as well as to self discovery and artful expression.

Briefly, What You'll Read in This Issue

Taken together, the pieces in this collection both suggest and question the uses of poetry writing across and against the curriculum in theory, in practice, in programs, and in the language and learning of ordinary students and teachers.

The first article, "Poetry Across the Curriculum: Four Disciplinary Perspectives," describes a poetry initiative that is a part of a mature communication-across-the-curriculum program founded in 1989. The poetry project at Clemson University is three-years old and involves twenty to thirty faculty from numerous disciplines. Young, Connor-Greene, Waldvogel and Paul represent four disciplines (literature, psychology, biology, and humanities), and together they explain the overall purpose of their program and then each individually illustrates through an analysis of student poetry why he or she assigns, reads, and responds to the poems.

James Britton's work is the theoretical basis of Clemson's program, and in the next article Rosemary Winslow provides a provocative critique of Britton's theory of the poetic as "spectator role" writing. In "Poetry's Place and the Poet's Participation with Fields of Knowledge," Winslow argues that Britton's use of the term "spectator" to refer to the poetic function is unfortunate. According to Winslow, Wolfgang Iser's theories provide a clearer understanding of poetry's role in learning and in self and cultural renewal.

"'Because His Shell is Empty': Writing Poems about Biology" by Richardson, Shetlar, and Shetlar describes a WAC project that links biology courses with a composition course in which students write poetry in order to learn biology and biological processes studied in introductory and sophomore-level biology courses. The authors stress the connection between scientific and artistic creativity, emphasizing close observation, exploring analogies, ethical perspectives, and precision of language. They also include assignments and thoughtful readings of several engaging student poems about

such issues as cloning, genetic mapping, and cellular respiration.

After reading the stories of her students who wrote about working as lifeguards at Chicago-area pools, Elizabeth A. Hatmaker provides us with a personal, probing essay that theorizes possibilities for the poetic in the cross-disciplinary construction of knowledge. In "City Confidential: On the Lyric Mapping of Urban Space," Hatmaker suggests "a space for the development of the cross-curricular lyric voice, for thinking about the ways in which poetry (and the traditions that produce it) can feasibly be applied to conversations in the fields of postmodern geography, critical cartography, and urban studies. In doing so, she acknowledges the tension of the narcissistic "I" in some lyric poetry, but, using the metaphor of lyric mapping, she provides a strong rationale for students and teachers to enter the postmodern lyric landscape inhabited by academics and poets.

Our next section includes many student poems in which a sense of "place," whether a beach, a downtown, or a wildlife preserve, is essential to understanding the experience of the poem. This anthology, "Oh that wonderful stuff: Selected Poetry by College and Middle School Students," edited by Shawn Apostel, includes poems by Clemson University students written in biology, business statistics, chemistry, psychology, and women's studies courses. These poems are followed by three from sixth graders at The Park School in Baltimore about their research and experiences on Assateague, a barrier island off the coast of Virginia and Maryland.

These children's poems were written by students of Nancy Abrams and Nadine Feiler. "Greater than the Sum of Parts: A Poetry/Science Collaboration" describes a middle school collaboration between science and language arts teachers and students. This project began with a familiar scenario: the science students would perform research and write reports and the language arts students would help revise and edit them. This one-sided collaboration, in which language arts students served the science students, evolved into a more fruitful collaboration when both classes agreed to do research on barrier islands and to write poems about their research. Students in both classes learned information, processes, and skills important to both poets and scientists, such as ecological theory, close observation, metaphorical thinking, and research and language development; they also learned how to

use science in writing poetry and to use poetic language and thinking to study science. This close relationship between science and poetry as seen in these sixth grade classes is also an important topic of discussion for Alice Fulton and Roald Hoffmann, both respected poets, in the last article in this collection.

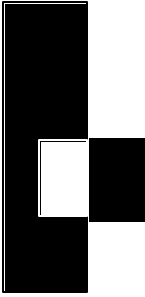
Steve Westbrook focuses on the discipline of English in “‘Plerk,’ ‘Plabor,’ and a Conventional Caper: Redefining the Work and Play of Poetry Within the Discipline of English.” He provides one answer to the question: if English had one course in which to introduce students to writing in English, perhaps similar to other writing-in-the-disciplines courses like “Writing in Psychology” or “Writing in History,” what should it look like? Drawing upon the scholarship of Wendy Bishop, Hans Ostrom, and John Trimbur, Westbrook argues for a course which centers on creative writing, academic writing, and comparisons between the two. English majors should investigate the intellectual and cultural work performed by both the poetic and the transactional function. Within most English departments, poetic writing is theorized as stylistic play and academic writing as cultural work, and they often have separate faculties, ideologies, and curricula. But as Westbrook’s title (Plerk, Plabor) suggests, perhaps a “Writing in English” course should bring these two separate disciplines into conversation.

“Unsettling Knowledge: A Poetry/Science Trialogue” by Jonathan Monroe, Alice Fulton, and Roald Hoffmann is a collage of poetry and prose with three distinct voices exploring what, if anything, poetry has to say to science and vice versa. Each writer, all of whom are poets as well as scholars, examines the connection of poetry to scientific inquiry via essay and email exchange, playfully and seriously, in poetry and in prose, in dialogue and in triologue. At some cognitive level, is there a natural and productive connection between the making of poetry and science? Or is poetry fundamentally unsettling, necessarily against the grain? We know in general terms what science is for and what the scientist does for society; but what do poets do for society? Monroe, a comparative literature scholar and writing program administrator sets out such questions and joins Alice Fulton, a MacArthur prize-winning poet, and Roald Hoffmann, a Nobel prize-winning chemist, in generating answers and speculations from their respective and differing perspectives. What

is most strategic about this insightful collage, and why it concludes this special issue, is its insistence that poetry find ways to open up dialogues with science and other fields of knowledge rather than participate in its own marginalization from scientific and cultural work. Through such cross-disciplinary inquiry and conversation, we may be able to envision and enact a participatory role for poetry in general education and disciplinary education.

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Poetry Across the Curriculum: Four Disciplinary Perspectives*

Art Young
Clemson University

Patricia Connor-Greene
Clemson University

Jerry Waldvogel
Clemson University

Catherine Paul
Clemson University

Our “poetry-across-the-curriculum” (PAC) project at Clemson University began in the fall of 2000, one facet of our university-wide communication-across-the-curriculum (CAC) program begun in 1989.¹ In August 2000 our CAC program received unexpected national and campus recognition when Clemson University was awarded Public College of the Year by *Time Magazine*, and we seized that opportunity to launch an unconventional “Focus on Creativity” component to our program. The CAC program was established to improve student learning and communication abilities, and we used familiar CAC approaches to do so, suggesting journals, discussion boards, and peer feedback on multiple drafts of major reports, speeches, and essays. More than 500 faculty have participated in our program over the years, from attending and leading workshops to participating in CAC curricular change, service learning projects, laptop computer initiatives, research collaborations, publications, grants, and assessments. However, to suggest the writing of poetry as a way to

* Parts of this article are reprinted from Art Young’s “Writing Across and Against the Curriculum.” *College Composition and Communication* (February 2003). Copyright 2003 by the National Council of Teachers of English. Reprinted with permission.

improve academic learning and communication in the disciplines was new and seemed counter-intuitive to many faculty. As they understood it, writing in their discipline involved various kinds of expressive and functional writing, but not creative writing, and certainly not poetry. And just as certainly, they did not feel prepared to “teach” the writing of poetry, or to read it, respond to it, grade it.

We sent out invitations to thirty faculty who had been active and innovative in integrating CAC practices into their courses, and twenty-four agreed to participate in the pilot project: *Focus on Creativity: Poetry Across the Curriculum*. Faculty representing all five of our colleges and numerous academic departments agreed to ask students to write poetry in response to course readings and other content-related prompts. This ongoing (2000-2003) pilot project involves faculty workshops and informal luncheons; an anthology of selected student poems from each participating class; print editions of whole sets of poems from particular classes, such as biology, horticulture, music, and psychology; judging sessions by interdisciplinary groups of faculty; awarding “certificates of achievement” and book store gift certificates to selected authors; web publication of selected poems (<http://people.clemson.edu/~apyoung/focusoncreativity.htm>); and ongoing formative assessment. We began to assess the poetry project in 2001 using faculty surveys, student written reflections, textual analysis of student poems, and case studies of classes from four disciplines. This essay reports on the purpose and findings of the poetry project, focusing primarily on the four case studies.

The purpose of these poetry assignments was not to train students enrolled in accounting or zoology courses to become poets in any professional sense, but rather to provide them with opportunities for creative thinking and language use, for gaining new perspectives and generating ideas on the material under study, and for exploring feelings and values in conjunction with academic learning experiences. In addition, we have discovered pedagogical uses for the writing of poetry in this context: it provides a voice to some students who are shy about speaking in class; it provides a place for humor, playfulness, irreverence, and the expression of shared emotions; it recasts thinking about course material into new patterns; it enhances student-teacher and student-student communication; and it fosters an interactive classroom envi-

ronment. When poetry assignments are carefully planned, they strengthen course goals.

Our primary theoretical framework draws on our understanding of the poetic function of language as developed in the work of James Britton and his colleagues at the Schools Council Project in England (*Development*). Britton asserts that poetic writing involves a kind of learning different from the learning in transactional or functional writing. In many instances, creative writing is connected to creative thinking and problem solving, to alternative and innovative ways of seeing and doing.

Britton speculates that both the freedom and the discipline of the artist's perspective enable us to express our values. For example, when we assume the artist's role in writing, we write in what Britton calls the "spectator" role. Writing in the "spectator" role frees the imagination to reflect on experience and to engage language in such a way that meaning is shaped and reshaped by an active but disinterested mind (not as interested in pleasing the teacher, getting an "A," or other "business" concerns). Britton writes: "As spectators, we use language to contemplate what has happened to us or to other people, or what might conceivably happen; in other words, we improvise upon our world representation—and we may do so either to enrich it, to embroider it, to fill its gaps and extend its frontiers, or to iron out its inconsistencies" (*Language* 6). This activity is fundamentally different from composing transactional writing, the purposeful writing we do to "transact" the world's business in the vested "participant" role, that role in which we are actively or tacitly involved in persuasion (selling a product, changing a mind, influencing a decision, or participating in the making of knowledge in a particular discipline—such as a scientific research report or journal article). Students often attest to the "freedom" of writing poetically once they develop trust that the teacher is encouraging creativity and risk taking rather than judging their artistic ability. "I never thought about science that way before," students say, or "I was able to say what I really thought," or "there is no one right way to write a poem." Writing poems across the curriculum interrupts students' expectations for transactional disciplinary writing and frequently enables them to think in insightful and unconventional ways.

One goal of Clemson University's PAC project is to test these theories in actual practice by 1) describing the learning that occurs when students write poetry in the disciplines, 2) collaborating as reflective practitioners in developing the knowledge of teaching and learning, and 3) assessing the effectiveness of the project and developing a set of models for faculty and students throughout the curriculum. We are heartened by the 100% return rate on the survey of participating faculty, and the fact that in response to the question: "What's the chance that you will assign poetry writing in the future?" 19 of 23 (one respondent did not answer this question) responded "excellent" or "very good." However, our focus here is on the four studies of poetry writing in psychology, biology, literature, and humanities. Each study was written by the assigned teacher, and thus is informed by disciplinary knowledge and pedagogical context.

The four of us agreed on some simple guidelines for our teaching and subsequent research: to assign students to write at least two poems and at least one reflection on writing poetry over the semester; to explain the purpose of the assignment to students; to require that the poems be about relevant course material (often a specific topic was given, e.g., cloning); to encourage and support students' creativity (e.g., playfulness with language; risk taking; thinking "outside the box"); to read some poems aloud in class and in connection with course content; and to provide freedom for students to choose the form, tone, purpose, persona, and style of their poems.

Since our study is naturalistic, there are also variations in each of our approaches because of differing course content and goals. In this study, biology and humanities are general education courses, enrolling significant numbers of non-majors. Psychology and literature are advanced courses, enrolling primarily majors and minors. One of us graded the poems; three did not. Two of us published a class collection of poetry; two did not. One of us required that poems be on ethical aspects of the content; three did not. However, what surprised us as we collaborated in writing this article were not the differences in our approaches, but the similarities we discovered about how poetry worked as a tool to accomplish our course goals. In each of our courses, the writing of poetry enabled students to make personal connections to the disci-

plinary content under study and to view that content in broader social and cultural contexts.

Informed Empathy: The Challenge of Teaching a Course in Abnormal Psychology

Patricia Connor-Greene

As faculty, we spend much time talking about how to stimulate our students' minds, but not so much on how to engage their hearts and senses. Encouraging collaboration of mind, heart, and senses can especially enrich the study of mental illnesses. Too often, the more a student learns about psychological disorders, the more tempting it becomes to replace an appreciation for the individual with disembodied "facts" about a disorder. In the process of learning diagnostic criteria, students sometimes transform a person into "a schizophrenic" or "a manic depressive," losing sight of the uniqueness of each individual. Ironically, it is interest in the individual that often draws students to the study of psychopathology, so it is especially important to find effective ways to integrate "objective" and "subjective" responses to people with mental illnesses.

My primary goal in teaching Abnormal Psychology is to increase students' *informed empathy*, blending knowledge about mental illness with an appreciation of its personal impact on individuals, their families, and those who provide their care. In addition to understanding factual information about diagnosis and treatment, I want students to imagine what it might *feel* like to have a mental disorder. The "informed" half of my goal is easy; Abnormal Psychology courses are packed with information. The real challenge is teaching empathy.

To address this challenge, I have incorporated poetry assignments into my Abnormal Psychology classes for the past three years. I gave minimal guidelines, asking students to write a poem from any perspective on any topic related to mental illness. Some students chose to write as if they had a disorder; others wrote from the standpoint of a family member or clinician. Students earned a small amount of credit for turning in a poem, but I did not grade the poems in any way. Because some students were apprehensive at the prospect of writing a poem, I assigned the poem for the next class period (two days later) to encourage spontaneity and minimize time spent worrying about the assignment. The resulting poems

demonstrated that along with fostering empathy, a poem allows students to create a brief but surprisingly rich snapshot of a complex idea.

In just 21 lines, Laurie Gambrell captured some of the most complicated and difficult obstacles therapists face: the struggle to maintain healthy personal boundaries while caring for an emotionally needy client, the threat of professional burnout, and the challenge of feeling (and instilling) a sense of hope despite setbacks.²

The Mental Health Professional

**have you ever made cornbread
watched the golden batter hit the hot
skillet and ooze
bubbling and slow to fill the pan**

**have you ever been frustrated
felt it slide over your hot
skin and ooze
bubbling and slow to fill the core
of you**

**i feel the oozing (is that even a real word?)
it doesn't matter if it is or isn't or wasn't or couldn't be**

**because all i feel is the ooze
the utter ooziness of the ooze is oozing**

**because i know that
it doesn't matter if it is tricyclic antidepressants or
lithium or benzodiazepines or
chickenoodlesoup**

**because i know that
it doesn't matter if it is four days or two weeks or
thirteen years**

**because i know that She will be back
in my office oozing her life**

into my pan of golden cornbread

Laurie not only demonstrates an extraordinary grasp of this therapist's ambivalence and fatigue; she invites the reader to empathize as well. By beginning with "have you ever made cornbread," she connects us to a familiar experience that engages our senses far beyond an intellectual discussion of therapy. In writing, "it doesn't matter if it is tricyclic antidepressants or lithium or benzodiazepines or chickennoodlesoup," Laurie raises questions about the long-term effectiveness of psychiatric medications, which in turn highlight the centrality (and the pressure) of the therapist/client relationship. Her use of the "oozing" imagery, "slow to fill the core of you," captures the insidious nature of therapist over-involvement and burnout. Laurie's choice of when to capitalize ("i know that She will be back") reflects the therapist's struggle against loss of self and the enormous emotional burden that a therapist may feel. This poem so effectively communicates the complexities of the therapist/client relationship that I will share it with future Abnormal Psychology classes. I found that a two-day deadline gave the students enough time to produce thought-provoking poetry.

On the day students handed in their poems, I asked them to do a five-minute freewrite on their reactions to writing the poem. Students' written responses to the poetry assignment supported its effectiveness in increasing empathy. One student wrote that the poetry assignment was "a unique way to kind of put yourself in another's shoes. So many times we just hear the 'name' of a disorder and we don't actually take time to understand what the person's life may be like." Another wrote, "Doing the poems really makes you think about the person with the mental illness, not just the mental illness." Once I saw the impact that poetry writing could have on students' ability to empathize with clients, I made poetry a more integral part of the class.

I decided to use poetry to replace another assignment, a site visit report. As part of the course requirements, every student in the class makes a "site visit" to a mental health treatment facility. Some students visit a clubhouse program for adults with chronic mental illnesses; others go to a state inpatient hospital or participate in the Walk for Mental Health Awareness, along with mental health center patients and staff. In past semesters, I have asked students to write a site visit report describing the facility, the staff, and their own reactions to both the setting and their perceptions of their

experience. Although I encouraged students to write subjective responses, their site visit reports tended to be rather sterile accounts of their visits, providing relatively little sense of what the student thought or felt. To encourage students to reflect on and express both their expectations of and reactions to mental health treatment facilities, I replaced the site visit report with an assignment of two poems, one before and one after their visit.

Jack Berno wrote “Schizo” in anticipation of his visit to an inpatient psychiatric hospital. He read his poem to the class with a rapid-fire, rhythmic beat that gained momentum as he read, mirroring the pressured speech typical of a manic episode. He doesn’t just “talk about” mental illness; he takes us on a wild ride that gives us a *feel* for mania.

Schizo

**It's a panic
To feel like
You're on a hallucigenic
247
doctor diagnosis is schizophrenic
with a hint of manic
depressive
I'm a maniac
Doesn't take a brainiac
To realize that it hits you
With no planned attack
Missin' deliveries
To me like a baseball player
With a fanned at bat
Sucks to be psychotic
Only friend
Is your narcotics
Far from exotic
Or erotic
My body's normal
When it's always toxic
The disease
People mock it
Suicidal thoughts
I try to block it
Give me a gun
I'd cock it**

**Maybe the voices in my head
Just talk it
Insaneness is movin' in
Actin' like a hooligan
My man down the hall
Just ate his poo again
See my family
I'm like
Who's this man?
Beatin' the wall
Threw fists and
I'm blue again
Want my mental
Bright as the light
In the sky
On the 4th of July
Boomin' in
Celebration
I want to reason
Went from high school grad
Makin' A's and B's in
To a mental house
People lookin' at me
Always teasin'
Life is cold, far from pleasin'
I'm always freezin'
Just want to settle
In a sunny meadow
Clear sky
Flowers bloomin' in
The season**

Jack is clearly “informed;” his words and rhythm demonstrate an excellent grasp of the clinical features of mania such as flight of ideas and loose associations. Yet this is no sterile clinical description. Jack’s character has a distinctive voice that is clever, irreverent, and frustrated. He wants us to know how his life was (and could be). We get a feel for the *person*, not just the illness.

Using one of the most effective strategies to create empathy, the poem reminds us that mental illness can affect anyone (“Went from high school grad / Makin’ A’s and B’s in / To a mental house”). Jack’s choice to make the character young and bright challenges stereotypes of the mentally ill and in-

dicates a willingness to identify with him rather than cast him as “the other.” Like Laurie, Jack makes the unfamiliar familiar (“like a baseball player / With a fanned at bat”) and in doing so, invites reader empathy. And like Laurie, Jack uses a fictional character’s voice to assume Britton’s “spectator role.” In Britton’s words, both Laurie and Jack enrich, embroider, and extend their ideas using the language of poetry.

Writing poems about mental illness encourages informed empathy, providing a forum for students to combine factual knowledge about psychiatric disorders with an appreciation of the uniqueness of an individual person. Most students wrote poems from a persona different from themselves, and attempting to see the world through another’s eyes is the essence of empathy. Along with fostering empathy, the poems provide a fresh, creative way for students to demonstrate mastery of the course material. Both Laurie and Jack demonstrate a poem’s ability to distill complex and emotionally charged topics into relatively few words rich in sensory imagery.

I will continue to assign poems in my classes: students surprised themselves, and they surprised me. Often, the students who were least involved in class discussions wrote the most vivid and insightful poems. Poems give students a different voice than they typically have in psychology classes, and they give me a new way to listen.

Making Science Personal: Poetry in a Biology Class

Jerry Waldvogel

Why should a biologist use poetry as a teaching tool? More than one colleague has asked me that question. Before I answer, consider the following observation from *Science for All Americans* by Rutherford and Ahlgren:

What the future holds in store for individual human beings, the nation, and the world depends largely on the wisdom with which humans use science and technology. But that, in turn, depends on the character, distribution, and effectiveness of the education that people receive ... without a scientifically literate public, the outlook for a better world is not promising. Most Americans ... are not scientifically literate. (v)

Now shift to recent headlines. Miss Cleo, the popular TV psychic, goes to trial on charges of false advertising - seems her Tarot card predictions do not come true (Bean). The makers of the Ab-energizer, that effortless tummy exercise gadget, are charged with deceptive marketing practices when users find that the product is not only ineffective, but actually dangerous (Hager). And amid much public squabbling by his children, the body of the late baseball legend Ted Williams is cryogenically stored, based largely on the scientifically unsubstantiated claim that the slugger might one day be revived when medicine has advanced sufficiently (Cohen). These examples give credence to the claim that many people are indeed functionally illiterate when it comes to the everyday application of science to their lives.

To improve science literacy, classroom instruction must not only focus on high-quality content and pedagogy, it should also get students to appreciate that a working knowledge of science helps them make more informed personal and social decisions (Biological Sciences Curriculum Study vii; National Research Council 3-6). One way that this can be achieved is by giving students opportunities to make meaningful personal connections between science and other ways of thinking that they typically perceive as “non-scientific” (e.g., philosophy and ethics). I have found that writing poetry about biology and its relationship to other aspects of our culture is an effective way to help students develop personal connections with science, because poetry allows them to step out of their traditional “participant” role as science writers and adopt a more personalized “spectator” role. Poetry thus frees students to use their imaginations, giving them the opportunity to express connections between ideas in ways that are not possible in other, more traditional written formats (e.g., term papers or exam essays). By allowing students to shift their perspectives in imaginative ways, poetry encourages critical thinking.

The General Biology class in which I have used poetry at Clemson University has about 20 students, roughly half of whom are science or engineering majors. Most claim little or no facility with poetry when the class begins, and almost none have used creative writing in their previous science courses. The idea for making formal poetry assignments in this course came from an unexpected poem that I received from one of my students in response to a take-home essay

exam question. Although I expect and almost always receive answers to these questions in academic prose, in the Fall 2000 semester Maureen McHugh wrote her answer in poetic form. The question asked the student to interpret the following short poem on the scientific process by J. Brooks Knight, and to explain why it was a good statement of the philosophy that all careful scientists should bring to their work:

**Say not that this is so,
but that this is how it seems to me to be
as I now see the things I think I see.**

The following are the first three stanzas from Maureen's seven-stanza, untitled poem in response to Knight's words:

**The goal of good science is to understand
Nature, the universe, the law of the land.
But science has certain rules by which one must abide
So the results gained are truly justified,
And on its own the outcome can clearly stand.**

**The behaviors we see once are not always true,
For reliability we must observe other examples too.
True science depends on validation,
A quality achieved by replication,
So we must test a hundred times, not just a few.**

**This is why we cannot just say "this is so,"
After a million times we still do not know.
For science is not in the market to prove,
It wants only that which is false to remove,
And allow valid ideas the room to grow.**

At the time I had no prior experience with poetry in my teaching, but Maureen's limerick-like poem got me thinking about the potential that writing poetry has for enhancing student learning. Not only did Maureen show me that she had a thorough understanding of the mechanics of the scientific process, she also demonstrated that she had internalized and personalized this process and could draw creative analogies to everyday experience using rhymed verse.

Intrigued by what Maureen had done, I decided to make writing poetry a more formal part of my course in the 2001-02 academic year. I asked the students to write poems on six

different occasions each semester. This time I assigned specific topics such as exploring the nature and limits of science, defining life (including where it begins and how it came to be), counseling a friend with a serious disease who might benefit from the results of stem cell research, considering the ethical dilemma of using humans as research subjects, examining drug addiction from the perspective of a user, doctor, or friend, and pondering the myriad implications of animal cloning. I gave students free rein in terms of poetic format, setting only a minimum limit of ten lines, and asked them to focus more on feelings, perceptions, and the interface between science and society as they saw it for the topic, rather than just the empirical “facts.”

All of the poetry assignments were graded, and together totaled 15 percent of the final lecture average. I did not attempt to judge the literary quality of the poems themselves, largely because I wanted the students to concentrate on personalizing the science and developing new perspectives, but also because I did not feel qualified to critically evaluate their poetry as such. My grading criteria were thus basic spelling and grammar, scientific accuracy, and evidence of both critical and creative thinking.

Two examples from the 2001-02 class serve to illustrate the personal connection to science that emerged from my students' poetry. Emily Hertzog's poem “First Murder” was written after a class discussion about the serious ethical problems associated with a long-term medical project known as the Tuskegee Syphilis Study, which ran from 1932-1972 (Allen and Baker 164-169). In this study, poor African-American males in rural Alabama were convinced to participate in a project to investigate their “bad blood” in return for the government's covering regular medical checkups, meals, and funeral expenses. In reality, the doctors were interested in monitoring the unchecked progression of syphilis in the black population so that they might better understand the natural pathology of this disease. As if this lack of informed consent (some would say deception) was not reprehensible enough, when antibiotic treatments for syphilis became available in the 1950s, participants in the study were not made aware of this new medical advance so that the “scientific objectivity” of the study could be maintained. Using history as her guide, Emily's poem put the emotional issue of ethics and research

on human subjects in a more modern context. Excerpts from her poem follow, with ellipses indicating missing text:

**This morning I killed a man.
I was the doctor on duty-
watching as he gulped-chest heaving-for his last
breaths of air.
He was lying on the ground when I walked in today.**
...
**Our motto: “To better the lives of all mankind”
seemed strangely inhumane all of a sudden.**
...
**Four years ago we began researching AIDS.
Still a virus without a cure, it was our idea that we could
make further developments toward such an end by
studying the disease in detail.
The only way to objectively do such was to watch men
like Big John die.**
...
**I myself was the one who suggested we withhold the
drugs.
My blindness! My failure to see!**
...
**How many more will come? ... Oh God, what have I done?
This morning I killed a man.**

What impresses me most about Emily’s poem is the raw human emotion juxtaposed with the emotionless understanding that proper scientific protocol is essential for medical research. This linkage demonstrates that Emily has wrestled with the needs of science and their social implications. In the midst of this emotional tug-of-war, Emily focuses on the tension between the physician’s credo of “do no harm” and the need for unbiased knowledge of a disease (part of which can include human suffering). The obvious angst felt by the storyteller as she struggles with the personal consequences of her research beautifully illustrates that Emily has forged meaningful connections between our class content (the importance of scientific precision) and the ethical ramifications of that content as it relates to research on humans. Indeed, during my thirteen years of teaching biology at Clemson University, I have never seen this kind of emotional connectivity between content and ethics emerge from a standard essay or term paper, making me think that working from the “spec-

tator” role when writing poetry gives students a better way to personalize science.

A second poem from the 2001-02 class takes a more tongue-in-cheek view of another controversial topic in biology, the issue of cloning. After lectures and discussions on the theory and practice of cloning, including how an uninformed public can hysterically misinterpret the potential dangers of this technology, Jennie Kill chose to further explore this idea in her poem “Geneticists on Parade”:

**Cloning is not something that we should be afraid of
All of the unfounded fears, when analyzed, seem quite
stupid
Women will eradicate men (don't push it, boys)
We will be the same, and wear the same silver jumpsuit
(genetic fashion *faux pas*)
History's hated will be recreated and wreak havoc (neo-
nazi genetic scientists)
The clone will be subjected to undue stress (having a
supermodel's body is such a drag)
The clone will be a deviation of nature, a soulless freak
(someone tell *that* to Luise Brown)
Scientists will create animal monsters that will kill us
all (Ahhh! Attack of the super lactating cow!)
Now really, is there such thing as a mad scientist?
A crazy genius plotting in his basement laboratory
To create the ultimate killing machine from some
dinosaur DNA and paper maché?
Ignorance gives rise to irrational fears.**

I like this poem because it shows how a solid understanding of science provides a useful counterpoint to the public (mis)interpretation of science. When compared using Jennie's parenthetical style, “what is” and “what might be” are seen as the products of different, yet interconnected worlds of objective analysis and personal interpretation. Her humor, exaggeration, sarcasm, and playfulness also make the poem fun to read. Jennie's poem shows clear evidence of understanding our class discussions about the unlikelihood that malevolent despots will clone new armies, or that dangerous organisms such as super-lactating cows will soon appear and take over the planet. The imagery also extends to examples that Jennie found in her personal research on the topic (e.g., the reference to one of the first successful test-tube babies,

Luise Brown, who critics suggested would grow up to be some moral abomination due to the process by which she was conceived). This connection to examples beyond our classroom discussion suggests a high level of critical thinking on Jennie's part, and points to her desire to formulate a complete personal picture of this topic. From poems like these, it appears to me that my students are learning to make well-reasoned personal judgments based on what both science and ethics have to say about a controversial topic. The ability to retain scientific information in its proper context, and to see links between science and the political or social agendas of various special interest groups, is an extremely valuable lesson for students to learn.

When asked to reflect on how they valued their poetry-writing experience, my students expressed an almost universal enjoyment, with many indicating that they had learned a great deal more about science from this process than they had thought possible. Many had initially doubted that poetry, which they perceived as an emotional commentary on life, could accurately portray the fact-laden nature of science. Over time, however, most came to recognize the numerous links between science, ethics, morality, and other issues, and that science as a human construct cannot be viewed independently of its social context. A number of students commented that they would never again look at a "scientific" issue the way they used to (i.e., isolated from "non-scientific" factors in life). Their comments also revealed an understanding of the importance of critical thinking, since the poetry writing assignments required them to consider important issues in science from a novel perspective.

To return to our original question, why *should* a biologist use poetry writing as a teaching tool? For me, the answer is simple. We need better science education, and a growing body of literature shows the value of using language arts to help students build connections between science and society (Century *et. al.*, 37-49). I now add poetry writing to the list of valuable linguistic tools that help students construct meaningful scientific knowledge in a social context. Poetry allows students to step out of their usual role as participants in scientific endeavors and to become broad-thinking spectators who develop personal perspectives on science and its connection to other areas of human enterprise.

Learning about Literature by Writing It

Art Young

When I teach a literature class, students are required to write poetry in response to the literature they are reading. In asking them to do so, I have eight goals for students: 1) to experience literature as producers as well as consumers; 2) to read poetry carefully and imaginatively; 3) to gain new understandings and perspectives about how poetry works; 4) to develop a personal connection (feelings and values) to the literature they are reading; 5) to pay close attention to the possibilities of language; 6) to express voice and to make discoveries about their own voices; 7) to behave as writers serious about the writing they do; and 8) to surprise themselves, each other, and me.

In spring 2002, I taught “The Romantic Period,” a course devoted to British writers at the end of the eighteenth century and the first half of the nineteenth. After we read selections about slavery and the slave trade, including narratives by former slaves Olaudah Equiano and Mary Prince, students wrote a poem in response. A particularly effective and engaging example is this poem by Tara M. Hanshaw.

interracial
strong sable hands,
luminous white smile like
in my third grade textbook
(black face-rags-crosshatched back)
the green eyes he borrowed
from that white man with the whip
lifetimes ago,
the man that (beat) (raped) owned
the ghosts that still dwell
in those eyes-
so forgiving of my flesh (so pale)
and of my father's forbidding nudge
and silence,
the hard stares of strangers
(colors don't mix)
pointing fingers, good ole boys snicker,
flags flutter in the southern winds-
but the warm hugs from his mama
who lets me call her such,
the acceptance of his family,
the dinners to which i am invited

**and the ones (at my parents') where he is not-
who is savage?**

Times have changed

(we are free!)

but we are still slaves to

the oppression of ignorance,

the bigotry that claims

his filthy darkness taints my

innocent clean whiteness

where he clasps my hand

protectively,

with love.

(to be silent is to endorse it)

Tara's poem and those of many of her classmates moved me. Let me see if I can explain why, knowing as I do that a prose analysis does not fully capture a poem's essence. And let me do so in a way that does not critique the poem as a creative writing teacher or literary critic might, because like my colleagues in psychology, biology, and humanities, my purpose for this assignment was to give Tara a writing-to-learn opportunity about the disciplinary content we were studying, not to provide her with direct instruction and feedback on how to write better poetry. Tara uses sophisticated poetic strategies not necessarily available to all of her classmates, for example, a monologue with an internal dialog in parenthesis, and in doing so she displays imagination, personal engagement, and the close attention to language that I want to help develop in all of my students as readers and writers.

Tara's poem describes a contemporary interracial love relationship to which a white woman's parents are opposed, even hostile, while the black man's family is accepting and hospitable. The tale unfolds through the speaker's reflections, memories, feelings, and thoughts about race and interracial relationships. There is a historical emphasis with "Times have changed" —the black man is descended from slaves and apparently conceived in interracial violence "whip," "(beat) (raped)"—the white master raping the black man's ancestor. This historical reference connects the present reality directly to the slave narratives we had been reading. One subtle irony of the poem with its complex thoughts and feelings is that the black man whose ancestor was conceived in hatred and violence represents love.

I like the visual portrayal on the page—the way lines are arranged and the movement back and forth in time and then a movement to the future—where we, ironically, are still slaves (“not free at all”) to that bigotry “that claims his filthy darkness”—a reference to her father’s voice or that of the dominant white southern society. The last line “(to be silent is to endorse it)” is richer in ambiguity because of the textual representation. The speaker of the poem, in one sense, is speaking out against racism. Yet, why the parenthesis that implies this sentiment is an aside or a kind of silent dialog?

The poem draws me further into interracial experience through color imagery (black, white, green, pale) and “hand” imagery. Strangers stare and “good ole boys snicker” because “(colors don’t mix),” and that’s what her parents’ apparently say with their “silence.” But the truth is that colors do mix—his sable hands and white smile and their hands together “with love” at the end demonstrate that. His clasping of her hand “protectively” is ironic and profound within the context of this poem, for elsewhere the hand imagery is associated with white bigotry and violence, the hand that smacks the “whip” during slavery and the “pointing fingers” on the hands of contemporary racists. He protects her with love, but there is no escaping the “ghosts that still dwell” in those green eyes and the racial hatred and history that infuses and complicates their lives. Thus the poem begins with black/white imagery and ends with the irony of her “innocent clean whiteness” and “his filthy darkness,” ironic because at times the white in this poem symbolizes hate, violence, and separation, and the black (he and his mama) enact community, love, and unity.

The overall impact of Tara’s poem on me is compassion for the interracial couple living in a racist society. I have been invited into a world not my own as created by this poet, and I have been asked to consider the legacy of slavery on contemporary race relations from a new, immediate, and intense perspective. My understanding and my empathy are renewed and enlarged by this student’s insight. Within the context of this course on British Romantic writers, the poet William Blake in “The Little Black Boy” provides readers with a similar experience, creating a dramatic situation in which to explore and express the often invisible toll racism takes on human aspirations. Such writing is the work of poets, whether the famous William Blake or the Clemson

student, Tara Hanshaw, and this is a key point I want my students to learn and to experience through their own writing and our collective reading.

Some students in the course responded to the readings by creating poetic monologues set dramatically and historically in the time of slavery. In “Woman of the House,” Kimaris Toogood writes from the point of view of a plantation wife whose husband brings a slave “domestic” into the home to do housework, but then favors her and fathers children by her, as the plantation wife deteriorates into hatred, jealousy, and drunkenness. The poem ends “I have not given my husband an heir, his name will not live on./But his blood will.” Chris Epting writes in “The Song of the Waves” from the perspective of a slave entrapped on a ship during the Middle Passage—dreaming of his wife left behind in Africa: “And when the salt water mingles with the air,/I shall breathe deep of you and hope that somewhere you are breathing me in also.” Janice Holmes in “Tea at Bellamy’s” writes from the point of view of a slave domestic expressing her anger at slave owners who believe they are doing God’s work by bringing Christianity and western values to their slaves. This poem ends, “They say the sun never sets on the British Empire,/I hope that the sun sets it on fire.”

This ensemble of student voices resonates against one another and against the Romantic Period literature we are reading, thus creating for many students a richer personal connection and communal experience with literature, both canonical literature and the insightful, moving literature the students themselves are composing. Tara reinforces this connection when she writes in a reflective essay: “I have truly enjoyed the experience of expressing myself through poetry and in reading the poems of classmates. It gives each of us a voice and a chance to write of our own experiences, opinions, and emotions instead of simply reading and memorizing parts of others’ writing.” On the first day of class, Tara had responded to a prompt asking what contributions she planned to make to the class. She wrote: “I am pretty shy. Even if I don’t speak much, please know that I am paying attention.” And she was true to her prediction, not participating in class discussions, but obviously paying attention, and eventually contributing to our collaborative learning through the poetry she wrote. Her poetic voice is strong and confident, and it surprised me and others accustomed to her silence. Kimaris

also surprised herself as well as the rest of us. On the first day of class, she had written: “I am not a huge fan of poetry: writing or reading.” Two months later, in a reflective essay about her poem “Woman of the House” Kimaris wrote: “I had originally had several drafts of this one poem because I was writing it with divided opinions about the tone of the poem. But once I opened up to the idea that I was to put more of me, unedited, into the poem, it flowed like a river. The result was a piece that I truly admired, even stuck it on the Fridge!” As I reread the poems and the reflective essays my students wrote that semester, and as I glance back at my eight goals for the poetry assignment, I am persuaded that these goals were fulfilled by the poems Tara, Kimaris, Chris, Janice, and their classmates wrote.

Finding a Voice in Modern Art: Poetry in a Humanities Class

Catherine Paul

On the first day of my interdisciplinary humanities course “Museums in Twentieth-Century Culture”—a general-education class—I often ask my students to name a museum they have visited and what they found interesting about it. Every time, there are several students who have never visited a museum. As the semester goes on, other students gradually reveal that they hate museums, especially art museums—they find them intimidating and don’t know how to understand art, especially modern art. Readings, writings, and discussions help them determine where that dislike comes from. We use the ideas of Carol Duncan to consider museums as ritualistic spaces, where citizens go to see how their culture understands itself and to participate in highly structured activities that enforce that sense of self (88-103). We use Eilean Hooper-Greenhill’s writing to discuss how museums, like many cultural institutions, present theories as though they are the only way of understanding the world. My students find that her presentation of older paradigms of science demonstrates that our paradigm is but one way of understanding the natural world, and by trying to see through the eyes of older museum designers—those from the seventeenth century for instance—they discover the limitation of their own era’s vision. Through these discussions, the students start to see how museums’ presentation of art, science, culture, and nature is constructed to create certain experiences and preclude others,

and that often the intimidation that they thought was their experience alone was deliberately built into traditional museums' appearance—high steps, large columns, and artworks on pedestals.

My students' reactions to poetry often involve some of the same intimidation. Many have learned that reading poetry means searching for "hidden meanings," and when they cannot find meanings as insightful as those other students or their teachers discover, they conclude that they are "not very good at poetry." Or alternately, they have come to believe that a poem can mean whatever you want, and so conclude that the activity of reading poetry is a frustrating free-for-all, where they make up something the teacher likes, and so get an A.

In teaching poetry about museums in the context of a museums class, I want my students to see the connections between these two cultural institutions. William Carlos Williams's poem "History" (1917)—which describes a visit to New York's Metropolitan Museum of Art in which the speaker imaginatively conjures the spirit of an ancient Egyptian priest buried in the sarcophagus at which the speaker is looking—is useful here. "The steps of the museum are high," Williams writes, continuing, "Worshippers pass in and out," thereby emphasizing how museums and temples both assume cultural ascent as part of their purpose (81). We can talk about the plot of the poem—what happens to the speaker inside the museum, why the setting of the museum is important, and how the structure of the poem makes the reading experience something like visiting a real museum. This activity, however, usually starts with a high level of intimidation: many of the students don't get Williams's poem right off the bat. That feeling of *not* understanding means that some students stop at the intimidation and don't ever get into the poem far enough to question why they feel intimidated. While some followed me to my making of this parallel between museums and poetry, many lost interest far sooner.

By writing their own creative assignments, however, students have come to these new understandings themselves, in part because the act of writing poems demystifies poetry. Before returning their poems to them, I read a few aloud, and we talk about what is interesting in them. Even those poems identified as fine fulfillments of the assignment are not as intimidating as professional poetry is. For instance, I read

“Viewing Modern Art” by Talgin Cannon. The class had been studying the works of Marcel Duchamp, including his *Fountain* (1917), which he made by tilting a urinal on its side, and signing it on the bottom right with the pseudonymous “R. MUTT.” He had entered the piece in an exhibition that claimed to be “independent” in order to show that even exhibitions such as this were deeply invested in the established notions of taste of the artistic mainstream. The assignment had been to write a poem responding to Duchamp. Talgin wrote:

**Wow, look at that
It appears to be a hat**

**Oh no no no no
It appears to be quite flat**

**Is it an animal or a person
Is it square, triangle or circle**

**I think it looks good
Oh you would
But you can tell it's not good.**

**What?! What do you mean?
Oh man, can't you see
That's a piece of toilet bowl
And it doesn't even gleam.**

**There is one thing thou shalt not fear
That modern art is quite weird—
Also you can be exact
When people question, What the hell is that?**

By focusing on the experience of viewing modern art rather than an interpretation of that art, Talgin can step back from Duchamp's piece to contemplate his own irritation at the work's impenetrability. Talgin's playful tone and use of rhyme correspond to Duchamp's own play, and they lighten the expression of his lingering confusion about what makes *Fountain* “art” instead of a urinal. He uses the “thou shalt” of commandments to amplify the consolation he gives himself and others. The poem seems really liberating, because it vents his frustration with people who claim to like this art.

It would not be possible to move on to more complicated questions without first venting that frustration. He has come away from his new encounter with modern art with a clearer sense of how his world has shifted than if he had not written the poem.

When I read this poem aloud in class, students laughed, identifying with the frustration. One student said she had thought poetry was supposed to be serious and about feelings, but Talgin's poem, while neither of those things, captured her own troubles with modern art; it made her rethink how poetry could work. Another student commented that "Hearing work done by other students opened up some other approaches." Seeing and hearing the teacher take student poetry seriously creates a more comfortable environment in which students can *believe* a teacher's invitation to safely take risks in their writing. Another student, who did not turn in a poem for the first assignment but did for the second, wrote in response "This time writing the poem was a different experience because I actually did the assignment. After hearing some of the other poems I didn't feel as ridiculous. I guess I thought since I really don't write poetry all that well I didn't want to write something that would make me look ridiculous." Hearing the poems of other students, and hearing students say they enjoyed the humor, the irreverence, and the expression of shared emotions, gave hesitant students a way to voice their concerns. While the poetry assignment in itself is a useful creative exercise, repeating it, and thereby allowing students to gain courage from the discussion of the first poems, draws out far more voices than might otherwise speak. It does not matter whether the poems fit critical definitions of "good poetry": a poem can be a great success for an individual student or for the entire class because it suggests topics for conversation, creates mutual understanding, or stretches beyond previous boundaries.

The in-class exercise springing from the poetry assignment consistently encourages previously silent students to speak. Sometimes, as in Talgin's case, a student whose poem was read aloud feels more comfortable voicing ideas. Other times, a student who saw interesting things in a classmate's poem when it was read quietly in a small group, then finds a voice to express these discoveries to the class. And sometimes a student is emboldened by a combination of the two. For instance, Jenny Jackson wrote in her first reflection,

“Initially I was hesitant about writing the assignment because in the past I have been rather ‘poetically challenged.’” She notes, though, that once she got going with the poem, it built itself—but she closes by saying “I just hope we don’t have to read these out loud!!” I feared her dismay when I read her poem aloud as one that was particularly good, even though the author was not revealed. She had written:

**Looking at a painting;
What does this mean to me?
What does this mean to the artist?
Was he cold like me when he created this marvel?
Was he hungry?
Was he alone?
I am cold.
I am hungry.
I am not alone, though, when with his work.
So whose art is this?**

She moves quickly from imagining the artist to examining her responses to the art, suggesting that the artist and the viewer create the artwork together. For students just learning to talk about what they see in art, finding connections between their own world and the seemingly foreign world of an abstract or ancient artwork can be a challenge. Here she speaks of the humanity she shares with the artist, and that expression lets her take ownership of her observations and of the art. Jenny’s poem concisely expresses how she relates to art—its fifty-three words convey a tactile sense of her connection that would be nearly impossible in prose. However, it does so without rhyme or regular meter, and that freedom inspired other students. Her own reflection, quoted above, shows how the process of writing the poem freed up creative parts of her that had felt intimidated by her expectations of what poetry should be. During the discussion of these poems, she commented that poetry and museums are alike in how they ask people to respond, and that both can be intimidating at first, but exciting once you move past that intimidation. *This* was the point I had wanted my students to reach, but we reached it at an unpredictable time and because of a connection a student made on her own and felt newly empowered to express. Jenny, who in her reflection had sought reassurance that she was not “poetically chal-

lenged,” got that reassurance from hearing her poem in discussion. Once students find their voice, and as long as they are encouraged by the teacher, they rarely lose it again.

It is not surprising that these moments of insight and empowerment come from creative writing. “The writing was more like creating artwork myself than writing a paper just talking about something,” wrote Lee McKie, a student who consistently did strong work but rarely talked in class. “Though I’m not a good poet at all, it still felt like the creation of art.” Creation more so than critique allows students to feel that they are working with the artists studied to express ideas. Neither, however, is it surprising that these moments of creative insight came in discussions of early twentieth-century avant-garde art, whose creators themselves challenged museums, which they found oppressive, better for entombing dead things than for artistic creation. Artworks that challenge demonstrate to my students that even such lofty institutions as museums and poetry are not untouchable, and their own attempts at creation bring them into dialogue with these artists and institutions. One student, Jason Snelgrove, a biology major, created for his final project an interactive web museum where his poetry showed visitors how to understand art. For some paintings he included label-copy-like text about the work or artist, but for others he inserted his own poems—some written for the class assignments, and some extras created specially for his museum. For instance, by clicking on an image of Marcel Duchamp’s *Nude Descending a Staircase* (1912), a visitor can access Jason’s poem:

**Watch her rush down the staircase.
No, she pauses. She stops, she isn’t walking.
Is she talking?
No, she can’t—she has no time.
She must continue her descent.
So much ado over today!
Everyone is awaiting her presence.
The debutante enters her ball.
Startling, she’s naked.
Did all the preparation pass in vain?
No, for I see she is aware of her new state.
She appears to have recently shaved her legs.**

This poem, like Talgin's, picks up on the playfulness and irreverence in Duchamp's artworks, but it uses them to create a new way of seeing the painting. The nude in the painting becomes more human and more approachable because of the final detail of the leg-shaving. The poetry assignment had opened a way for Jason to respond to art, and his web museum may have grown in part from that creative in-class experience. By placing his poems into the same spaces as the artworks to which they responded, Jason created a context in which writers and artists and visitors could interact, and in which creative responses are as valid and important as factual or historical explanations. Like the other students who made literary artworks, Jason had become an artistic creator, even a writer. Whereas students rarely think of themselves as writers after completing an assigned research paper, making a poem allows that identification, leaving them more empowered to express and take seriously their own ideas.

Conclusion: Why Poetry?

In our analysis, the four of us found that when students write poetry in response to a specific assignment carefully constructed to fulfill a course goal, under the tutelage of an encouraging teacher who makes students feel "safe" as they compose and share, most authors do express fresh perspectives on disciplinary knowledge and develop better understanding of the multiple purposes, connections, and contexts for that knowledge. On many occasions we also found that students discovered alternative language to express their ideas and values, thus broadening their use of language as a communication tool.

But why poetry? We feel confident that other forms of creative writing composed in the "spectator" role, such as short stories and plays, would also provide students with similar opportunities for learning and expression. However, poetry's intensity of language and succinctness allow for pedagogical use in the disciplines in ways that longer and more time-consuming writing tasks do not. The students' poems quoted in this article, with the exception of the two from the biology class, were assigned as brief, daily homework assignments. Students are free to spend as much time writing them as they wish—and undoubtedly some writers spend less than ten minutes and others spend an hour or more—but the choice is theirs. In some cases, teachers set limits for sub-

mitting poems—a minimum of ten lines but not longer than one page. Because the quality of a poem is not commented on critically or graded, teachers can set parameters on their own reading time as well. As previously mentioned, the purpose of these assignments is not to teach the students to be better poets but to provide opportunities for them to engage the content in meaningful ways. And short poems, like the ones presented here, can easily be read aloud to the class to enhance perspectives and collaborative participation on the content being studied.

For many students, creating a poem provides a way into disciplinary discussions in which the writers' own poetic language engages, recasts, and critiques disciplinary knowledge without having to conform to the conventions of what to them is an alien discourse. Instead of relying on discipline-specific diction, students construct metaphors—making cornbread, a batter striking out—that use common experience to understand complex phenomena. And instead of adopting a reverent attitude toward academic subject matter, students use poems to employ a more casual or “lowbrow” response. For other students, who “know” the formula when they are required to write a lab report or book review, composing a poem occasions disequilibrium because they have learned to mimic the prose of familiar “school” discourse, and now to write poetry they must rethink both form and content. As one colleague told us recently in describing the usual academic writing of such students, “they just go on automatic pilot.” Yet many of these students, both the novices and the automatic pilots, respond enthusiastically to writing a poem on an academic topic. As teachers, we seek to provide these inexperienced poets with writing tasks that are unpredictable—tasks that keep writers off balance and tend to shut down the automatic pilot.

For example, when people write poetically and express their ideas and values about science in non-scientific language, freedom from scientific discourse creates opportunities for writers to make personal connections to what they are writing about. Putting themselves in another's shoes, they achieve informed empathy, compassion, and a wider sense of science's ethical implications. Writers are free to invent their own poetic language in order to find fresh insights into their learning as well as imaginative and innovative ways to communicate with others. They demonstrate a

less sterile sense of the material addressed, relating their own emotional investment or enjoying a humorous response. Writers take the unfamiliar knowledge they are learning in the class and attempt to integrate it into the familiar—that is, integrate the new knowledge into what they already know—and thereby assimilate, enrich, or critique the new. From this integration they might clarify science’s relationship to daily life, imagine the experience of mental illness or slavery, or identify the strangeness of modern art. Some students tell us they think of themselves as “artists” and “writers” after they have written poems in the disciplines. They do the work of poets and thinkers—not just study how others do such work. They develop a voice that emerges from their “spectator” role writing—a voice distinct and often more fully engaged than the one they typically employ in biology, psychology, and other classes. This voice speaks with authority about new understanding and invites its listener to partake of its discovery.

As teachers, we see these poets creating knowledge using course content and context, sometimes with startling originality. In writing poetry, they usually do not simply reproduce what they have heard in lectures and read in texts. This quest for originality is why when we read a student’s poem that we believe to be insightful in its perspective and use of language, we find ways to share it with the rest of the class. Such sharing is why we ask students to write at least two poems during a semester, since students perceive many new and creative ways to express themselves after they have seen and heard a myriad of possibilities from their classmates’ first poems.

Poetry assignments strengthen the teaching-learning environment of our classrooms. As we or the authors themselves read their poetry to the class, listeners respond with laughter, awe, thoughtfulness, empathy, questions, and applause. Poems are sent to parents, posted on refrigerators, entered in contests, published on the web and in literary magazines. Students converse with other writers and artists, thereby becoming creators and not just consumers—and, after initial hesitation, they enjoy it. Writers surprise us, themselves, and each other. In some cases, as with shy students, we view them differently after reading their poem, and in doing so our expectations change. Most of us, teachers and students alike, feel that we have a more complete picture of

the human beings who are our classmates, and this understanding enhances our other academic work in the class.

All of these aspects of students' experiences with writing poetry in the disciplines speak to the successes of poetry writing as a pedagogical tool. The consistency of our findings—despite disparate disciplines and learning environments—has allowed us to generalize about how poetry writing enhances learning across the curriculum. And our findings have become the basis of our work to provide other faculty with models and approaches to using poetry in their own classroom. We will continue to make poetry assignments that provide opportunities for creative thinking as well as critical thinking. We are considering broadening PAC to include performance, visual arts, and new media. We are even imagining ways to broaden the project beyond the current twenty-four participants to include many more faculty, thus making PAC an integral component of our university-wide, communication-across-the-curriculum program. Ideally, writing poems in courses across the curriculum will no longer be an esoteric activity but an important influence on student learning and campus culture.

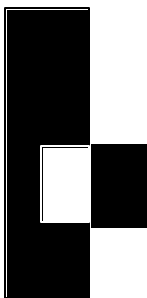
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Endnotes

- ¹ An earlier version of this paper was presented at "WAC 2002: The Sixth National Conference on Writing Across the Curriculum," Houston, Texas.
- ² We would like to thank our students for permission to quote them: Jack Berno, Talgin Cannon, Chris Epting, Laurie Gambrell, Tara M. Hanshaw, Emily Hertzog, Janice Holmes, Jenny Jackson, Jennie Kill, Maureen McHugh, Jason Snelgrove, and Kimaris Toogood.



Poetry's Place and the Poet's Participation with Fields of Knowledge

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Does poetry writing have a place in writing across the curriculum? If so, what place? What is poetry, and what does it do that might make it valuable to learning academic subjects?

Although the writing-across-the-curriculum movement has demonstrated the effectiveness of expressive and transactional writing to assist subject matter learning, poetic writing remains nearly absent in classrooms and research studies. Yet, when the first theorists of discourse in composition—James Britton, James Moffett, and James Kinneavy—worked out the theoretical models for discourse that became, and remain, central to the research and teaching of writing, they included poetry (in its broad meaning of all literature) as a major mode and function of discourse. These and other theorists and researchers advanced arguments and evidence that poetry offers learners a way to imagine (and to image) through sudden global insight, to organize their experience, and to connect new knowledge to other areas of knowledge; yet, their appeals for poetry's place in a full curriculum have been only rarely heard beyond the elementary school level. Why this neglect? In an essay published in 1983, "The Relation of Thought and Language," Janet Emig demonstrated that even English curricula, as rhetoric and writing textbooks have given evidence since Hugh Blair's first (1784) text, have suppressed creativity. She concluded that the problem was a view of language solely as a "vehicle of communication" (Emig 35).

Since then, some degree of creativity has been restored to composition textbooks, but at the same time literature has become increasingly separated from the teaching of writing, research, and theories on composing. *College English*, for example, no longer publishes poetry or creative non-fiction.

And poetry written by students has suffered the worst neglect, by-and-large complete dismissal. In a summary overview of papers by top scholars envisioning the future of the field and presented at the Composition in the Twenty-First Century Conference, Lynn Z. Bloom critiques the almost total lack of concern for creative writing by the leading scholars in composition studies (276). Shirley Brice Heath's essay in that volume is the only one to present research on teaching creative genres. Reporting on two separate studies of adolescent writers and adult writers, Heath found that people frequently seek out and value creative genres in preference to "gate-opening" genres that lead toward economic advancement. She predicts that writing curricula will inevitably include a wider range of literacy practices that engage the fuller dimensionality of human existence.¹ If she is right, we will see a change in the current state of values Robert Scholes has described: the academy values consumption over production; students are consumers of what others have produced. Even in English departments, the status of the expert writers of literature is far below that of the consumer professionals—the historians, theorists, and critics. If student compositions have little value in a consumer-oriented discipline, even less value accrues to student poetry, which is the least valued sort of production. What Emig noted 20 years ago remains too often the case today: "Too often . . . the teacher [is] interested chiefly in a product he can criticize rather than a process he can help" (92-93).

The perception of language as communicative tool still holds sway and remains the central roadblock to understanding the value of the poetic as a process that assists learning. Despite two decades of theoretical work and research on social constructionism, deconstruction, and other post-structuralisms, the view that poetry is a distinct *kind* of language has been replaced only by a prevailing view that it is a subcategory of rhetoric, and this new perception has served to propel poetry further to the margins of the educational system. Poetry has come to be seen as yet another tool for representing—for conveying—the suppression of individuals through cultural systems. This view serves to disguise an older, and still current, view: poetry is self-expression; poetry merely reproduces what already widely exists; poetry conveys nothing new of knowledge value to a community. On the other hand, if writing is seen as a *process* for discovering

and developing thought, the processes writing poetry activates engage *both* a fuller, more expansive discovery and development in which the individual actively learns something new. Because poetry remakes reality, it cannot be a mere tool of communication. The chief value of poetry in learning is its capacity to alter the old by incorporating new organizations of reality through a thoughtful participation with and across domains of knowledge.

In this essay, I want to present the case that poetry has an important place in learning precisely because it enables this remaking of old constructs of knowledge into new organizations. Poetry is actively *participatory*, engaging the writer in crossing boundaries among fields of experience and knowledge, breaking these into parts, selecting elements from constructs and rearranging them in new patterns of connection in and across fields. Poetry-making has had this function historically from its earliest recorded times, and it retains this renewing function. This creative, reordering, renewing capacity makes poetry valuable to learning across the disciplines.

As James Britton's theory of discourse functions has been the central model applied to writing across the curriculum (Fulwiler, *The Argument* 23-24), it seems most useful to consider how his category of the poetic has hampered poetry's value as writing to learn and how this category can be revised to define the literary as a mode in which learning happens. Particularly at issue is Britton's naming the role of the poetic writer as *spectator* and placing poetry on a pole opposite the transactional in which the writer is *participant*. Britton's view suggests the writer is relatively passive, stepped back from specific reality to gain a global view. However the writer is not passive; the writer (and the reader of the poetic) actively participates in construction of a view of reality. To develop this point, I will first consider what Britton had to say about the poet as maker in the spectator role. Second, I will trace a brief history of the poet as a re-maker of knowledge. Third, I will consider how relevant contemporary literary theory, particularly the phenomenological and anthropological work of Wolfgang Iser, enables a view of the poet as re-maker. Finally, I will return to Britton to consider his writing on the spectator function and conclude with implications on the value of the participatory role of the poetry writer to learning in the disciplines.

Britton and His Context: the Poet as Imaginative Player, Thinker, and Maker of Order in Language

The first theorists of discourse in the contemporary field of composition were engaged in the task of carving out a paradigm that could ground English in the manner of scientific disciplines. For Britton, as for others, the theory of discourse presented by Roman Jakobson at the Indiana conference on Style in 1958 provided the first such formulation, as it laid out a model of language kinds and functions not restricted to but including poetry. In his conference address, Jakobson was interested in locating the field of poetics within linguistics; as a result, his theory, and those built from it, distinguished the nature of discourse functions as *kinds* of verbal expressions. Jakobson divided discourse functions into six kinds, which were based on six constituent factors of language: context, message, contact, code, addresser, and addressee. All of these, he said, were found in every instance of speech, but one dominated in any speech instance (353). When the poetic function dominated, the kind of discourse was poetic; when the context was dominant, the discourse type was referential; when the addresser was dominant, the kind was expressive discourse. Of the six kinds of discourse based the six dominant functions, these are the three that became most important in Britton's theory. Jakobson asserted that the poetic occurred in all discourse acts. He defined the poetic as a free play of pattern-making: an imaginative play (not held to restrictions of "reality") made into ordered structures. The mode was marked by a high enough density of patterning that it called attention to language, to its madeness, to the materiality of construction dominating its representational and communicative functions. Tzvetan Todorov reaffirmed Jakobson's field definition and research direction in 1982, stating that poetry may be used by other disciplines, but the study of its semantic, verbal, and syntactic aspects were the territory of poetics (8). Poetry can be used in all disciplines because it presents existing views in dialogue with new views of all aspects of human concern: from politics to the natural world. Past, present, future; actual, imagined, and potential: all may be found and studied in poetic texts.

In 1953, Britton recognized poetry's broad and deep relation "to life itself," calling poetry a "strong instinctual drive." Poetry is "an interpretation of experience . . . a penetration of experience, not a mere purveying of a distilled essence, or

key formula, or a mathematical solution. There is something in it of a *reconstruction* of events—and yet an *ordered reconstruction*” (Britton, *Prospect* 21; emphasis in original). In the next three decades, Britton expanded and refined his definition of the poetic as construction, or *making*. He came to view the maker as primarily a “spectator,” an “onlooker”; following D.W. Harding’s work in psychology, Britton emphasized a stepped back, passive looking instead of the active constructive aspects of poetic activity. Britton was attempting to distinguish the social place of transactional writing from the poetic. And although Britton’s discussions on the mental activity of poetry-making clearly show regard for its active nature, the term “spectator” that he settled on conveys neither the activity in consciousness nor the activity of re-making social/ cultural knowledge that is helpful in understanding how poetry writing involves acts of learning.

A Brief Historical Overview: Poetry's Place in Society and Culture as Remaking Knowledge

Poetry has played many roles in different cultures at different times, but one constant is its capacity to reorder structures of knowledge and experience into new orders, re-forming the old when new circumstances and experience require changes in knowledge. Poetry is a social institution in the wider culture beyond educational institutions and existed long before formal education. Before the development of written technology, knowledge was held in rhythmic chunks and narrative paradigms, which made it possible to remember information and ideas more easily. Knowledge was passed on when the oral poet re-assembled the chunks into verse form using paradigmatic outlines. Oral poets did not remember whole texts word-for-word but rather pieced parts of text together. The oral tradition of composition made incorporating change in knowledge—updating it—easy because the verse makers would incorporate new elements and leave out old. For centuries after the advent of writing, poetic forms remembered and supported the values of a culture while creatively renewing them. Poetry was a people’s literary store, which held communal patterns of identity and values embodied as narrative and the metaphors out of which narrative is spun. The literary store gave models of understanding and action-guides to make coherent sense of self and society’s fit in the world. The pleasure that poetic forms gave came to be re-

garded as force impelling acceptance of values and views presented in literary models; rhetoric and poetry were conflated until the Romantic period two centuries ago. That critical point in history coincided with the rise of modern science, which had by that time overtaken and supplanted a major aspect of poetry's traditional community and cultural function. At the same time, a critical shift occurred in the relationships of individuals to society, marked by the political revolutions in America and France. Poetry became more centered on individual expression, value, and views of the world. Poetry came to be a locus of the individual's envisioning new relations to the natural world and to social institutions (economic, political, religious, family, intimate couple, etc.). But poetry is not primarily a private art, even though it may be written and read primarily in private. Poetry's function of binding an individual to society and culture remains. What has shifted from previous times—and it has been a gradual shift—is the function of poetry as a place for the individual to reconfigure the binding relations in our present circumstance of rapid change and collision of cultures.

As a social institution, poetry serves to mediate between the culture and the individual. In poetry, the writer has a great deal of control in this mediating. Three institutionalized aspects support this control. First, poetry is a mode in which the writer may bring the whole of life—all knowledge, all contexts, and all dimensions of the person—psychological, intellectual, imaginative, emotional, moral, spiritual, even the physical as the breath is used in rhythmic organization and as the emotions begin in bodily sensation. A second aspect is that poetry is a zone of imaginative play, potential, and possibility, where new thoughts arise and are ordered in ways that renew the individual writer. Potentially, poetry may renew culture if a sufficient number of readers experience changed views through experiencing the new configurations available in the work. The third aspect is that poetry assumes a constructed speaker (often called a *persona* in the last 100 years) and addressee; the speaker and addressee inside the work are assumed not to coincide with poet and hearer/reader. This condition sets up the zone for imaginative play—a place for *what if?* What these three aspects mean for writing across the curriculum is that learners know they can draw from a rich knowledge base, play with possibility,

imagine the new, fit the new and old together, and make an ordered construct in which they relate themselves to something larger—the self to other fields, for example, to a body of course material, to a discipline, to other areas of culture and other aspects of his or her own life.

Contemporary Views: The Poet as Maker of Connections Between Self and “Fields” of Knowledge and Life

During the past 20 years, researchers and theorists working on identity issues in many disciplines have come to a consensus that one major aspect of the literary–narrative and its undergirding metaphors—is that it serves to form identity. Narrative is the vehicle by which individuals make their identities—their sameness and distinctiveness—in a community of others. The process is two-way: available cultural forms and materials make the individual, but the individual by making a narrative helps to remake—renew—culture (Habermas 136-7). Charles Taylor finds, in the loss of the grand heroic myths, a loss of the “enchantment of the world,” which spelled the loss of connections between head and heart—between reason and the political, emotional, moral, and spiritual dimensions of life (3-4). The major imaginative framework for understanding one’s connection to the world—for one’s meaning-full place—was lost. Of the literary genres, short story and novel rely most heavily on narrative, but poetry has additionally significant lyric dimension, reaching out-of-time, beyond boundaries, toward the unknown, in a global direction in contrast to narrative’s linear movement and structure. (Pure lyric is extremely rare.)

A clear view of poetry’s constructing operations and value is presented in Wolfgang Iser’s phenomenological and anthropological theories. In the 1970s, Iser developed an interpretive practice and theory of aesthetic response which he termed “a process of re-creative dialectics.” Text, author, and reader are the three participants in re-creative interaction. The text is a “reformulation of an already formulated reality, which brings into the world something new that did not exist before” (Iser, *Act of Reading* x). An extension of Jakobson’s value of the poetic function as an interplay via selecting and combining elements in new patterns, for Iser the literary is an interplay of patterns of the real into possible new organizations of the real, a dialectic mode since the patterns of the real and the potential interact with readers causing them to

notice and break down old schemata of reality. The dialectic engages a critical looking and potential changing of views of the real. The world of the text constructed by the author is a set of schemata incorporating conventional organizations of the real world and of literary genres. Readers actively construct meaning from the text's schemata using their prior knowledge of them. In literary texts that are not merely reproducing conventional social, cultural, and literary schemata (such as popular romance novels, for example), the world view constructed by the author and embodied in the text presents a critique of conventional schemata by setting them into a new order of relationship that brings them into view against potential relationships. Readers, in the process of constructing an understanding of the text, have to change their views of the world—which is held in schemata as the real—when they assemble the new arrangements of familiar schemata, or they cannot continue to read, to make sense of the text. Both the writing and the reading of literature require acts in consciousness that change ways the world is known, that is, known in human consciousness. Thus poetry is the *remaking of old orders of the world and language into new possible orders* that distinguishes the poetic from the transactional, for in the transactional mode, the participants have to *fit into* existing, conventional schemata of the real world and language use. Both the poetic and the transactional modes require the full range of cognitive abilities—comprehending, interpreting, analyzing, evaluating, and synthesizing. However, the poetic mode uses *all* of these in a richer expanse of world and personal dimensions and uses more intensively the partially unconscious processes of pattern noticing and making, which lead to new insight and knowledge.

For Iser, literary activity is necessary to human consciousness and bears a necessary renewing social/cultural function (*The Fictive* 246). In his early work, Iser focused on the processes of individuals reading individual texts by individual authors. He noted, however, that his ideas explained an essential need and process of human fulfillment (*The Act*, xi). Iser took up this larger human function of literature in *The Fictive and the Imaginary: Charting Literary Anthropology* (1993), proposing that the poetic, or literary, is an ordering mode that must constitute a primary human drive, or it would have disappeared. The poetic is necessary because it con-

nects the “real”—communally-held organized views, or schemata, through which we see and understand the world—to renewing potential views. Iser seeks to explain how the literary provides a cultural place in which the new organization can be tried out in experience as writers connect the imaginary to the real in new orderings, and readers experience the remaking of an old order into a new order. Selections of schemata and their elements are put into a network of new connections among schemata that cause the reader to raise them into consciousness, to consider them critically, to try out new orders of the personal, the social, and the cultural—new ways of ordering and experiencing ourselves and our world. Through the reader's process of experiential remaking, a change in the schemata of the real—the organization of its elements—is brought about. The shared schemata of the real can be changed in a society or culture if enough readers experience new possible ways the world (or a part of it dealt with in the text) might be. The sense of the self and society expands through the imagined versions of self and social realities and renders them flexible to further change. The same expansion happens in a society when enough readers engage in experiencing the imagined extensions of roles; the experiencing is an expansion of consciousness.

As an example of the literary's place as interplay for critique and imagining of potential renewing versions of the real, Iser examines the pastoral genre as a place of imagined mixing of social roles. The playful disordering and reordering of class and gender schemata was envisioned in various ways for several centuries in pastoral works before the roles in actual society began to break down. At the time of the political revolutions of the late eighteenth century, the pastoral ceased to exist, because its function as a place of imagined mixing was no longer necessary. The change in human consciousness had occurred to a sufficient extent to become actualized in the real world. The example of the pastoral demonstrates how the literary “crosses boundaries” of the real, imagines them differently, and composes a new possible order for them that may become part of the real. And it is literature's position in culture as removed from immediate tasks that allows its long term, flexible work to be done (Iser, *The Fictive* Ch. 2).

Revising Britton's Spectator Role:

The Writer as Participant with Fields of Knowledge

Except for its focus on active, participatory reordering of world views and its emphasis on the literary as pragmatic, Iser's re-creative dialectic model and his tri-partite model of individual renewing of social and cultural consciousness—the real—through imaginary and fictive means—share some features with Britton's functional model of discourse. And where they depart, Iser's views offer implications for learning processes.

The distancing from immediate, pragmatic work is the central point on which Britton differentiated the poetic mode from the transactional. The spectator role provided an explanation of non-doing that allowed this distinction to be made. But the conception restrains the view of a more complete range of thought processes, in favor of the immediacy of the work's being an object of value in itself at the expense of its long-range cultural work. (I retain the word "work" here, though repetitive, to give some of the meaning of the German term "Wirkung" and because Iser emphasizes on the inadequacy of translating it as "response" or "effect," (*The Act* ix, Note 1)). Iser's model suggests that Britton's spectator role distinction fails to capture the operations of the constructing mind using language creatively for self- and culture-remaking and renewal.

Writing out of the era of formalist aesthetics, Britton is concerned with the nature of the finished individual and unique literary work in its relationship as unique and of interest "in itself" (Britton 1975, 93). Expanding and refining his model in 1982, Britton relied heavily on Jakobson and on Burkean and Kantian notions of the spectator in art through D.W. Harding and Widdowson (*Prospect* 46-58). Intent on building a functional theory of discourse, Britton emphasized the contemplative and "fine art" aspects of the poetic to distinguish it from the useful communicative work of the transactional. Here is Britton's definition of the three types of discourse:

Transactional is the form of discourse that most fully meets the demands of a participant in events (using language to get things done, to carry out a verbal transaction). **Expressive** is the form of discourse in which the distinction between participant

and spectator is a shadowy one. And **poetic** is the form that most fully meets the demands associated with the role of spectator—demands that are met, we suggested, by MAKING something with language rather than DOING something with it. (*Prospect* 53; emphasis and parentheses in original)

Clearly, Britton does see the poetic as active—as “making”: the writer of poetry lets it be, so to speak, rather than putting it forward into a situation to accomplish something specific. In light of the discussion of Iser, the following distinction can be drawn instead: transactional writing does something *in* the world; poetic writing does something *with* the world. Transactional writing has, Britton says, a “localized” context, and the poetic has a “globalized” context (*Prospect* 55). So, the *restriction of contextual area* enables transactional writing to focus on a specific situation and task therein. Poetic writing, however, because it is global, encompasses more fields of knowledge and allows a freer play among discourses. Poetic organizing crosses situational and discourse boundaries, potentially using any available fields of knowledge in the making process. Its arena is global because it is not field-dependent or restricted.

Yet global in this sense does not mean holistic. Rather, it means the participant is moving across knowledge domains, searching for fit and for new ways of connecting their elements. The writer interacts with schemata: writers participate with world views, seeing through them, out of them, and beyond them as they select out of schematic intersections new views of order (Iser, *The Fictive* 9). The interaction takes place among areas of old knowledge and new knowledge, making the writer a creative participant with the old. This participation is social insofar as the institutional role of the poetry writer is assumed to be a re-configuring of the old into new organizations. Likewise, when readers experience a literary work, they participate with it creatively because they must bring their knowledge—the old schemata, as known—and remake it as they read the text. As a process, the writer is moving among the old formations, to a certain extent below the level of conscious awareness, searching for new patterns to bring into consciousness. These may arise as whole images, configurations, or discursive structures.

The process of writing creatively can be related to the process of creating new knowledge. Martin Greenman has applied Graham Wallas's four-stage model of the psychology of new thought to the formation of concepts in philosophy. Wallas's stages are preparation, incubation, illumination, and verification. The preparatory stage is an acquisition of material and ways of using the material (processes, methods). The incubation stage is unconscious; it happens out of sight and for this reason it is often neglected in curricular planning. Incubation cannot be seen directly; it cannot be taught; but it can be allowed, and the writer can be encouraged to emerge. The illumination stage is the sudden coming into awareness of an insight, the "click" or "eureka," the experience of new knowledge comes into view—"an immediate *seeing* of something that one has not seen before" (Greenman 126; emphasis in original). The verification stage, renamed "validation" by Greenman, is also conscious; it involves checking out the insight by whatever methods a discipline uses. The entire process is cyclical in that new knowledge goes into the preparatory base to be used for further thought—a feedback loop.²

Poetic thinking and writing and transactional thinking and writing (including disciplinary) both follow this process. They differ in the areas they range over and in the kind of ordering that has to be achieved. In disciplinary knowledge and transactional writing, the new insight has to be assessed for fit with existing structures, then either accepted in, discarded, or held as anomaly for subsequent cycles of thought. Researchers know this cycle well; they are learners, they produce new thought. When they arrive at a new insight that "checks out," it becomes knowledge new to the discipline. Students learning a discipline go through this process in order to learn course material. The old knowledge of a field is new to them. In a sense they recapitulate the core insights of the field when they gradually build up an understanding of its structure, details, and methods. They have to remake their old schemata to accommodate the new information. But the new knowledge does not stay within neat disciplinary borders. It bumps up against other areas of the individual's life, other fields of schemata. This "bumping" knocks the schemata in these other fields, which then requires that learners re-envision, rethink, and adjust the structuring of the other fields. An advantage is that this process adds to the preparatory base learners can use for other

thought, in the same field or in others. This is what happens when cross-boundary thinking emerges in new scientific insights, or in inventions, or in the formation of new fields, for example. Each piece of new knowledge alters the whole, and if some pieces cannot be made to fit, and a sufficiently substantial aggregate of them emerge, a new order of ideas—a new framework, or paradigm, may emerge (Emig, reviewing Kuhn 147-8). And, as Einstein reported, sometimes new thought arrives as image, not word, just as it does in poetry (Gates, *Creativity* 150). Poetry by contrast, is systematic within each poem; new insights must fit the developing system of order it is becoming. But poetry's insights can make connections within structures of a field or with other fields of knowledge and experience. These new insights all feed the preparatory base, for disciplinary learning and for other fields of the learner's life, with new schemata and their elements. The stages for re-creation of knowledge are congruent with Iser's literary re-creative dialectics; thus, offering the view that the process of re-creative learning is a poetic mode. Britton's model has been widely applied to writing-to-learn pedagogy because his category of expressive writing provided a way of accessing the preparatory base, the store of schemata and elements out of which thought incubates, as a stage toward connecting and forming. In expressive writing, the role of the addresser is a "shadowy one," he says, where spontaneous thought and feeling, that is, whatever is coming into consciousness, can emerge. Writing gives thought a chance to emerge, even requires it, as writing in sentences connects new information to old. The purpose of writing in learning is to generate ideas that can be revised toward the end of either transactional work or poetic work. The shadowiness results, in his view, from an uncertain, loose mixing of the participant and spectator roles. Mixed in role, writing is mixed in structure, with a mix of felt and rational aspects. Writers can explore freely, letting their minds follow threads of meaning until understanding is reached, or if not reached, they can discover the lack of resolution. Anything a person experiences and knows can be brought forward. The function of writing is a wide-ranging search: possible connections and meanings can be tried out. There's no penalty for wrong direction; there is a continuing search for ideas. Like Britton's category of expressive, Iser's imaginary is immediately arising, loosely structured, drifting, the "matrix" of new ideas, to

use Britton's term with an emphasis on the root meaning of the word—“womb.” As Britton envisioned it, the expressive was the beginning point for both the transactional and the poetic. Revision toward the transactional narrowed the domains to a local context, and revision toward the poetic moved the writing toward making order in a global context. In view of Iser, the category of expressive is subsumed in the poetic processes of consciousness. What for Britton is an expressive area of crossing back and forth loosely among domains and functions, knowledge and feeling, is for Iser the place for re-creative dialectic. Britton's stepped back spectatorial position is but one aspect of the imagining process as writer and world, reader and text, exchange roles in participatory interaction with the schemata we call knowledge.

The very meager research that exists on writing poetry to learn in the disciplines has given evidence that poetry writing helps students to learn course material and to learn it and value it more deeply.³ I have explored how and why the poetic as renewing remaking brings about understanding, critique, integration, and synthesis of knowledge; how the poetry writer is a participant with fields of knowledge in the dialectical process of remaking; how the creation of new thought is initially a poetic process.

If Heath's prediction is right, creative writing will become essential—not an “extra”—to human life as our educational population changes and our world becomes increasingly globalized. One indication of this need is that poems began to appear in the media immediately following the events of September 11, and sales of poetry books tripled. In crisis, in confusion, people turn to poetry. They need to renew by remaking the torn views of the world. In totalitarian regimes, poetry acquires a high value; its suppression and regulation by the state and the vitality of banned literary works attest to this fact. As Heath says, people need poetry “at particular periods in their lives” (231). I would argue that as our culture intersects with increasing rapidity with other cultures, the students in our universities need the poetic as a participatory reordering, renewing art in order to deal with the burgeoning information and colliding views of the world and to re-create, intelligently, our world. Poetry writing not only assists learning, it assists meaningful connection of course knowledge to other areas of students' lives and pro-

vides a valuable art in which to continue to search out re-
newing thought and possibility.

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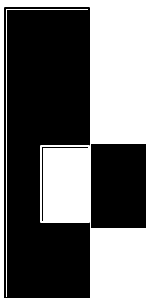
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Endnotes

- ¹ Poetry is one of the "fine" arts, often classed dichotomously to the "useful" arts, such as medicine, business, engineering, even architecture, which crosses the boundaries of the distinction. As everyone involved in education is probably aware, the fine arts are the first to go when budgets are cut. They are perceived as "extras," not essential, not useful, an enhancement only. I was once told as much by a major media corporation when I was seeking funds—a mere \$1,000—to print a collection of poetry written by women in a homeless shelter: the company was already giving money for food and shelter, and poetry was not important. Yet, the evidence of the women's statements and lives demonstrated the opposite, as I reported in "Poetry, Community, and the Vision of Hospitality: Writing for Life in a Women's Shelter."
- ² For a more detailed explanation of the creation of new knowledge, see Martin A. Greenman 1987; Rosemary L. (Gates) Winslow 1989 and 1993.
- ³ I say "almost non-existent." A few publications exist on the topic: Marie Ponsot and Rosemary Dean's *Beat Not the Poor Desk* incorporates the literary knowledge of the two excellent poet-authors into a full writing curriculum that blends the ancient trivium with contemporary language and literary theory; Toby Fulwiler and Art Young collected

essays on literary writing in literature classes in *When Writing Teachers Teach Literature*; Art Young explores the use of James Britton's model of the poetic function, focusing on Britton's trait of poetry as including values; Michael E. Gorman, Margaret E. Gorman, and Art Young have done a fine study of students writing poetry in a psychology class; Louise Z. Smith explored the way metaphoric language exposes the gaps and darkness of the unknown, that language is inadequate to represent—the places we must “write” (hypothesize, interpret, understand); Winslow and Mische developed and reported on a curriculum for at-risk students that uses literary and visual art forms, elements, and processes to teach academic reading and writing; and A. Merrill has edited a collection of poetry written by students enrolled in a wide range of courses, from humanities and sciences to architecture and engineering.



Because His Shell Is Empty: Writing Poems about Biology

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In “Poetic Writing in Psychology,” the authors suggest that poetic writing offers students taking courses in disciplines other than English unique and valuable ways of learning course content:

The results of this study suggest the value of poetic writing in a content course. Students found the poetic assignments particularly valuable for exactly the reasons that Britton suggests—poetic writing encouraged them to explore their values and feelings about schizophrenia and permitted them to play with language. . . . What would happen if we tried [poetic writing] in a highly technical class outside of the Humanities or Social Sciences? We suspect [it] would be useful in learning scientific and technical material as well. (Gorman, Gorman, and Young 1986, 158)

Our own experiments with students writing poetic expressions of information in an introductory level General Biology course and an upper level Cell Biology course bear out the authors’ observations. Not only did the students explore values and play with language, they also exercised several specific kinds of cognitive skills valuable for learning in the sciences. Most significantly, many of the students who participated experienced a kind of understanding that took them more deeply into the subject matter of biology than they or

we were expecting from an exercise with a relatively small investment of time and energy.

This paper will review a poetry writing assignment used in both an introductory level General Biology class of 148 students and in a 200-level Cellular Biology class of 34 students. In addition, it will consider two group-written poems composed in a first-year composition course linked to the General Biology class, demonstrating how writing poetry about technical material not only promotes the acquisition of knowledge but also stimulates critical and creative thinking, leading to a more accurate understanding of the material and to a deeper appreciation of the subject.

What Good is Writing Poetry in a Science Course?

Science teachers are fully justified in asking that question. Many science courses, especially at the introductory level, enroll too many students to permit much writing of any kind. If the teacher's precious time is going to be taken up with reading student work, shouldn't it be more explicitly scientific writing, or at least expository (i.e., explanatory) prose?

Most of the literature locates the value of writing poetry in the student's general development rather than in course-specific learning. So Joseph Moxley, quoting Dave Smith, points out that “creative writing is one of the few formal opportunities in education for self-discovery and self creation” (1989, xii-xiii), and Gorman, Gorman, and Young cite James Britton's assertion that “poetic writing encourages students to explore their own feelings and values” (1986, 139). While no one would deny the value of self-exploration and discovery, we are asking how writing poetry can help students learn *science*.

In the first place, most poems are short. This makes them useful for focusing intensely on specific processes or ideas and also means that teachers won't have to read prohibitively long papers in large lecture courses. In the second place, poetry is relatively dense for its length; often, a great deal of thought goes into the production of just a few lines. Some of this thought may be expended on purely poetic questions of rhyme, meter, and so on, of course, but some of it will inevitably go to better understanding the scientific processes the student is writing about, to choosing the word or image or analogy that most exactly expresses the understanding the

writer wishes to convey. The tendency of poetry to encourage precision—because it is not expansive and explanatory, one naturally wants to get each word right—is also an effective device for helping students focus on the intricate details of, for example, the Krebs cycle, as we shall see, or the electron transfer chain.

Besides its brevity and focus, poetry also encourages the careful observation of physical details (imagery), a habit of mind particularly valued by the sciences as well as other academic disciplines. In *Researching and Writing in the Sciences and Technology*, for example, Christine A. Hult devotes a whole section of chapter one to “The Importance of Observation in the Sciences,” and every lab manual for introductory biology courses stresses the importance of careful observation in the formulation of questions that lead to hypotheses and in the monitoring of actual experiments, as well as in the discussions of their results. Furthermore, the analogical nature of poetry, with its metaphoric and similitic comparisons, promotes careful, detailed thinking about the nature of biological processes. If you compare electron transport to riding in a cab, for example, as one of our students did, thinking about the ways the two kinds of transportation are similar as well as different means that in the end, you have thought a lot about electron transport. Generally, then, poetry focuses attention on the fine details of scientific knowledge in a limited space where other kinds of writing might require many pages.

Poetry also has value for students in the way that it promotes imaginative and emotional connection with the subject matter, as has been well recognized. In several places, for example, Art Young has argued that poetic expression helps students engage with a subject emotionally and appreciate the values at issue (1982; 1997; 1998; 1999; 2000. See these same sources for his discussion of poetry’s ability to help students “engage the fine details of the information.”) The ability to visualize the implications of a process like cloning, for instance, and to respond to those implications emotionally, out of their own values and beliefs, helps students establish a framework in which everything about cloning, from the mechanics of nuclear cell transference to the ethics of therapeutic cloning of humans for stem cell research, is more clearly understood, as we shall see in one of the poems we consider below.

Finally, we would like to add that the role of creative thought in the sciences is sometimes forgotten by the rest of the academic community. Most scientists, though, are familiar with stories of dream-like, visionary inspiration in great discoveries like those of Rutherford (atomic structure), Kekule (the benzene ring), Loewi (chemical transmission of nerve impulses), Watson and Crick (structure of DNA), and Curie (radiation). At a dinner given in 1998 in honor of the great Australian biologist Howard Florey, who first developed antibiotics for use in human beings, Michael Wooldridge, then Minister for Health and Family Services (Australia), remarked: “I . . . hold to the view that there is no essential difference between artistic creativity and scientific creativity” (1998). Many scientists feel the same way, although those in the humanities tend to see more of a gulf between their subjects and the sciences than scientists do (see Standler, n.d., for example). Writing poetry about biology helps to call attention to the creative impulse present in both areas.

The Assignment

The assignment had two components. In the first component, the 148 students in an introductory level General Biology class and the 34 students in a 200-level Cell and Molecular Biology class were asked to write a poem about a biological process or idea. The choice of the process was left up to them, as were choices about the length and style of the poems to be written. Since the assignment was conceived of as a “writing to learn exercise,” students were awarded a small number of points simply for writing the poems and turning them in on time. (In both biology classes, ten percent of the students’ grades was based on homework assignments and short quizzes. The poetry writing assignment counted as one of these homework assignments.) This freed students and teachers from concerns about the quality of the poetry as verse and allowed us to focus on using the concision, focus, imagination, and emotion of poetry to learn science.

We expected that all of the students involved in the project would have had enough exposure to poetry in some form that, given the absence of constraints as to style, form, length, or poetic “quality,” they would be able to write a poem about a biological process or idea without any explicit guidance. However, since some students tend to appreciate guidance, a more complete set of directions were posted on the Web CT biology

site (see Appendix 1). This guide emphasized two qualities of poetry—*images* and *comparisons* (similes and metaphors)—and suggested that for this exercise, these two qualities were more important than form, rhyme, and meter. As noted above, images were valued because careful observation is one of the hallmarks of the scientific method (as well as being necessary for writing effective verse), and comparisons are powerful tools for both creative and analytic thinking because they often come to mind spontaneously but can then be subjected to close analysis of the point-by-point similarities and differences between the two compared phenomena. Students were not *required* to follow any direction in the writing of their poems, however.

In the second component, students in a first-year composition course linked to the General Biology section wrote a poem as a group going through a directed, in-class activity. The students in this section of composition were also enrolled in the same section of General Biology and were writing papers in composition about subjects and issues raised in the biology course (the scientific method, genetic engineering, evolution, as well as more focused and technical processes like diffusion, cell membrane permeability, biochemical bonding, and so on), so the idea of writing and then commenting on a poem about cloning was not foreign to them. After the group-written poem was completed, students commented on their perceptions of the biological and social issues raised by the poem and on whether or not it changed their understanding of these issues, and if so why.

The Group Writing Experience

Poetry, like all the arts, is essentially a way of creating a state of advanced or heightened awareness in the perceiver. The faculties of awareness, of what we might for convenience's sake call reason, emotion, and imagination are excited, stimulated, raised, and fused into a heightened awareness, an enhanced ability to see into the nature of things. For this reason, poetry might be considered a particularly good vehicle for understanding more fully the nature of controversial biological processes and the social and moral issues they can raise.

This is exactly what happened in the group poetry writing aspect of the experiment. In the composition class linked to the larger General Biology class, students had been read-

ing and writing about genetic engineering, including such issues as genetic screening (looking for genetic disorders in fetuses and embryos), gene therapy (repairing genetic defects), genetic enhancement (introducing traits into plants, animals, and people to improve or alter their physical characteristics/abilities) and cloning. Of all the technologies, cloning fascinated them the most, as it seems to fascinate (or horrify) the culture at large. In particular, they were interested in the human implications of cloning individuals. Would someone try to resurrect Adolph Hitler, as an old Gregory Peck movie proposed, or would there be multiple Brittany Spears, Brad Pitts, or Michael Jordans populating the future?

The poetry writing component of the composition class offered students the following scenario about which to write a poem that addressed their questions:

It's 2022. A wife and her husband are unable to have a baby—the husband's sperm seem to be at fault and not even in vitro fertilization techniques are working. So the couple decide to bear a child cloned from just one of them. They both want a little girl, so they decide to clone the wife. A body cell is taken from the wife and its DNA—the blueprint for the whole woman—is extracted. Next, an egg cell is removed from the wife's ovary. Its nucleus, which contains half the amount of DNA necessary to make a new person, is extracted and discarded. The complete DNA taken from the body cell is coaxed into the empty egg cell, which is then implanted in the wife's uterus. Nine months later, she gives birth to a baby girl who is genetically identical to her, who will grow up to look exactly like her and have all of her physical characteristics along with whatever personality traits that are inheritable, though of course the cloned daughter will also be an individual, a person in her own right. Write a poem which looks at four or five interesting moments in the life of the cloned daughter. How do her parents see her at each of these moments? How does she see herself? Write the poem in the past tense, looking back at the events from, say, 2072.

The poem was written on the board as the class members contributed lines, words, ideas, suggestions. Suggestions were

vetoed, voted on, lobbied for, and questioned as the poem progressed. At each point, students were led, with the teacher’s guidance, into a consideration of the situation that the family would have faced with each change in the age of the cloned child. Here is what finally emerged:

The Clone

**Born in 2022
She was her mother’s mirror
Her time machine.**

**When she was five,
Her mother taught
Herself manners.**

**When she was 15,
Her father took his teenaged wife
To the father-daughter dance.**

**When she was 23,
She gave her mother
A grand-niece.**

**When she was 50,
She watched herself die.**

After the poem was composed, the students were asked to reflect on what they had learned about the nature of cloning and about using poetry to explore it. All of the students observed that the act of writing the poem finally cleared up confusions which had existed between their understanding of the mechanics of cloning and the half-superstitious fear and distrust in which cloning is held by the uninformed. (We don’t mean to suggest that ethical concerns about cloning are misplaced—far from it. Uninformed people, however, tend to think of cloning as the mysterious production of a Frankenstein monster rather than as a potentially viable form of reproductive science.) One student said, “I always thought that cloning was, like, making a whole person in a lab. When we had to think about what this girl’s life would be like, I realized that she would be born just like any other child.” Another student said, “I don’t see what the big deal about

cloning is. It's just about like *in vitro* fertilization, and they've been doing that for *years*." What struck us was that these students had known how cloning works before they wrote the poem, but still tended to view the process through the lens of their earlier assumptions that cloning was a kind of monster-making. Writing the poem not only reminded them of techniques like nuclear cell transference and facts about diploid and haploid cells, but also personalized that knowledge in the life of a fictional girl they had created. Here was an instance where mixing sharply observed detail with emotional and imaginative responses led to a deeper understanding of a biological process.

Of course, we don't mean to suggest that all of the students became ardently pro-cloning. Many of them, perhaps the majority, agreed with the student who said "It makes me feel that cloning is a miracle breakthrough in science, but that there are a lot of questions and concerns about cloning that deal with the way it will affect people's lives." Several even said, "It [i.e. the poem] made me feel more against the process." Writing the poem crystallized the implications of cloning in human terms, making students better able to respond fully to the conflict between the reasons people might have for using cloning as a reproductive aid and the students' own feelings about family relationships. Although they wouldn't have used these words, it is clear the way "The Clone" makes explicit the Freudian elements in the "family romance" disturbed many of them deeply. The important point is that through writing the poem, students came to understand the *process* of cloning, as well as its controversial *implications*, more clearly than they had before, even after studying the technology in General Biology class and writing a paper on the ethical implications of genetic engineering in their composition class.

One more poem was group-written during the course of this project. In designing the assignment, the composition instructor asked a small group of students from the composition class to collaborate with him in writing a poem that would be used as an example in presenting the assignment to students in the General Biology and Cellular Biology courses. The instructor gave the students the subject of ionic bonding and asked them to compare this kind of atomic behavior to some other sphere that students could understand. Here is the poem that resulted:

Bonding

**Ionic bonding is like love.
One gives, because the electric charge
Sizzles in her veins
The other takes because
His shell is empty.**

The comparison of ionic bonding to love was almost inevitable—the students played with the idea of bonding for less than a minute before they settled on a love relationship for the central comparison. On analysis, the students decided that ionic bonding did indeed seem very like one kind of love—but not like all kinds—and so the poem tried to capture the relationship between one person full of love and her more parasitic partner. The striking line “because his shell is empty,” which gave our paper its title and which refers both to the atom that can accept an electron from another and to a person who has nothing to offer in a relationship, a person who might be characterized as an “empty shell,” (a completely different metaphor, though also biological), illustrates the way that using analogy or metaphor helps students better understand the processes they are considering. In discussing this poem, one student remarked that she might get the other kinds of bonding confused, but she would never forget how ionic bonding works.

Results of the Poem Assignment in the General Biology Course

Since the poetry writing (for both biology classes) was a “writing-to learn” assignment, which de-emphasized evaluation in favor of the knowledge gained from the experience, and since we had made no requirements as to length, style or form, we were prepared to find that many of the poems were perfunctory, and indeed many were. Of the 148 poems submitted in response to the assignment in the General Biology Course, some were very short and very simple, while other were just vague, their writers using the occasion to raise questions or to philosophize about the subjects of biology/life. While these poems may have had some value for their writers, they were not what we were hoping the assignment would produce. Other poems were more specific and detailed, and even when very short, reveal some of the educational value

we were looking for. A scatter table at the end of the paper offers a visual impression of the range of the poems and something of a sense of how many students took the assignment seriously and how many did not (see Appendix 2).

Although a number of students responded to the assignment with mild enthusiasm at best, even the weakest efforts helped students to review biological concepts and facts, even if they weren't always accurately expressed; and again the poetic form tended to confer a kind of crystallization or focus on an idea. Consider this sample:

What is Evolution?

Evolution is nature's solution.

Changes that occur to guarantee that a species will survive

Adaptions necessary for life's success.

Because in nature it takes the best of the best.

The rhyming of “evolution” and “solution” and the slant rhyme of “success” and “best,” along with the short lines and the stanzaic form (a quatrain) are, though minimal, poetic gestures that reflect some thought, some playing with the possible ways of expressing the idea. Again, we found this evidence of poetic dabbling important not because we cared about the production of “quality” verse but because the demands of form confer a kind of dallying with the subject matter which encourages reflection and ultimately understanding—and the understanding of the idea of evolution is roughly valid, though the poem stresses a sense of predetermined purpose which is absent from Darwinian evolution. (In the poem, the success of the species is seen as a goal of evolution. In Darwinian evolution, the success of the species depends on random mutations, which accidentally improve the chances of the descendants to survive.) By itself, then, this poem was perhaps a modest *aide memoire* for the author. It would have been of even greater value if the occasion had permitted a discussion about the accuracy of the evolutionary ideas. Nevertheless, the evidence of this poem and several more like it suggests that the form and concentration of poetry tend to throw misconceptions about scientific ideas into high relief, making them easy to identify and to discuss with students.

A little over half of the poems reflected the influence of the optional assignment posted on the biology course's Web

CT site, which directed students to focus on imagery and metaphor in writing their poems (see Appendix 1). Some of these poems focused on a single comparison, and though minimalist, were clearly useful to their writers in understanding and remembering biological concepts:

**My love is selectively permeable
Like a plasma membrane
Only letting those in worthy of my love.**

The biology instructor for this class liked the way this poem captures the essential function of the cellular membrane, to keep in the constituents of the cell necessary to its functions and to keep out unnecessary substances, especially waste products, while allowing necessary substances to pass through its protein gates. Though the poem is very brief, the comparison between love and plasma membranes confirms the student’s understanding of the idea of selective permeability.

Another, longer, more detailed poem compares cellular respiration to a track and field event, the triple jump:

**Aerobic cellular respiration is like the triple jump.
They take a hop, skip, and a jump to reach their goal.
Glycolysis is the short hop of the triple,
By investing two ATP, it receives only four, and
grosses only two.
The Krebs cycle is the skip of the triple,
For it profits only two ATP.
While the electron transport chain is the long,
Powerful, goalgetting jump of the triple.
By spending only two ATP,
The ETC—
Jumps with energy
With a profit of 32 ATP.
With a short Glycolysis hop,
A Krebs cycle skip,
And an Electron Transport Chain jump
You have the Aerobic Cellular Respiration triple jump.
It uses its energy
And strives for ATP
Resulting in a leap profiting thirty-six
Strong bits of energy, as it lands—in the sand.
It gets up, runs down the approach,
And does it all over again.**

All of us liked the way this poem *embraces* the complexity of cellular respiration with a comparison that offers readers a visual and tactile approximation of the steps. The analogy may not be perfect, but it is very good, as are the poetic devices—control over the monetary metaphor in line four, the music of “skip of the triple,” and the concentration of energy down into the two shortest lines of the poem to describe the moment when the most energy is produced:

**The ETC—
Jumps with energy**

We also liked the way the poem repeats the process in brief after it has explained it in detail. One senses the writer understanding the process well enough to play with it, to present it in various forms, long and short, the way a professional writer might, and to decorate it with poetic effects. Like a basketball player whose ball-handling abilities allow her to show off fancy moves or a violinist who plays fast because he can, the poetic flourishes here demonstrate mastery of understanding.

Metaphor clearly offered an intellectual playground to both these students, and in both cases the sense of play with the comparison spills over into an effective explanation of the phenomena with which they are concerned.

Still another comparison came from the textbook, Krogh’s *Biology*, which compares certain chemicals involved in the electron transport chain—NAD (and NADH) and FADH_2 —to taxi cabs ferrying electrons back and forth (2000, 133). The student cleverly explores the details of the metaphor and sets the whole scene to a hip-hop beat, transforming the intracellular activities of energy production into a lively urban street scene:

**The never stopping cab, Always on the job
Never passing any needed ride. Hey Mr. Electron just
get inside
Only when the cab isn’t full it will stop
But you know because the plus sign will be
highlighted on top
Get on in, the ride is smooth, Mr. Electron get ready
To be oxidized and let’s cruise.**

Sorry the ride is now full and can’t stop,

**We all know that
You all want to be oxidized too, but look now there
Isn't a plus sign but an H on top.**

**The overly anxious passengers are ready to be
dropped off
Oh!! Great this is your stop, here ya go so let's hurry
Up so the cab pick up some mo!**

The sharp observation of detail—in this case, the changing positive and negative charges on the molecules that transport electrons down the chain—is effectively captured in the analogy between the molecule's charge and the cab's company and in-service signs, which are merged in the poem. It's instructive that the student took liberties with the physical reality of cabs (the sign on the top shows the company's name—the sign in the window shows if the cab is available or engaged), not with the physical reality of electron transport. In writing the poem, it was more important to him to get the science right, a sign that he understood the thrust of the assignment.

Some of the poems were quite witty in their application of scientific method to life experience. The following cleverly and accurately encapsulates the scientific method (a popular theme) as a lens for understanding how to pick up boys at bars:

Scientific Method for Approaching a Man

**As I sit on a stool at the bar
I observe a handome man from afar
I tip the bartender and down my Coors
And ask another admirer, Is he yours?
Do I approach him and risk rejection—
Or sit quietly and risk losing his affection?
As the buzz of my drinks catches up with me
I make an educated guess to go to him and see
I decide to experiment and risk my pride
And attempt a seduction instead of running to hide
When I introduce myself, he starts to walk away
And I conclude: It's not my fault—he must be gay.**

This poem accurately reflects the main steps in the scientific method (observation, question, hypothesis, experiment, re-

sults, conclusions). In playing with the steps, the writer masters them, to the extent that she can reflect them clearly while applying them to a non-scientific setting. “Wit” used to mean “understanding” as well as “cleverness”; here, the writer’s ability to play with the elements of scientific process confirms her thorough understanding of them.

The last category of poems we would like to discuss is one that is framed by Art Young’s comments on the poetic function of written language when students are attempting to relate new knowledge to their value systems (1982, 78). Young argues that when students encounter new ideas that may run counter to their system of beliefs, poetic use of language helps them assess this knowledge and stand in relationship to it. The poet asks questions, establishes a sense of distance from the material, fictionalizes it, plays with it in ways that resemble an animal exploring a new object, visually, tactilely, to see if it is good or useful.

One of the most powerful poems we looked at examined the author’s troubled relationship with his father in light of his new knowledge of what being a biological son implies about his own identity and about the possibilities inherent in his future fatherhood:

Gene Therapy

**I was in my Dad’s gonads . . .
And he is still in mine
I continue to carry on his traits
Even the ones I still hate**

**Half of his DNA I will pass on . . .
If I could subtract that half
Then it would be half gone
I could castrate myself . . . Cut it all off!
Would you like to watch?
See me here, with my
Barbie doll crotch . . .
Snippity snip!**

The way this poem plays with the “halfness” of heredity from one parent (we each receive half—23—of our total of 46 chromosomes from each parent) reflects a dawning awareness of how the mechanism of heredity determines aspects of character and identity: “if I could subtract that half / Then it

would be half gone” shows that the student understands acutely the nature of heredity and uses that accurate knowledge to meditate with disturbing power on the possibility of ever eliminating those traits from the world. It is as if the knowledge of how personal traits are passed on has alerted the writer to the degree of control he has—or more properly, does not have—over their transmission to a new generation, which leads to the powerful imagery of the second half of the poem, with castration and the “Barbie doll crotch” representing the only way he can be assured that the “traits . . . I still hate” won’t live beyond himself. (Incidentally, the implied voyeurism in “Would you like to watch” and the gender confusion of “Barbie doll crotch” add another psychic layer to this already intensely felt poem.) In this poem, we can see the student/writer thinking (and feeling) his way through the intricate relationship between heredity and personal identity in his own life. For many students, this kind of awareness marks the beginning of their ability to integrate the world-view of biology and of science in general into their lives. Writing poetry offers students the opportunity to personalize biological processes in ways that convince them of the relevance of scientific understanding more effectively than lectures and textbooks can.

Poetry Writing in Cell Biology

Writing poetry in an upper-level, cell biology course raised somewhat different questions than doing so in the introductory biology course. Although the poems were again a writing to learn exercise which was not to be graded and which emphasized learning science rather than writing “good” verse, just as in the introductory course, the higher stakes of the upper-level course, with its expectation that assignments would engage more complex material more deeply, made us wonder if the technical information would lend itself to poetry and if the poetic format would aid in understanding or would enforce a simplification of the material in order to conform to students’ ideas of what poetry should look like and be about.

The cell biology instructor had other concerns as well going into the experiment: she expected the assignment to take students outside of their comfort zone and challenge them with its very nature as an assignment quite unlike what they might expect from a biology course—especially an up-

per-level one—and although not constrained to grade the poems on their merit as verse, she still wondered about her own ability to respond to and assess poetry, especially non-classical poetry that lacked clear criteria of rhyme and meter. (She found it more difficult than the others to relegate the poetic to a tool for learning biology and wondered if the poetry didn't deserve to be considered as formally as the science learning did.) In effect, she worried that the assignment could fail either by being too exotic for students in an intensive science course or by producing poetry too exotic for her to evaluate, or by doing both.

In any event, the poems written by the cell biology students resemble the poems written by the students in the introductory course, with perhaps somewhat greater technical complexity and somewhat less concern for poetic technique (see scatter chart, Appendix 3). The cell biology instructor concluded that the poems were well thought out (for the most part) and showed evidence that the students understood the concepts they were writing about. She came to see the poetic dimension differently than she had expected: for her, it became a kind of catalytic base for the assembly of facts and ideas in ways that neither the student nor the instructor had anticipated. Metaphor, simile, imagery, form, meter, and rhyme became the substrate on which new reactions among facts and ideas formed in the students' minds, reinforcing knowledge of the material in ways similar to the ones we saw in the poems written in the General Biology course.

A good example of the new expression of learned ideas may be seen in the following poem about water:

**I'm strong yet weak all at once.
I'm the star in the play called life.
I'm always called back for more. I guess
They can't live without me. Being weak
Gives me the ability to do many
Things. I can hold things together.
I can stabilize things. And I expand
When I'm cold. Who said that being
Weak isn't cool. I'm the coolest man
On the earth. I'm versatile!**

This meditation on water abstracts the qualities H₂O displays in its relationships with other organic substances and elicits

those qualities with a metaphor (“I’m the star”) and a paradox: “weakness” (water’s relative formlessness) gives water the ability to play many indispensable roles. What the cell biology teacher liked about this poem was the way the analogy (“star”) and the paradox summed up the many varied and crucial roles water plays in the biochemistry of the cell.

At their best, the poems written in the cell biology course, like those written in the general class, use poetic language to make scientific information vivid and memorable:

**I am standing on the median
Three ways to go
Which fall shall I take?
I may never know.**

**I see the solutions before me
Each numbered one through three
I can’t decide into which one I should jump
For only one will life be**

**The first solution I see they say is hypertonic
I become better experienced as to what I should do
When I watch my friends dive in, shrink, and die
Definitively this solution I shall not choose**

**The second solution from which I have to choose they
call hypotonic.
This solution they say is a lot less crowded than the last
However, when I see my friends jump in, lysis, and die
I begin to think the solution isn’t such a blast.**

**As I begin to think that things can’t get better
I remember I have one solution left
This solution they call an Isotonic one
I hope this one will be the best.**

**I have chosen my destination
Everyone there is always happy
There is no deathly swelling or shrinking
There is only equality.**

All the poetic effects here—the way the poem plays off of Robert Frost’s “The Road Not Taken,” the lovely line “which fall shall I take,” the interesting parallel between the cell lysing (in effect, exploding) and the rhyme word “blast,” and most of

all the imaginative way the writer dramatizes the idea of tonicity by anthropomorphizing a cell poised to fall into one of three different solutions—combine to define the idea of tonicity in a clear and memorable way. Students often confuse the kinds of tonicity and their effects on organisms with semi-permeable membranes. Few texts manage to make the differences clearer or more vivid than this student poem.

Writing poetry in this more advanced biology course had similar benefits to writing poetry in the lower level course, suggesting that the assignment is not constrained by course level or complexity of information.

Conclusions

Writing poems about biology has proven to be a rewarding assignment for students and teachers alike. Students realize a variety of benefits:

- Reviewing the scientific material promotes retention.
- Analyzing the scientific material promotes understanding.
- Writing poetry about the scientific material promotes greater imaginative and therefore greater emotional intimacy with the subject matter—students are able to see ramifications and possibilities that make the subject more immediate and more real for them.
- Playing with poetic form promotes creativity and imagination, abilities that are as vital to the sciences as they are to the humanities.

On the whole, for a relatively small expenditure of time and effort, students came to a better and deeper understanding of the biology they were studying by writing poems, and they seemed to have fun in the process.

Biology teachers (and other teachers in the sciences) interested in trying this assignment with their students may wish to keep in mind the following caveats:

- Keep the emphasis of the assignment on the science: let students write any kind of poem that appeals to them. The benefits of the assignment will grow out of free poetic play with the subject matter.
- Avoid complex assessments. If possible, make the assignment pass/fail, or, as we did, worth a few of points if done at all. In particular, avoid judging the merits of the poems as poems. They may, however, be critiqued for accuracy of scientific content.

- Consider having the class trade poems and critique the scientific content of each other’s verses (something we did not do but will next time).
- In making the assignment, emphasize the qualities that poetry shares with scientific inquiry: close observation of physical detail (imagery), analytic probing of similarities and differences between objects or phenomena (metaphor), and creative impulses developed by method and discipline (form). Downplay the idea of poetry as a way of philosophizing about life. We all felt that the poems that went in this direction were less rewarding than the poems that considered specific processes or ideas.

In closing, we would like to dwell on the value of creative approaches to science. The goal of stimulating students to think creatively is of course highly valued in all educational models. The fostering of critical and creative thinking is a central goal to literacy teachers, teachers in content areas, and to university missions. The Council of Writing Program Administrators (WPA) outcomes list “the uses of writing as a critical thinking method” as one of the core goals of first-year composition courses; a handbook on writing papers in the biological sciences remarks that “biologists need to think creatively about science” (McMillan 1997, iii); and the mission statements of many universities include language like this:

Our hallmark is a comprehensive university experience that promotes student growth and success through creative strategies . . . , [graduating] students who are knowledgeable, clear-thinking, articulate, and effective in problem-solving. (“Mission” 2001)

English teachers who ask students to write about imaginative literature in the composition classes are often dismayed by the students’ inability to fully imagine the people and worlds invoked by the works they are reading. Biology teachers are just as dismayed that the beautiful intricacies of cellular function or the dance of meiotic division remain, for most students, flat, dull, poorly understood textbook illustrations. We would argue that writing poems about biology—or history, chemistry, engineering, marketing, literature, or any subject in any broad area—brings the complexities and the beauty

of that subject to life for students, allowing them to enter into it imaginatively, emotionally, and intellectually.

The connection between poetry and biology in particular, however, surprised us with its peculiar intimacy and power. William Wordsworth, in his famous poem “Lines Composed a Few Miles Above Tintern Abbey,” speaks of the power of nature to calm the mind and to produce “that blessed mood,/ In which . . . /We see into the life of things.” We suspect that he would claim the same power for poetry to help students of the biological sciences see more deeply “into the life of things;” or in their case, into the things of life.

Appendix 1: Instructions for Writing a Poem about Biology

This is meant to be a fun exercise that will get you to think clearly about a biological idea or process and to write creatively and entertainingly about it.

Poetry isn't really about rhyme, at least not any more. Instead, it's an attempt to use language to speak powerfully about a feeling or an idea. It has several techniques for speaking powerfully, but it especially makes use of *images* and *comparisons*.

Images are vivid, sense descriptions:

The only other sound's the *sweep*
Of *easy wind* and *downy flake*. (Robert Frost)

This old thigh bone is *hard* and *heavy*.
Smooth, but *bumpy* where the long-dead
muscles attached.

Another way that poetry gets its power is by effective **comparisons**:

My love is *like a red, red rose* (she's silky, soft,
dewy, fragrant)

Ionic bonding is *like love*
One gives, because she has it to give
The other takes, because his shell is empty.

For this assignment, write a poem that explains some biological process or idea of your own choosing. If you want, you can answer one of the following questions. Your poem does not have to rhyme. It’s more important that you use accurate and vivid descriptions and interesting comparisons.

Some sample topics you could write about (feel free to make up your own):

- 1) What is life? Why do some scientists think it began in water?
- 2) What is the scientific method?
- 3) How do atoms bond to form molecules?
- 4) Why is carbon so good at forming bonds with other atoms?
- 5) What is osmosis?
- 6) What are passive and active transport of molecules across cell membranes?
- 7) Explain cellular respiration
- 8) Explain “survival of the most reproductively fit”
- 9) Explain how traits are combined and passed on in human reproduction
- 10) How are proteins produced? Why are they important?
- 11) How do viruses work?
- 12) What is a symbiotic relationship?
- 13) How do biologists classify living things?

Appendix 2: Scatter Table for Poems written in General Biology

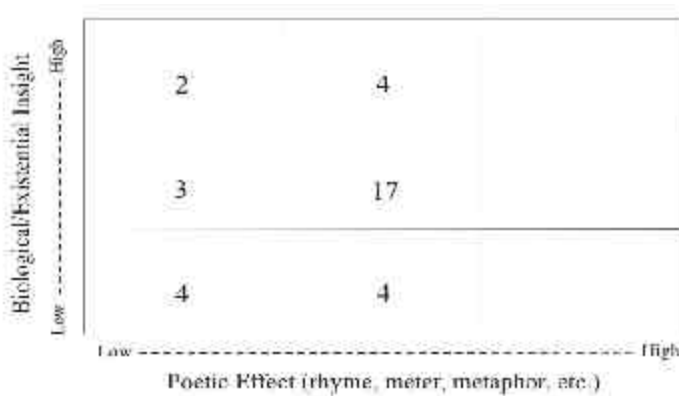
Biological/Existential Insight	High					1
		1	1	1	1	
	1		5	5		
	2	4	13	9	1	1
	5	5	14	2	1	1
	Low	11	30	13	7	
		Low		High		

Poetic Effect (rhyme, meter, metaphor, etc.)

Numerical values indicate numbers of poems out of 148

This chart reflects the relative sophistication of the student poems with regard to biological and/or existential insight and with regard to poetic complexity. Poems with relatively more complex insights, ideas, and information (either about biology or about human experience or about both) occur towards the top of the chart; poems with relatively more complex use of poetic devices like imagery, metaphor, rhyme, meter, stanza, line length, symbolism, and specialized forms (like haiku or sonnet) were listed towards the right side of the chart. For convenience, instead of indicating where each poem fell, just the total number of poems in each segment of the grid is shown.

Appendix 3: Scatter Table for Poems written in Cellular Biology

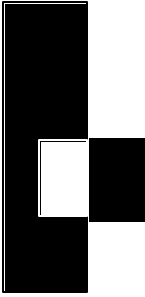


Numerical values indicate numbers of poems out of 34 (See previous appendix for an explanation of the chart.)

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City Confidential: On the Lyric Mapping of Urban Space

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*Flesh, color, speech:
these exist by the rivalry
amongst little phrases
the struggle to conceive
sounds that palpitate and style the possible:
distant horizons that complicate a ghetto
in the grove, in the shadow of a city
that goes on writing.*

-- Leonard Schwartz,
"As You Run Up the Stairs"

While teaching creative writing, I began to note a pervasive narrative in several of my students' work; they wrote about being lifeguards at suburban Chicago swimming pools. While it seemed a strangely particular narrative, inevitably the trope of the "bored lifeguard" was the backdrop to the same discoveries—that living in the suburbs "sucks," that the consumerism and sameness prevalent to that locale was sapping everyone of their will to live, that they longed to get away and be "real." Throughout the semester the class had been grappling with the idea of the "I," debating its various modes, determining how the first-person subject was constructed both in their work and in the culture at large. Generally, the students seemed both willing to accept that subjectivity was defined by media, fashion, etc., and unwilling to part with the idea that somewhere underneath all that was a unique, "real," and more aesthetically pleasing subject struggling to emerge.

In attempts to differentiate their similar narratives, I began to ask my ex-lifeguards why they had wanted to be

lifeguards, if they had liked it at all, what their background was like. Yet, even when asked these questions, they responded with similar stories. It was as if they had come from the same vague family structure, with the same aspirations, the same feelings about being lifeguards. They were, you know, like everybody else, just struggling to escape being like everybody else. Moreover, I found myself assuming that they all worked at the same pool. This was the assumption that most disturbed me.

I am a lover of swimming pools. When I lived in Boston, I remember taking the commuter rail to lovely scenic beaches only to return happily to my favorite public pool, up from the old Boston Gardens in the North End, along the Charles. Something about the color of the water, the conversations of my fellow swimmers, the difference in temperature between the swimming and diving pools, the system of bodies in the pool brought more pleasure than the ocean. Like Burt Lancaster in the film *The Swimmer*, I find that different pools resonate in different ways. Some evoke romance; some evoke loneliness; others evoke heartbreak. All, however, evoke history and community in some form. Given my fascination with pools, I began to ask each ex-lifeguard specific questions about the size, shape, depth, and general demeanor of the pools at which they worked. After I began to ask about the pool culture from which they emerged, I was pleased to see their revisions become more varied. They began to indicate the differences in being bored at a Naperville (“Naper-thrill” as they call it) pool and being bored in a Skokie pool. Dependent on which type of pool they worked (public, health club, country club, neighborhood, YMCA/YWCA pool), they began to notice different images, different attitudes and expectations, different commodity cultures from which they wished to emerge as individuals. Arguably, the narrative of boredom and escape from adolescent suburban existence remained, but the revisions indicated a more sophisticated notion of identity once the writers had situated their narrative in a specific space.

While it might seem that what is at stake here is a simple lesson in writing with more detail, the problem in these students’ early drafts indicates a larger debate about the state of the contemporary lyric voice. The lyric can be defined as “a short poem in which a single speaker expresses an emotional state or process of thought” (Barton and Hudson 96). How-

ever, this definition (as definitions are likely to do) fails to suggest the tensions involved in the lyric articulation. More usefully, poet Elizabeth Willis describes the lyric as an ever developing “voice as figure,” through which the physical can be spoken as phenomenon and/or subjective identification (Willis 228). The particulars of the voice make the physical landscape aesthetically pleasing, if not always mimetically accurate. The voice suggests the central nature of subjectivity in defining the objective. Yet often the contemporary lyric voice, as articulated by students and professional writers alike, seems to evoke an empty narcissistic projection: The swimming pool is interesting because “I” work there, even if the “I” seems underdeveloped and unengaging. Given the privileging of self, central to the lyric, and the pressure my students feel to define themselves against the trappings of suburbia, it is easy to see why they seek what seems to them a transcendent voice, evoking a speaker different from and superior to their surrounding, even when it might seem to others a voice empty of the ability to distinctively define itself and thus “make the invisible visible” (Willis 227).

The problem of the lyric strikes me as one that exists not only in creative writing classes but also more centrally in the very concept of the liberal arts student. Far from simply banking knowledge, the ideal student should be in dialectical transformation with knowledge. The ideal liberal arts student lyrically projects knowledge. They can do more than simply relay knowledge; they are able to embody it and transform it, respond to it as both speaker and audience. While in situating the lyric within the larger framework of liberal arts, I risk sacrificing the very specific poetic tradition of the lyric; I’m convinced that the risk is necessary if we are to consider the implications and place of poetry on the larger academy. At the very least, interest in the “I” voice is central to many in the academy; writing programs, in general, and Writing Across the Curriculum and in-service learning initiatives, in particular, encourage students to develop, through their writing, a rhetorically complex subjectivity. Likewise, rising interest in creative non-fiction indicates not only an interest in a rhetorically complex subjectivity but also an interesting and “readerly” one. However, it is one-sided to merely suggest that students should become more subjective, and more lyric, in their approaches to learning. Indeed, my students’ lifeguard narratives indicate that the problem of developing

a lyric connection depends less on the “I” than on the physical and narrative space the “I” contemplates. More than simply adding detail to their work, these students had to risk conflating their identity with the space of their narratives. They had to risk embodying “Naper-thrill” in order to effectively speak to their readers about it. Indeed, one of the primary problems in teaching the contemporary lyric resides in the lyric’s relationship to the material. My interest in this problem has led me to consider ways in which the lyric can be constructed as a cross-curricular project. As I am, like my students, a product of a suburban environment, I found my answer in the same place many of my students find theirs, on television.

City Confidential airs on the Arts and Entertainment Network on Sunday nights at 8:00 PM, CST. At first, it appears to be yet another “true-crime” exposé program, the type of show that would seem trashy if it were on, say, FOX, or anonymously moderate if it appeared on NBC. However, it retains a veneer of respectability on the more literary A&E. Like its more issue-centered counterpart, A&E’s *American Justice*, *City Confidential* presents a murder, offers suspects, follows the investigation and trial, and offers some final commentary on the effects of the crime. Although many of the murders covered gained national notoriety (the “Amityville Horror House” murder, Florida’s “Lobster Boy” murder case, the murder of San Francisco porn producer Artie Mitchell), some cases are distinctively mundane, the types of crimes (husband kills wife, son kills father) are likely to happen in any city. The charm of *City Confidential* is in the show’s ability to situate the crime in relation to the city in which it happens. Thus the episode about the “Amityville Horror House” murder highlights the Long Island community—its history, its inhabitants, its economy—in which the crime occurred, suggesting how the location itself produced the crime and, conversely, how the crime produces and maintains the community’s space.

The tradition of the *City Confidential* gets its name from a series of crime exposé books produced in the early 1950’s by Jack Lait and Lee Mortimer.¹ Books such as *New York Confidential*, *Chicago Confidential*, and *Washington Confidential* detailed the private, “confidential” workings of cities, highlighting police corruption, drug smuggling, vice, political graft, and, most notably, “red communism.” These cities could be

best understood, Lait and Mortimer argued, not by the buildings, the culture, or the economy of the town alone but by the dialectical and systematic nature of the secrets the city sought to hide in relation to its economy, culture, and citizens. While the citizen might not overtly participate in the vice and corruption of their city, he or she both participates covertly and is formed as a citizen through this participation. Interestingly, Lait and Mortimer never separated their own agenda from the corruption they discussed. In *Washington Confidential* (1951), they write: “We have no hope or aim to make Washington a better place to live in. We don’t give a damn what kind of place it is to live in except that the kind of place we found furnished us with that sole commodity in which we deal—copy” (Lait and Mortimer x). Though they likely did not imagine their unabashed commercial agenda as part of the corruption they detailed, their unabashed lack of civic interest makes it hard to morally disengage them from the city they, admittedly, wanted to profit from.

In fact, their lack of civic interest is something they presume of all Americans. Though the earlier books emphasized larger cities, later anthologies like *U.S.A Confidential* noted the presence of similar “confidential” systems in all American cities. In *Power and Paranoia: History, Narrative, and the American Cinema, 1940-1950* (1986), Dana Polan comments upon the formula for the “Confidentials”: “Crime is no longer the effect of a specific figure of criminality but a quality potentially at work in every person and in every relationship” (Polan 243). This presumption of criminality and corruption suggest the links between the “confidential” and the post-war noir tradition and suggests the divide between Lait and Mortimer’s conservative project and the progressive aims of turn-of-the-century “muckraker” journalism. The “confidential” city is neither reformable nor is it escapable.² In suggesting the link between the “average” citizen and the phenomena of crime, the Lait and Mortimer books denied even the reader a position outside of the narrative, for in the very act of reading the “confidential,” the reader becomes complicit. Subjectivity in the “confidential city” is fraught: the citizen can participate in the illicit activities that define the city, yet can neither escape nor reform the city systems at work.

In offering the dialectic between the individual “subject” (the reader and/or the citizen) and the city space (the “ob-

ject”), and by insisting on the material and social reality of the city space, the “Confidential” tradition offers both a popular form of human geography. In this dialectic, I want to suggest a space for the development of the cross-curricular lyric voice, for thinking about the ways in which poetry (and the traditions that produce it) can feasibly be applied to conversations in the fields of postmodern geography, critical cartography, and urban studies.³ Though I have yet to teach a course specifically involved with these issues, it is my contention that the “city confidential,” in its foregrounding of both the lyric subject responsible for the development of the city and the city responsible for the formation of the lyric subject, is a useful nexus for students of both creative writing and geography to theorize both the located nature of the subject and the subjective nature of location.

Mapping the Lyric: Tensions in Contemporary Lyric Culture

A heavy reliance on traditional definitions of the lyric often fails to articulate its changing definitions and attitudes. Thus I don't wish to attend to specifically genre-based discussions. Instead, I am more primarily concerned with the culture that emerges, the lyric sensibility. Certainly the most prevalent notions of lyric subjectivity come from nineteenth-century Romanticism and from the twentieth-century confessional. Creative writing students, and literary-minded college students in general, are likely to associate lyric poetry with the natural, “rustic” imagery of Wordsworth, as well as the unified sense of beauty and connectedness represented in all of the Romantic poets. They are also likely to identify the confessional moment of self-discovery (the confidential moment?) found in the work of Elizabeth Bishop, Robert Lowell, Wallace Stevens, Sylvia Plath, and Anne Sexton (to name only a few). Beyond literature and creative writing, Romantic sensibilities are likely to be fostered in writing courses, especially those influenced by expressivist pedagogy. Yet these observations, schematic as they are, fail to really articulate the tensions at the core of this lyric sensibility. They describe an attitude towards poetry and writing without really suggesting how this attitude plays out in the contemporary academy. Outside of the creative writing classroom, the same students who are attracted to these glorified notions of the transformative self are often leery of its uses in the profes-

sional realm,⁴ as well as the sincerity of its uses in the classroom.⁵ Instead, I wish to briefly discuss three central problems that confront the liberal arts students' engagement with the lyric: self-reflexivity, proximity, and universality.

Certainly a central academic value at stake in the lyric is in the speaker/writer's ability to discover and re-discover the nature of their subjectivity, to grow as individuals. Yet in *Poetry at Stake: Lyric Aesthetics and the Challenge of Technology* (1999), Carrie Noland notes the double-edged problem of lyric self-reflexivity:

The lyric no longer promises a moment of epiphany in which the subject triumphantly attains its true nature (or union with God). Instead the lyric is redefined as a discourse in which a subject comes to recognize and then negate its past delusions revealing each succeeding figuration of subjectivity, each effort to assume a voice of sincerity, to be histrionic, mediated by objectifying forces previously taken for the substance itself. (62)

Noland's analysis represents exactly what students often fear about studying subjectivity: that they will be found to be the product of everything that they wished to define themselves against. The Naperville lifeguard risks finding out that the voice of "the bored suburbanite yearning to run free" is, itself, the voice that defines the suburban space. Their voice is Naper-thrill.⁶

Noland notes Theodor Adorno's *Negative Dialectics* as a classic representation of modernism in which Adorno posits lyric possibility as "the paradoxical task of simultaneously positing and denying the validity of its own self" (72). Unfortunately, this dialectical move, seemingly full of fresh possibilities for lyric transformation, often seems, to some students, like the bankruptcy of the contemporary lyric. Why write a lyric of self-discovery if the discovery is that the "I" may not be "valid"? Indeed, the recognition that one's subjectivity is consistently in question is always trumped by the need to have a voice able to articulate this paradox. To the degree that students often want a unified and consistently validated *poetic* "voice,"⁷ they are often very sympathetic to the idea that their everyday identities are always in a state of revision. My students often see attempts at redefining iden-

tity (through fashion, interests, trends, etc.) as positive tools for personal growth, even when they are suspicious of the commodity culture that facilitates these identity transformations. Experimenting with who they “are” is often seen as an integral part of the experience of “growing up” and being at college. While they might not be especially excited by the negative functions of the contemporary lyric as such, they often recognize the possibilities of a more multiple notion of identity that can emerge from the negative gesture. Noland, in fact, argues for an evolving subjective voice that integrates, in particular, the varied subjectivities offered in technological advances. The contemporary lyric, for Noland, is embodied in the cyborg, though I imagine there are many other postmodern and late capitalist formations that might represent equally compelling models.⁸

To the degree that the contemporary lyric complicates notions of self, it also complicates the proximity of the “voice” to the world. While the traditional lyric voice is often defined by its phenomenal relationship to the physical (“the visible”), the concept of “voice” in relation to self is a complex one. Olivia Holmes notes the transition from oral to written poetry in thirteenth century Italian poetry and the effect this transition had on the construction of voice: “It was only in alphabetical documents that the acoustic medium was objectified and words were separated from the person who uttered them” (3). With the advent of writing came a separation between the acts of speaking and writing that remains integral to contemporary writing instruction. Even freshman composition students (hopefully) come to learn that the written “voice” and the oral “voice” are different. Not only is their written “voice” structurally and grammatically different from their oral voice, their willingness to manipulate each voice is markedly different. Although many students are comfortable writing a paper that does not represent “their opinion” per se, they are, in my experience, much less likely to verbally articulate a position they don’t believe. Holmes goes on to note the socializing nature that took place as oral texts were replaced by written texts:

Not only does the poems’ placement in a larger macrostructure allow narrativity (and thus history) to enter the poems, but it permits the kind of intricate numerical planning and intratextual relations that

enable the individual pieces to slip outside the immediate circumstances of performance or reception and to exist in a time frame that cycle itself has defined. This text is no longer naively transitive, pointing only beyond itself to the spoken word or sung voice, but intransitive, pointing only to itself and the “voice”—or self—constructed in it. (3)

Holmes thus defines the transformation as allowing, in the same moment, the lyric voice to be social, in relation to other voices and/or history, and to be insular, to craft itself as a construction (à la New Criticism). The social nature of the “voice” is further complicated by the separation of social space into the realms of public and private. In the event that students are willing to verbally articulate insincere positions (and be “yes-men”), it is almost always within a public and/or professional space (where their ability to express themselves is limited by economic and/or political power structures) than in a private space in which they are “free.” Certainly the Romantic pre-disposition towards the rustic and the rural indicates the investment in privatization central to this conception of the lyric, one that fuels the assumption students have that poetry, as opposed to prose, is a private form of communication, best produced and appreciated in solitude.

Related to the social proximity of the lyric “voice,” is the proximity of the “voice” to the ideas it expresses. Leonard Schwartz, in “A Flicker at the Edge of Things,” details his belief in the transcendental lyric in which “. . . subjectivity is again given access to visions—and vision happens when image and idea are no longer separate, the contents of thought and the objects of the eye attaining a kind of synesthesia” (98). To Schwartz, what is significant about the lyric is its ability to articulate the image “before the idea.” Although one could have a series of philosophical debates about the viability of this notion, the idea that the lyric is immediate and unmediated is, indeed, part of its aesthetic appeal. Hyatt Waggoner specifically defines the American Sublime in which “nothing is known, nothing given, everything is discovered or created” (xvii). Thus, the agency of the “private” lyric voice is defined in conflict with both the socio-political elements of “public” space and the *a priori* nature of conceptual space.

To the degree that social proximity is a central tension, certainly the problems of universality also come into play. Thus far, I've discussed the relation of the lyric to the concept of "self," to the "social," and to the conceptual object, but the lyric also resonates as a historically treasured form of individual and social communication. Not only is the formal "beauty" of the lyric supposed to positively influence the reader, the experience of confession is supposed to gratify and transform both the author and the reader (as opposed to the voyeurism central to reading a "confidential"). Influenced by middle-brow cultural advocates like Oprah Winfrey and Bill Moyers, students who want to see poetry (and literature in general) as primarily celebratory and unifying often find themselves at odds with teachers, versed in postmodern and multicultural theory, who wish to show how the lyric tradition can be silencing and/or falsely universalizing. On a more formal level, some creative writing teachers, invested in L=A=N=G=U=A=G=E poetry, spoken word, and "pomo" literature in general, may, in fact, view the lyric sensibility and the "domestic lyric" (as it is often derisively known) as antiquated—they've gotten beyond the "I."⁹

Though students are most likely to confront formal disenchantment with the lyric in creative writing workshops, the ideological stakes of the "universal" lyric are felt throughout humanities courses. Recently I taught Langston Hughes's "Harlem" in a senior-level literature class and was somewhat chagrined to note that my primarily white students chose to interpret "the dream deferred" as a problem encountered by everyone. When I pointed out the title and suggested that Hughes might not be talking about "everyone" having their dreams deferred, they seemed unwilling to acknowledge that their reading, while certainly all-embracing, might be problematic. Poetry, even to upper-level humanities students, was supposed to make "everyone" feel good. Certainly traditional lyric sensibility, with its status as universal and private, privileges the notion that all poetry can be stripped of social and political meaning and consumed however the reader desires. Often this lyric sensibility—through poetry I can remove myself from the ugliness of "false" social experience into the solitude and union with my noble and true self—ironically fuels the ideological stance that contemporary white middle-class subjectivity should, in a more general sense, allow an uncritical and relativistic notion of public engage-

ment—people don't have to think about what they don't want to think about if it makes them feel bad. For those who teach poetry, it is often hard to oppose this popular form of engagement and risk alienating students from poetry all together, but I find it increasingly hard to image this engagement as especially progressive or transformative.¹⁰

Yet to the degree that the lyric can be used in problematic universalizing discourses, especially in the classroom, the production of lyric poetry, itself, offers possible ways out of universalizing discourses. As Carrie Noland notes, Adorno's *Negative Dialectics*, while arguably critical of "sincere" notions of selfhood, remains a testament to the power of the lyric to express the angst of its own impossibility—an arguably sincere gesture. While it might be easy to critique the hegemonic lyric tradition as such, it is always important to note the variety of anti-hegemonic spaces such as the Nyorican Café, the St. Mark's Poetry Project, and the Electronic Poetry Center (to name only a few) as useful spaces for lyric transformation. Even formally, as Elizabeth Willis notes: "the aesthetics of 'language' or 'post-language' writing . . . are primarily lyrically driven . . . but there has been a shift within contemporary lyric practice, whereby the overall structure and strategy of the lyric is overlaid or mixed with other influences, forms, and rhetorical sampling, often in significant ways" (228). The lyric tradition, even when contested formally and ideologically, has the ability to resurrect, to revise itself in relation to the changing landscapes it phenomenolizes.

Within the classroom lyric poetry, even when presented as a private and universalizing discourse, retains the ability to imagine the transcendence of political difference. While I was disturbed by my students' inability to historically and politically contextualize Langston Hughes' poetry, they were, nonetheless, engaged and thoughtful about the poem. Though I found their responses, on one level, solipsistic and naïve, I want to be careful not to ignore the empathy of their response. Indeed, if they can't imagine the "dream deferred," on a personal and emotional level, it is unlikely they will understand it for anyone else or be moved to work against the forms of racism detailed by Hughes.

Thus, within its tensions (and there are certainly more than I've noted here), the lyric tradition remains central to issues that are aesthetic and social, formal and ideological.

As a poet and as a teacher, I am invested in this tradition not as an object of study, but as a mode of inquiry. While the “lyric” as such, is studied in both creative writing and literature classes, and while the ideology of the Romantic lyric sensibility is prevalent both in the classroom and the culture at large, I want to use the production of the lyric subjectivity as a tool of continuous conceptual revision of, among other things, the “objective” map, the “confidential” city, and the concept of postmodern space.

The space of the city¹¹ has long been interesting to writers, especially poets. In *Le Spleen de Paris*, Baudelaire notes: “the experience of great cities [is] musical without rhythm and without rhyme, supple enough and abrupt enough to adapt to the lyrical movements of the soul, to the undulations of reverie, to the paroxysms of consciousness” (qtd. in Ramazani 200). The city space, almost by definition, provides a better environment than the rural countryside for describing the evolving industrialized subjectivity. As industrialization spread, the Romantic “noble savage” became a subject ill suited to contend with the changing spaces the lyric had to define. While distrust of the city continued, as is clear in the “city mysteries” of the 1850’s as well as in noir fiction and film of the twentieth century, the city became a space one couldn’t dismiss. In contrast to the often lurid tales of the city, the desire to celebrate the city emerged in turn of the century poetry such as Joseph Clarke’s “Manhattan: an Ode” and Hart Crane’s “The Bridge.” Beyond celebrating the urban space specifically, contemporary “geographic poetry” contends with the complexities of subjectivities, the fracturing, silencing and naming involved in maps. In *Giscombe Road*, poet C.S. Giscombe traces the naming of a road (and portage) in British Columbia for a Jamaican ancestor, a racial and ethnic “other” to the region. Beyond documenting the strange geographic naming, he articulates a more open-ending vision of what maps might do: “[the] meaning the map of sound got fleshed out so/it, the map got to be more/than a ‘document of voice’ but/ a way of/ bending north (out of range, peripheral, and sourceless)” (Giscombe 14-15). Inevitably, the location cannot escape being named by (and for) the subject (even the marginalized one) any more than the subject can escape being named by the location, though, for Giscombe, the wish remains that, through the map, the subject might court a different type of transcendence. Geography works to invite

escapes, a driving to a “periphery,” yet it also works to offer comfort and grounding in what seems to be an infinite and multi-faceted world. In *The Lure of the Local*, landscape artist Lucy Lippard notes, “The intersection of nature, culture, history, and ideology form the ground on which we stand—our land, our place, the local” (7).

This pervasiveness of lyric interest in the city space (and space in general) suggests to me the ways in which, artistically, geography has already implicitly invaded the contemporary lyric sensibility and, thus, the creative writing classroom. Thus I am interested in the uses of lyric production within geography classrooms. As maps and geography are of interest to lyric poets, the lyric, even if it isn’t identified as such, is of growing interest to the contemporary urban geographer. Though I must admit to having far less experience with students of geography than with students of poetry, the literature is replete with examples of cross-disciplinary interest and similarity.

The Lyric Map: Poetry and Geography

In *The New Nature of Maps* (2001), J. H. Andrews reviews the essays of one of the more prolific cartographic philosophers of recent history, Brian Harley. Though he died in 1991, Harley’s influence remains challenging, especially in its cross-disciplinary aspects. Andrews notes: “The peculiar quality of Harley’s achievement may best be appreciated by inventing a game for map historians. Tabulate the specialized vocabularies of cartography, philosophy, and the aggregate of all other academic subjects in three columns. Choose one term at random from each column. Whoever combines these terms into the most arresting and plausible short sentence wins the round” (3). Though Andrews is clearly dismissive of the “arresting and plausible [*lyric?*] short sentence,” he notes Harley’s warm acceptance of the cross disciplinary possibilities of the map. While Harley’s use of political theory, philosophy, and rhetoric often vex cartographers, he offers, for others, ways of thinking about the often insular and highly technical world of maps.

Beyond Harley’s political critiques of map-making— he critiqued, among other things, the “silencing” of non-hegemonic structures in maps¹²— his interest in the marginal decoration of maps, the colors used, and the scripts (and names) used to define space makes his critiques especially

approachable to non-geographers. He was one of the first cartographers to be interested in the map as more than an objective and empirical tool, as he noted, “My position is to accept that rhetoric is part of the way all maps work and that all maps are rhetorical texts. . . . we ought to dismantle the arbitrary dualism between ‘propaganda’ and ‘truth’ and ‘artistic’ and ‘scientific.’ . . . for there is no description without performance” (Harley 163). It is clear that he thought good maps could offer the empirical uses of the atlas and more broad philosophical, historical, and aesthetic dimensions at the same time—“both decorative and geographic images on a map are unified parts of a total image” (Andrews 11). Certainly this would seem a high order for mapmakers, but it is also one that the lyric sensibility seeks to address.

In his focus on the aesthetic of maps, Harley was able to note their formal construction and the complicated ways in which the stylized uses of font and color complicate representations of physical space. Much as the twentieth century L=A=N=G=U=A=G=E poet finds the multiplicity and semantic disharmony between word and meaning to be significant, urban geography tracks the ways in which city space is defined by similar disharmonies. In *Cities in Space: Cities as Place* (1990), David Herbert and Colin Thomas note a central problem in locating a stable definition of city space: “Of the three components of townscape—plan, architectural style, land use—the former is the most resistant to change whereas the later is the most dynamic. Discord between form and function will occur as changing land uses produce the need for functions to adapt to built forms [that] were originally designated for different purposes” (126). In much the same way that urban geography students must contend with former industrial spaces being converted into “yuppie loft spaces,” creative writing students must contend with the changing signification of words and poetic style within ostensibly stable notions of genre. Therefore, the urban geographer and the poet have similar struggles (and productive possibilities) in defining and re-defining the form/usage binary in both space and in language.¹³

To the degree that cartographers like Brian Harley seem overtly interested in lyric concerns, I note with interest the ways in which urban geography and lyric poetry have similar descriptive characteristics as objects of study. Both the city and the lyric are defined as giving centrality to the ideas,

spaces, and subjectivities that surround them. While I've already addressed the problematic social centrality (the "voice" as universalizing and as presupposing the idea) of the lyric, the city presents similar problems. Historically, cities have been defined specifically by their central economic position in a region. In 1933, Walter Christaller described the city in his definition of central place as "mediator of local commerce with the outside world" (qtd. in Carter 27). However, one of the central tenants of postmodern urban geography is to problematize this centrality: the city space cannot function locally in an increasingly globalized and technology-based economy. In "Exploring the Postmetropolis" (2001), Edward Soja notes the pervasive transitions between the modernist (definable by central place theory) and the postmodern city. Of many factors, he notes the shift to a post-Fordist and globalized market economy, the rise of technology based and service-based communities, and the rise of the Carceral cities in the form of gated communities and the abandonment of "public" space as central to this transition. Certainly my students' understanding of cities is influenced more by Soja than Christaller, though I imagine few are aware of it. Of my suburban lifeguards, I discovered that one worked at a pool in a gated community. When I asked him about it, he was unable to articulate what a "gated" community was and how having a gate on one's community might influence one's subjectivity and ideology. While students of geography are more likely to understand these "objective" differences, I wonder if these students are able to articulate these differences in relation to larger ideological, aesthetic, and subjective concerns. Perhaps they can, and if so, I want to put them in conversation with students of poetry.

The ideology of privatization is noted both by Edward Soja, and more explicitly by Mike Davis in *City of Quartz: Excavating the Future in Los Angeles* (1990) and *Ecology of Fear: Los Angeles and the Imagination of Disaster* (1998). *City of Quartz* offers a project similar (though more progressive) to that of Lait and Mortimer; through maps, newspaper articles, specific ethnic and sub-cultural histories, and urban renewal planning, he offers a vision of the changing spatial/political landscape of Los Angeles. In *Ecology of Fear*, he offers perhaps the most unnerving equation between the lyric sensibility and postmodern geography as he defines the relationship between subjectivity and geographic space in opposition to

one another. Much as the Romantic poet wishes to escape the demoralizing city for the privileged rural space, the middle and upper-class have, in the face of what Davis calls the “Third-Worlding” of urban space, fled the city to suburbs, gated communities, CID (Common Interest Developments), and “panic rooms.” Davis charts the rise of public hysteria surrounding gangs, pedophilia, and drugs, commenting on how these urban fears, as well as the responses (gated cities, “no tolerance” police policies, surveillance and profiling) effect both the map and the urban subjectivity: “Any post-Burgess mapping of urban space must acknowledge the power that bad dreams now wield over the public landscape” (387).

While one might note the differences between these two movements from urban space (one based on a desire for aesthetic purity, one based on fear), their similarity can be felt in the desire many students display for the separation of aesthetics from issues deemed “public.” My poetry students either didn’t want to sully Hughes’ poetry with discussions of racism and historical context or perhaps they feared the repercussions of discussing racism in a public setting. Though the thing my suburban lifeguards wanted to avoid was conflation with the suburban (albeit middle-class, privileged, and, in one case, gated) spaces from which they emerged, their parents likely saw the suburbs as a safer and better space with which to identify. As Davis notes in both texts, this escape from the urban space functions to decrease funding for public spaces/programs (parks, museums, schools, community art programs¹⁴) and increase the middle-class Bill O’Reilly-supported sensibility that such spaces and programs are unsafe for middle-class citizens and that their funding represents a “theft” from “private” interests and revenue. In this articulation, one hears echoes of Lait and Mortimer’s overt capitalistic endeavor in creating the *Confidential* books: the city is for enhancing individual freedoms and profit—period.

Urban geography, especially the work of Soja and Davis, offers more varied representations of the functions and representations of the city and in the subject influenced by geography. In these representations, they suggest clear and frightening drawbacks to the popular separation of individual from geographic space. However, this separation still remains central to the romantic lyric tradition that influences young writers, as well as to the idealized American subjectivity: the

safe, financially-secure, consumer. Given my experience with creative writing students, I see this tension between subjectivity and geography as both a pervasively unproductive writing block and, potentially, an engaging tension to explore with geography students whose study of postmodern geography and map-making is more clearly influenced by theories of subjectivity. How, then, do we re-theorize this tension with both students of geography and creative writing? What might such theorizations produce?

Lyric Mapping and the Geographic Subject

Though the relationship between artistic process and urban geography is not new, it has, as often as not, yielded dissatisfaction from artists. Popular modernist projects such as Lucio Costa and Oscar Neimeyer's Brasilia plan and Le Corbusier's "machines for living" models were met largely with disdain and futility from both Bauhaus and Situationist artists: Guy DeBord and Jorn Asger noted, "Urbanism renders alienation tactile" (qtd. in Salder 50). Yet urban geographers are much more hopeful about such collaborations. After noting the lack of sustainability of such current models as the global city, the electronic city, the "edge" city (suburban model), and the competitive city, Tim Hall writes of the "creative city":

A characteristic of the current wave of urban creativity is the innovative utilization and compilation of skills derived from artists, designers, educators, and entrepreneurs with new technologies . . . At the moment this creative capacity is expressing itself in a number of small-scale, locally-oriented milieu within European states. These creative communities have broken down barriers that have existed between, for example, art and technology and work and leisure, in the solution to the problems that have found themselves facing. Indeed the failure to precisely define exactly what is meant by creativity in the urban context is the main thing limiting understanding of the process at the moment. (163)

Hall's excitement regarding collaborations between urban geographers and artists, as well as the feasibility of such collaboration and what these collaborations can produce, is

gratifying. In addition, his concern over “the failure to define,” directly suggests how urban geography and creative writing might be useful to each other. The fact that geographers are often more receptive to the collaboration than artists (of course, the Situationist aesthetic, in its overt avant-gardism, likely does not represent popular tastes) is yet another process to map. Many artists may, in fact, view the creation of physical space as distinctly secondary, if complementary, to the creation and maintenance of human relationships and systems. However, if we can, in the academy, foster discussions between these groups, the process of “urban creativity” can better be defined in conjunction with the creative city projects in development, current aesthetic movements, and evolving pedagogical and institutional theories. Perhaps we might, together, conceive the “creative university.” If, as is the case at least with my lifeguards, the current city and suburban space represents something to escape, it would seem of interest to both determine what factors make the space so distasteful and to work collaboratively to make these spaces more pleasing and productive.

The process of developing a more public lyric sensibility cannot occur, however, without imagining both how we, as subjects, embody space and how space defines our subjectivity. As we live in a time when city space is defined by the “City Confidential” and by the assessment of postmodern geographers like Soja and Davis as a dangerous and alienating space, this project seems fraught with classroom resistance (to what degree will students resist geographic subjectivity, i.e. “being Naper-thrill?”). Interestingly, however, I submit that students already implicitly accept, or at least fear, the idea that spaces might produce subjectivity (my students clearly imagined that, without escape, being “Naper-thrill” was inevitable). I think it is their attitudes towards their geographic subjectivity (being “Naper-thrill” is never a good thing) that are more pedagogically challenging to me than their complex acceptance. While I have suggested the “City Confidential” genre, with its populist sensibility, its appealing luridness, and its historical contextualization, as a useful site for classroom collaboration, it is this very genre that needs to be reformed in its pedagogical use. Lait and Mortimer’s conservative vision of the possibilities of the city are certainly problematic, yet the methodological approach

they use can, I think, transcend the negative message of their texts.

In this essay, I have suggested that the lyric subjectivity is central not simply to the development of creative writing skills (i.e. making their creative work more detailed and interesting) but to situating the phenomenal relationship between students and the knowledge they embody and transform in the academy. A geographically situated lyric subjectivity offers students, whatever their field of study, a more civic-oriented subjectivity. What students learn in college can affect broad changes both in the communities in which the students work and in the ways students think about the idea of community. The interplay of these ideas is central to how they define themselves as students and citizens, as producers and consumers not only of products, but also of the relationships that structure their reality. As geographer R.J. Johnston notes: "Creative change can be achieved only by understanding how society operates to structure space within the urban systems and then, by producing programs which will affect the operations, not just the outcomes" (25).

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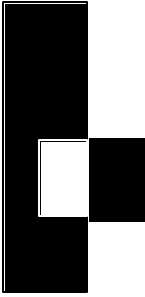
Endnotes

- ¹ This tradition can be traced back even further to the “city mysteries” of the mid 19th century. Novels such as George

Lippard's *Quaker City*, trace the lurid corruption of Philadelphia. For a full account of this tradition, see Michael Denning's *Mechanic Accents: Dime Novels and Working-Class Culture in America*, M. Denning. (New York: Verso, 1987).

- ² James Ellroy's book (and the subsequent film) *L.A. Confidential* illustrates this point admirably.
- ³ Though my students come from a suburban rather than an urban space, many postmodern geographers note the ways in which suburban space is defined in relation to urban space, an idea I will explore later in the text.
- ⁴ For a provocative case study about student resistance to critical literacy pedagogy (which promotes a more ideologically-centered construction of self), see *Collision Course: Conflict, Negotiation, and Learning in College Composition*, R. Durst. (Urbana: NCTE, 1999), 48-63, 120-4, 129-41.
- ⁵ On the subject of student resistance to confessional writing, see *Fragments of Rationality: Postmodernity and the Subject of Composition*, L. Faigley. (Urbana: NCTE, 1992), 111-31, 225-42.
- ⁶ I am reminded here of the beginning of *Red Harvest*, when the Op thinks that he mishears the town name, Personville, pronounced as "Poisonville" only to discover that every resident calls it that.
- ⁷ For a detailed study of the growth of the lyric "voice" and its critical reception in the 20th century academy, see *The American Poetry Wax Museum: Reality Effects, 1940-1990*, J. Rasula (Urbana: NCTE, 1996).
- ⁸ For example, many of my students use the model of the D.J. to articulate how a subject can subtly change, transform and sample experiences and how he/she might creatively mark shifts between experiences.
- ⁹ For a detailed examination of popular criticism of MFA-based poetics, see *Poetic Culture: Contemporary American Poetry between Community and Institution*, C. Beach. (Evanston: Northwestern UP, 1999).
- ¹⁰ The conservative nature of this larger ideological stance is highlighted in *Postmodernism, or, The Cultural Logic of Late Capitalism*, F. Jameson (Durham: Duke UP, 1997); Laurent Berlant, *The Queen of America Goes to Washington City: Essays of Sex and Citizenship*, L. Berlant. (Durham: Duke UP, 1997); and *The End of Politics: Cor-*

- porate Power and the Decline of the Public Sphere*, C. Boggs (New York: Guilford, 2000).
- ¹¹ Though my primary interest is in urban geography, there are numerous programs emerging in rural studies. While I have limited knowledge of these programs, I would certainly not want to make the connection between the contemporary lyric and the city overly exclusive.
- ¹² For more on the cultural coding of empty or silence spaces, see G. McDonogh, "The Geography of Emptiness," in *The Culture of Meaning of Urban Space*, R. Rosenberg and G. McDonogh, eds. (Westport: Bergin & Garvey, 1993), 3-15.
- ¹³ For specific theorization on maps and the contestation of social and ideological meaning, see *Pleasure Zones: Bodies, Cities, Spaces*, D. Bell (Syracuse: Syracuse UP, 2001); *From Nowhere to Everywhere: Lesbian Geographies*, G. Valentine, ed. (New York, Harrington Park, 2000); *Putting Women in Place: Feminist Geographers Make Sense of the World*, L. Domosh and J. Seager, eds. (New York: Guilford, 2001); and *Globalizing Cities: A New Spatial Order?*, P. Marcuse and R. van Kempen, eds. (Malden: Blackwell, 2000).
- ¹⁴ New York's St. Mark's Poetry Project, a community-based experimental writing project run by Bernadette Mayer, is often threatened by such cutbacks.



“Oh that wonderful stuff”: Selected Poetry by College and Middle School Students

Compiled and Edited
by Shawn Apostel
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When students use poetry to imagine and explore academic subjects, they examine the topic in new, creative ways, resulting in interesting and lively writings that stimulate thought and class discussions. The following poems are examples of student poetry written in a variety of classes throughout the curriculum. I am pleased to showcase student writing in this section, and I hope reading these poems will suggest possibilities and adaptations for teachers and students elsewhere.

Students at Clemson University in South Carolina participating in a Communication-Across-the-Curriculum (CAC) project wrote poetry as part of their classroom experience. Professors from a wide range of disciplines assigned the poems to help students engage course material through their creative thinking and writing abilities, so that they, and their classmates, might discover new perspectives on the subject of study. The endnotes on the title of these poems detail the teacher, course, and assignment given to the student.

Middle School students at The Park School of Baltimore (a K-12 independent school in Maryland) wrote the second group of poems as part of a language arts and science collaboration. Students wrote the poems based on their research and experience with nature after being taught the skills of close observation, note-taking, and metaphorical thinking. Teachers involved were Nancy Abrams, science; and Nadine Feiler, language arts and social studies. The essay they co-authored immediately follows these poems and describes the interdisciplinary project in which the students composed the poems.

“Oh that wonderful stuff”:
Selected Poetry by College and Middle School Students



The poem was submitted in the circular form on the prior page, in a format that is readable, but that we were not able to reproduce, so here is the "translation," so to speak:

Fertilization Poem ¹
Maureen McHugh

Sperm:

*I've lost my phone number may I borrow yours?
They call me coffee because I grind fine
Hey baby, are your feet tired? Cause you been running
through my mind all day.
Are you from Tennessee? Cause you're the only 10 I see
Do you know karate? Cause your body is really kicking
You must be a parking ticket because you have "fine"
written all over you.*

Egg:

*Go ahead and break through my gelatinous veil.
Many have tried and many will fail.
You've already been through a dangerous road;
the acids did many of your friends corrode.
But you have made it through the difficult trial,
and you've reached me whom you so desire.
You want to combine your DNA with mine?
Haploid to diploid, or so you pine.
Well go ahead and pine after me.
We'll see which one's the most lucky.
We've only this chance to fulfill our fate,
so put away your tired lines, come on, let's mate*

“I watch those hands...”²

Amanda Oberdorff

**I watch those hands that are still too small
To grasp what I carry with ease.
But while my own hands resign themselves
To the tasks that comprise adulthood
His move with frantic fascination
To interpret the details of life.
With black ink and pencil lead
I record the Crayola spectrum of his day.
And while he touches the worms and critters
Whose sensation I've long since abandoned
I look at my own hands and wonder
Do my fingers point direction for him
Or is his easy grip pulling me
To the memories and excitement that age forgets?**

Chemical Equilibrium ³

Catherine Taylor

**Chemical equilibrium may be confusing to some
I may leave them frustrated and feeling quite glum.
Why can't a reaction just happen one way?
What's this K_w , K_c , and K_a ?
If you'll sit back and listen, I'll show the way
All you need is the principle of LeChatelier.
When you listen to him, it will help you decide
If the reaction will shift to the right or left side.
When the products are large, the reaction moves right
Don't let all the K business give you a fright.
When the products are many, K is greater than one
... Oh wait!! Please don't go—your lesson's not done.
When the reactants are large, K is smaller than one
And it's the left side this time that has all the fun.
I can see you're not listening—you're bored as can be
So I hope on the test you improve on your D.**

Going Downtown ⁴
Hayley Shilling

We wear few layers
And go out into rainy February looking for warmth.
Our twenty white toes, pinched by high shoes, strappy
shoes, click on the side walk and
Pinking from cold air, and the friction of
Going downtown.
We open doors, present ourselves to bouncers—bona fide
by age.
We present ourselves to men inside
All the time casting our eyes around for a tall body, a
shock of dark hair,
Someone
Not too drunk to speak, but drunk enough to say hello
(to the likes of us) we think.
Often the place is only partially filled and we move on.
Two approaches, stools change, bouncers change
(They know our faces, if not our names)
And again we slip out into the rain
Hunting and hunted, going downtown.

We order few drinks
And down them slowly, swirling the ice looking for
warmth.
Our beautiful painted lips, pursed around short straws,
bitter disguised liquid,
Pinking from Sex on the Beach and
Going downtown.
Sometimes the loud music makes it all worth it if it's
something we recognize,
And there's someone there too,
From classes or from last Friday to pretend to be
interested in shouting at our ears and hearing us over it,
Or notice we made ourselves up to show them.
Other girls have longer hair, shorter skirts, higher boots,
and we're jealous and sorry for them.
Old men say, "You look like my daughter, want to
dance?"
Young men say, "I'll be your daddy, what's in your
glass?"
They compliment our clothes and grab our ass
We're just girls, going downtown.

Beach Baby ⁵

Haley Ann Nelson

Sun kissed cheeks decorated with freckles,
Golden hair touched by the sun
Sparkling green eyes that ached to see all.
The excitement of sand,
Dunes that became castles,
Fortresses with princess
Ruler of the land.
A Minnie Mouse Bikini
With Hot Dogs at lunch time
The taste of saltwater
The smell of coconut sunscreen
Brown legs and arms
Racing towards the water battling the waves
Becoming the beautiful mermaid.
Only seven years old and imagination
That filled a lifetime.
A wanting, a needing a yearning
To never grow old
Knowledge began to gain power,
Took over the princess
The beautiful mermaid.
No more Minnie Mouse Bikinis, but towels
Wrapped around a tortured body
That hungered to feel the freedom of dashing in the ocean
With a stomach full of hotdogs
And sandcastles with seashell windows.

Region of Rejection: Gettysburg Address Revised ⁶
Bo Gillooly

**Four score and seven years ago,
our Tukey, brought forth on this subject,
a new formula, conceived in the Studentized range,
and dedicated to the proposition
that all pair's two corresponding population means
are not equal.**

**Now we are engaged in a great Bartlett's Test,
testing whether that variance, or any other variance,
independent and normal, can long endure.**

**We are met on a great battlefield between two mighty
tests.**

**We have come to dedicate a portion of the Wilcoxon Rank
Sum field,
as a final resting place for those who are ranked and
independent,
and another field to ranked and non-normal samples,
who gave their lives so that Kruskal-Wallis might live.**

**It is altogether fitting and proper that we should do this.
But, in a larger sense, we can not forget General
Friedman,**

**For we can not consecrate a whole block without this
fallen comrade,**

**And so we hallow this statistical ground, as Anova, sum of
squares, a treatment.**

Just a Thought ⁷

Felisia A. Sims

**What if Stanley dug the hole Alice fell in?
Would her bottle of fizzy drink really be ploosh?**

**What if Pinocchio crossed a tarbaby in his path instead
of a serpent?
Would that sly fox still lay low?**

**What if Max’s journey was across desert sands instead
of the wide ocean?
Would the wild things be bearded ladies selling *paan*?**

**What if Flopsy wore a blue jacket?
Would she have eaten so many radishes?**

**What if Harriet was in the Ceremony of the Twelves?
Would her assignment be “Busybody”?**

**What if Disney had known Carroll?
Would they have had profound conversations while
sharing a hooka?**

**What if Pinocchio’s Fairy with the Azure hair had really
been The Warden?**

**What if the toad Harriet hid in her classmate’s desk was
really a prince?**

What if Ole Golly had nappy hair?

Just a thought.

Poem ⁸

Amanda Brown

**The war in my head over getting help or fighting on my own
A constant struggle to show no signs
Feeling desperate and alone
Try to exert control, calm, breathe
Push through the fog of the mind to be like everyone else
All the Average Joes of the world with their families
Their nine to fives and cups of coffee
While I sit within my own work group
But not working on projects, figures, company reports
Although something is under construction- or rather
Reconstruction-
The mind being slowly twisted back into shape
Carefully molded with imperfect hands
Trying to fix the wrongs even a Perfect Hand couldn't fix
Soft voices trying to soothe the tantrums within
To the point where Reason can be heard speaking
A constant struggle to show no signs
The war in my head over getting help or fighting on my own**

Passing the Old Kitfield Inn, Monck’s Corner, SC ⁹
Matt Creech

**Of course, you no longer shoot and instead
Travel daily to the fields, coming first to a strange
Convergence
Of dirt and asphalt roads, the sun-blached sign
“Kitfield Inn”
Left towards the big oak (the base strewn with the cigarettes
and cheap beer cans of bored teens)
Through the trailers and lines of scuppernong, and finally
To the graffiti covered Inn itself. You unhinge the gate, follow
The worn road, and begin another day of work.
After all, you no longer shoot, and the preparation is all.
Walking along the raw ruts of new earth
You kneel suddenly, as if genuflecting to some pagan god—
mother, father, a bitch, or a bore—
And rise slowly under the bend and weight of arthritic age.
Between the broomstraw and sorghum strips,
Out toward the traces of loblolly and brambles,
Cracked corn and seeds powder the soil.
Sifting your weary (but still strong) hands through the work of
An old man’s autumn, your soil will not yield crops, but the
Restrained and familiar sunrise violence of falling doves.
The preparation is all.**

Math the Deceiver¹⁰

Bridgett R. Duggins

**I see you Math
hiding behind your a's and b's
sometimes x, y, and z's
I see you.....**

**You think slick
I'm sure $1 + 1 = 2$
but you question my integrity
had the nerve to ask me
to come up with a proof.**

**Proof by Contradiction
more like proof by lies
nevertheless math I see you
so don't try to hide....**

**You hide behind E's, N's, Z's and R's
but I see you math
I know who you are**

**You're nothing but a number
too much of a coward
to be straight forward
I swear there's always a twist
making me go through theorems
and identities just to prove you exist**

**In the end
Math, I'll break you down
and I'll expose you
cause I see you
and I know who you are....**

Ode to Math (With strategically placed vocabulary)¹¹
Maureen McHugh

**Humor me, as I become reflexive.
I wish to relate to you the transformation
Of my composition as a student.
One-to-one, myself and I (the unique identity)
I seek to find mathematical relations, and to
Generate some finite order in my infinite mind.**

**The field of math, it seems, is cyclic,
A ring mapped onto itself.
All classes appear equivalent, a symmetric group,
Each partition taken as a subgroup of the whole.
Outwardly prime (relatively, at least),
But the domain of math is eternal, and
All ideas become congruent; it's just a function of time.**

**This is the unity that compels my mind;
This is the beauty that satisfies my soul;
This is pure, this is abstract, this is the science of our world.**

This is math.

Wacko-Tobacco¹²

Kara Davis

Dear Stevie:

**Roomie, I do love you so,
But this chewing snuff has got to go!
Our room is laced in bottles and cans,
And a smell that lingers with your hair and hands.
Your constant spitting while I'm trying to work
Has led me to act a bit like a jerk.
I'm sorry, really, but think how I feel,
When you're sucking your teeth and tapping your wheel.
And what about Josie when he kisses you sweet?
A surprise sure awaits that tastes of rank feet!
If not for us, then quit for just you,
The scary stats prove all too true.
Ulcers, cancer, heart disease, even death,
A hell of a case of God-awful bad breath!
Besides that, darling, you are a girl!
Think of social stigmas, your place in the world.
If you're stressed take runs, naps, showers.
Set small goals; a few days, several hours.
Baby steps, baby steps, you'll pull right through,
And there'll be a much happier, healthier you!**

Victoria's Secret (a poem for two voices)¹³
Victoria Ward

I am Pedro.

I am Max.

**We are the secrets
of Victoria's house.**

**We are the secrets
of Victoria's house.**

**I am white and
I am black.**

I am both, all of that.

**We are the rulers.
We are the cats.**

**We are the rulers.
We are the cats.**

There are two others.

There are two others.

Just like the rest.

But we are the best.

**We are the cats
Pedro and Max.**

**We are the cats
Max and Pedro.**

The landlord's

Name is Erik.

If he knew about us

We'd be gone on the bus.

But what he doesn't know

Won't hurt him.

We are the cats,

We are the cats,

We are the rulers,

We are the rulers,

And we are the secrets

And we are the secrets

Of Victoria's house.

Of Victoria's house.

Of Carrots and Sticks¹⁴

Jason Meadows

**Some shout “*Only carrots!*”
Others cry “*Only sticks!*”
And still are those who ask for “*Neither!*”
 (to whom I say “*Get Real!*”)
Alas! If the people were smart
I would give them only carrots
Or, if stubborn and cattle, only sticks
But in my experience they are both
And such requires a mix.**

**For remember:
When they are big,
 carrots are of poorer quality
When they are big,
 sticks frighten more
When they are small,
 carrots are more alluring
When they are small,
 sticks are called twigs**

**Wise mothers say,
“*Eat your carrots!*”
 and
“*Don’t play with sticks!*”
Both to the benefit of your eyes
So to see with clear vision,
My own wisdom is this:
Carrots are the measure of a gem
 take them while you can
On the far side of sticks is Hades
 avoid them while you can**

Detritus ¹⁵
Michael Roswell

**Oh that wonderful stuff,
Muddy,
Goey detritus.
Some would say
It smells
Like sulfur,
With a bit of methane,
And rotting dung
Mixed in
So bad,
Not me.
Hungry,
Eat it.
Dying,
Become it.
Need a home
Knead a home.
Why bother
Making any landfills,
Mountains of trash
Filling our planet
The way
Water gets soaked up
Into a napkin
When you
Can make
Detritus?
Why make
A sandwich
When detritus
Is over there?
Why make
Mud bricks
Or concrete,
If you can
Dig a hole?
Potpourri,
Detritus will do.
Detritus.**

Sun Rise Walk ¹⁶

Maggie Sachs

**I walk along a road of sand, never ending.
Along my side, the black water,
Sloshing and writhing
Like a fire, in the ocean.
Darkness surrounds me.
In the far distance, there is a tiny gleam of light,
As if someone had ripped a hole
In a black sheet that resembled the sky.
At the beach, music plays.
The waves crashing in furiously
Keeping the beat
Seagulls sound the melody
And the sandpipers dance to the music.
I keep walking, and walking
Miles and miles
Slowly vanishing into the distance.
Soon, the sun begins to rise,
Fast,
Faster than an Olympic runner.**

The Wonders of Assateague ¹⁷
Sami Winer

**I take back memories of...
The beach,
The cold, cool water
Shimmering in the sunlight.**

**The salt marsh,
That unforgettable smell,
Of the mud that smelt of
Rotten eggs.**

**The dunes,
Ever changing...
Animals landing there,
Then the sand, tumbling down.**

**The forest,
Where the animals run freely,
The trees folding over you,
Like you wrap in a blanket,
On a cold night**

**The bay,
The fish swimming,
Without any fears,
The cool air,
Blowing in your hair.**

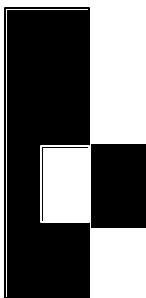
Will you ever return?

Endnotes

- ¹ Professor: Jerry Waldvogel; Course: General Biology; Assignment: Students were asked to accurately portray some aspect of the biology covered in the course.
- ² Professor: Jan Murdoch; Course: Psychology, Clinical Practicum; Assignment: After hands-on clinical experience with individuals having diagnosed mental disorders, students were asked to write a poem from their perspective or from the perspective of a person with a diagnosed mental disorder.
- ³ Professor: Melanie Cooper; Course: General Chemistry; Assignment: Students were given the topic Equilibrium and asked to write a poem that incorporates both the everyday “real world” meaning and the chemical definition of equilibrium.
- ⁴ Professor: Judith M. Melton; Course: Women’s Body Image in Popular Culture; Assignment: Students were asked to create two poems dealing with the themes of the class.
- ⁵ Professor: Judith M. Melton; Course: Women’s Body Image in Popular Culture; Assignment: Students were asked to create two poems dealing with the themes of the class.
- ⁶ Professor: Wayne Patterson; Course: Intermediate Business Statistics; Assignment: Students were asked to focus on a subset of the basic topics examined in the course, write a poem to inform a non-class member in some way about statistics, and illustrate the ideas using practical examples or illustrations.
- ⁷ Professor: Lucy Rollin; Course: Children’s Literature; Assignment: Students were asked to experiment with words, think “outside the box,” and imagine new ways to experience a work of children’s literature.
- ⁸ Professor: Patricia Connor-Greene; Course: Abnormal Psychology; Assignment: Students were asked to write two poems: the first poem was to be written just before visiting a mental health treatment facility (in anticipation of what they might see or feel); the second poem was to be written immediately after the site-visit.
- ⁹ Professor: Alma Bennett; Course: President’s Seminar, “Place: An Interdisciplinary Study of the Function of Setting”; Assignment: Students were asked to write a poem that reflected an intense but carefully focused response to a place, to place itself.

“Oh that wonderful stuff”:
Selected Poetry by College and Middle School Students

- ¹⁰ Professor: Joel Brawley; Course: Introduction to Modern Algebra; Assignment: Students were asked to write a poem which had to be at least ten lines but no more than one page and had to pertain to the course in some way.
- ¹¹ Professor: Joel Brawley; Course: Introduction to Modern Algebra; Assignment: Students were asked to write a poem which had to be at least ten lines but no more than one page and had to pertain to the course in some way.
- ¹² Professor: Jerry Waldvogel; Course: Honors Biology; Assignment: After discussing topics like drug addiction, cloning, smoking, and abortion, students were asked to write a poem that explores the topic from the perspective of some person or object involved in the issue.
- ¹³ Professor: Michelle Martin; Course: Children’s Literature; Assignment: Students were asked to write a poem based on the poetry of Paul Fleishman in “I am Phoenix” and “Joyful Noise,” poems which are written for two voices. Directions to read the poem are as follows: the person on the left reads the left column; the person on the right reads the right column, and each is silent when nothing appears on his/her line; when text is printed for both readers, they both read, even if the words are different for the two speakers.
- ¹⁴ Professor: Margaret Thompson; Course: Studies in Environmental Science, Law and Policy; Assignment: Students were asked to review the curriculum and find a topic to use in a poem.
- ¹⁵ Teachers: Nadine Feiler and Nancy Abrams; Course: Sixth Grade Science and Literature Project. Assignment: At four different points in the project students were given jeweler’s loupes and asked to look at objects, sketch them, write about what they saw, ask themselves what the object reminds them of, and theorize about why the object looks as it does. The notes were used for the poems, three of which are used here. According to *The Concise Oxford Dictionary*, Detritus is “waste or debris, in particular organic matter produced by decomposition or loose matter produced by erosion.”
- ¹⁶ “Sun Rise Walk” and the poem that follows describe the poets’ thoughts and feelings after a field trip to do research on Assateague Island.
- ¹⁷ Assateague Island is an ocean park in Maryland.



Greater than the Sum of Parts: A Poetry/Science Collaboration

Nancy Abrams

The Park School of Baltimore

Nadine Feiler

The Park School of Baltimore

Any good poet, in our age at least, must begin with the scientific view of the world; and any scientist worth listening to must be something of a poet, must possess the ability to communicate to the rest of us his sense of love and wonder at what his work discovers (Edward Abbey, qtd. in Brown xv).

Collaborations between disciplines in middle school usually occur between language arts and social studies, or between math and science; however, we found a collaboration between language arts and science to be a fruitful experience for our students in their learning both disciplines and in improving our own teaching.

Understanding poetry and science requires many of the same skills: close observation, description, and metaphorical thinking. To that end, we developed a curriculum that focused on those skills as our students studied barrier islands in sixth grade science and poetry in sixth grade language arts.

The collaboration began with Nancy's desire to improve the writing her science students did. While the content of their reports was satisfactory, Nancy found students did not use the writing skills they had learned in language arts classes. (This lack of transfer is commonly observed in middle school and is one reason for cross-disciplinary collaborations.) Nadine's involvement was first limited to helping students with the research and writing of their reports. Students used language arts class time to take research notes, and Nadine

helped them to revise and proofread their reports. This collaboration met Nancy's needs, but it was essentially a one-sided collaboration, with language arts supporting learning in science. We wanted a collaboration that better served student learning in both areas. Poetry proved to facilitate such a collaboration. Students would be applying the same skills in learning both science and language arts. They also would now be working on substantive tasks in both classes: researching barrier islands and writing original poems. Consequently, the learning in both disciplines was transformed. The whole was greater than the sum of the parts.

Why Science and Poetry?

The connection between art and science is well documented. Albert Einstein frequently referred to the value of his imaginative capability; one such example is found in *Bartleby's Quotations*: "I am enough of an artist to draw freely upon my imagination. Imagination is more important than knowledge. Knowledge is limited. Imagination encircles the world." The writings of Stephen Jay Gould, Lewis Thomas, Rachel Carson, Annie Dillard and others are powerful because they use poetic language to precisely express science concepts.

We can also look at the relationship between science and poetry from the poet's point of view. Poets have often spoken of the drive to write in terms that could easily be used by scientists; John Ciardi describes writing as a compulsion, a search "for those glimpses of order that form can make momentarily visible" (Murray 4). According to Donald Murray, numerous poets have described the experience of writing poems in words such as "discovery" (John Ashbery, Jorge Luis Borges, Maxine Kumin, Denise Levertov, Gertrude Stein, William Carlos William), "surprise" (Robert Frost), and "exploration" (Charles Simic, Robert Penn Warren). Introducing an anthology of poems about science and math, Kurt Brown writes:

Perhaps the kind of imagination it takes to conceive of a radical and complicated new scientific theory, and prove it, is not so different from what is required to envision, compose and successfully execute a great poem. The human mind may not be as compartmentalized or fractured as we tend to believe. If science

and art have anything in common it exists in the resources of the human brain and our ability to create something unforeseen and revolutionary out of our dreaming. (xiv)

Close observation and careful recording of those observations are fundamental skills of scientific endeavors. Poets as well as scientists must see the world around them with new eyes, collecting an abundance of sensory images from which they can draw. Poet James Dickey offered a definition of a poet that could easily apply to scientists: “Someone who notices and is enormously taken by things that somebody else would walk by” (Murray 17). In *The Private Eye*, an interdisciplinary curriculum incorporating science and the arts, author Kerry Ruef proposes that skills provide the common ground: “The four most important tools, the four most important thinking skills of the arts or sciences—applied or academic—are looking closely, thinking by analogy, changing scale, and theorizing” (9).

Science and poetry are connected by an even stronger bond, that of metaphorical thinking (the “analogy” Ruef speaks of). In both disciplines, people use metaphor in an attempt to understand a new concept, by imaginatively comparing it to a known concept. Ruef notes the pedagogical value of this function of metaphor; metaphors “help make sense out of the unfamiliar, they sort new patterns into your own familiar patterns. They make a barnacle, or a spider, or your fingerprint into ‘a friend.’ The analogy allows you to see more....” (Ruef 25).

We can further “mine” the metaphor to uncover correspondences between the two objects, thereby helping us to learn even more about the new concept.

...analogies often contain clues to the function of whatever feature you are observing. 99% of what’s found in nature is functional, and since form follows function, ask yourself: “If it reminds me of *that*, I wonder if it might function like *that?*—in some way. (Ruef 17)

For example, in our classes, students were encouraged to think of the salt marsh as a sponge that successively fills with and empties water. Less obvious is the comparison of the functions of marsh and sponge: we use sponges to clean

things, and the marsh acts as a filter for the water. A sponge that has been dry for a while looks and feels very different from its usual damp state; likewise, the marsh at high tide looks quite different from the way it looks at low tide. In this way, the metaphor of sponge for salt marsh can also work as a mnemonic device, enabling students to integrate more new information about salt marshes.

The pedagogical use of metaphor is further explored by Pugh *et al* (122). Additionally, they note that scientists themselves use metaphor to expand knowledge:

Not only do metaphors help students learn about science concepts, but they also help scientists in discovering scientific precepts [...] the function of the heart became clear only after the invention of the pump. Indeed...the function of the heart became knowable only after the invention of the pump. Once people understood how a pump worked, they could use that knowledge to make sense of the heart's function. (Pugh *et al.* 122)

Because making metaphor is frequently an intuitive act, a “leap” of imagination (to use a metaphor), we are frequently surprised, even delighted by, metaphors. That quality of surprise is likewise found in both poetry and science. The words of writer Edward Abbey quoted at the head of this article express this idea, as did Einstein, as recorded by *Bartleby's Quotations*, when he said, “The most beautiful experience we can have is the mysterious.... the fundamental emotion which stands at the cradle of true art and true science.”

The Curriculum

To introduce the focus on the skills of close observation, note-taking, and metaphorical thinking, we used activities from *The Private Eye* curriculum. According to this model, students use jeweler's loupes, which magnify objects by ten. Students examined a variety of objects using the loupes and followed these steps:

- Looking
- Sketching
- Writing about what they see
- Asking themselves what the object reminds them of, therefore making metaphors

- Finally, theorizing about why the object looks the way it does: what purpose does its shape serve?

Some of the objects we had students look at through loupes were the palm of their hands, celery, cardamom pods, and dried purple coneflowers.

These skills were then extended to a science project based on the different zones of a barrier island. Students learned about beach, dune, salt marsh, bay and forest zones, as well as about ecological models, producers and consumers, equilibrium, community, and interdependence. The unit culminated in the sixth grade retreat to Assateague, a barrier island off the coast of Virginia and Maryland. In addition to activities designed to create cohesion among the class and some just for fun, students also did primary research into one of the five zones. We brought the loupes and plenty of paper and pencils so that students could observe, sketch, and write as part of their primary research. The notes and sketches from the trip provided part of the raw material for their barrier island projects, which they created when we returned to school. Although projects took on various forms in the past, such as books, board games, dioramas, videos, and posters, when the project took place at the end of the science/poetry collaboration, many students chose to create poems that contain metaphors for their projects about what they observed.

Applying the skills of observation, note-taking, and metaphorical thinking in language arts class was easy. All the observational notes from the science notebook also served as the raw material of poetry. We read poems that provided either closely observed details and/or focused on something in nature. We primarily used Dunning *et al.*'s book *Reflections on a Gift of Watermelon Pickles*. To establish the importance of close observation in poetry, we read "To Look at Any Thing," by John Moffitt. We compared "The Bat" by Ruth Herschberger, which is full of scientific information and "The Bat" by Theodore Roethke, which is largely metaphorical. We also read Rosalie Moore's "Catalogue" to notice the closely observed details and metaphors and Wallace Stevens' "Thirteen Ways of Looking at a Blackbird" for a model of an interesting way to structure a poem and for the sheer mystery and fun of his multiple perspectives. Students also learned about and practiced using line breaks, alliteration, consonance, repetition, and white space.

With *The Private Eye* model for gathering information and the published poems as models for finished products, stu-

dents each chose an animal to observe closely over a few days. (We are fortunate to teach on a campus with geese, ducks, a swan, horses, and, at the time, tropical fish, so students did not need to have family pets.) These notes became the raw material for animal poems.

Students extended these skills yet again in another literature project. As part of our next unit, world literature, we read the novel *Walkabout*, which is set in Australia and which abounds in descriptions of the flora and fauna of Australia as well as in metaphor. Students were asked to select one of the flora or fauna, research it (in place of close observation), and draw it. They created poems and illustrated them with images of their subjects.

Student Work

In this section, we include (in roughly chronological order) four of our students' poems, first from the animal poems based only on direct observation, then the barrier island project using both observation and research, and finally Australian animal poems based only on research. For each poem, we will discuss how it reveals the student's understanding of scientific concepts and how it works as a poem. Students' comments are from their writing portfolios, written months after the poems, more evidence that the learning was fully integrated.

Seven Ways of Looking at a Hermit Crab

1

**Among the tons of sand only one
moving thing,
the antennae of the hermit crab.**

2

**I was of two minds,
like a sponge in which are two
hermit crabs.**

3

**I do not know which to prefer,
the color of his claw,
or the tickle of his legs.**

4
When the hermit crab
waddled out of sight,
he marked the cornmeal upon
which he fed

5
The cornmeal is disturbed,
the hermit crab must be moving.

6
A man and hermit crab are one,
a man, a hermit crab, and
the ocean are one.

7
Like a human buys new clothes,
a hermit crab changes shells.

By Max

This poem shows that Max closely observed his pet hermit crab. He noticed its behavior (its slowness and how it feels to hold one), habitat, its diet in captivity, and the coloration of its claws. He also uses a metaphor to express the way it sheds and finds new shells. As a poem, it succeeds in imitating the form and mystery of Stevens' poem. Max carefully chose language to communicate the details he observed, such as "the tickle of his legs" and "waddled out of sight." Verse 5 is especially effective in communicating the slowness of hermit crabs: a disturbance in the cornmeal is the only evidence of movement. This was a point of pride for Max, who noted in his writing portfolio that this "is a poem I wrote where I did a lot of observation of a hermit crab. (Which goes very slow!)"

We include two examples of poems from barrier island projects, from students whose command of poetic language was quite different in sixth grade—yet both students succeeded in using scientific information and poetic devices.

The Forest

The wind ruffles the forest floor
Sending spirals of leaves into the air

**To drift down again
The live oaks, loblolly pines, red cedars
Rise gracefully,
Towering over us
Protecting little heads
From the storm that rages outside
A magnificent palace, a peaceful sanctuary**

**Safe, quiet places, cheerfully invaded
By chittering squirrels
Singing birds
Cedar waxwings dart, stealing cones
To add to the growing pile of plundered nuts**

A mockingbird calls

**The forest grows silent
Squirrels freeze, and birds take wing.
You hear them, then see them
Tramping through the silent wood
Bright voices, loud colors
Scaring the forest away.**

**The forest revives
Shaking silence from every leaf
Slippery silver substance
Rides a roller coaster of leaves
To the wooded floor**

**A hummingbird buzzes by
Wings never pausing
As a monarch butterfly rests,
Dreaming
Of blooms long past**

**Night has come
The twinkling blanket of stars
Wraps the world in darkness
Overwhelming**

**Giant majesties have risen
And are again
Gently brushed by midnight breezes
Sending once more, spirals of leaves to the ground.**

**Moon and stars sweep across the sky
As dawn paints the horizon
Brilliant beauty ignored
By grim soldiers
Unrelenting
March**

**Huge Noise breaks loose
Buzzing, causing trees to shake
Down to their roots
Jolting animals out of sleep
Moments, and the forest is empty
Silent
But for the fearful shaking of those rooted
And the bone-shaking
Nay,
Bone-breaking
Sound that filled the forest**

**The sun beats down
With nothing to shade them,
The animals, terrified, peek
At the desert of stumps
Not majestic
Still oozing sap
Like tears.**

By Elizabeth

Elizabeth based her poem on a bike ride through the forest zone of Assateague, noting trees such as loblolly pines, which are specific to the island. She weaves into the poem the importance of the forest zone in providing protection for animals during the many storms a barrier island endures. Elizabeth describes the changes in the forest from day to night. By contrasting the protected Assateague forest to one being cut down to make way for development, she demonstrates understanding of the concepts of equilibrium and community. Elizabeth's command of the concepts and of the imaginative leap she took are especially evident in the poem's revision, as Elizabeth explains in her portfolio: "The second half—the half about the destruction of the forest—I wrote later, when the county started cutting down a forest near my house." Elizabeth does not stint on the poetic aspect of the assignment,

either. The use of poetic devices is impressive for such a young writer, from the numerous, effective uses of alliteration to the many evocative metaphors. She gave careful thought to the use of line breaks and white space to create pacing and meaning.

Silverside Fish

**My name is Mr. Silver,
I am a fish that lives in the marsh,
Zooplankton is my food every day.
I swim around all year until there is a
Spring tide and the salt marsh over flows and
I go zooming out to the bay like a silver bullet.
But once in a while I get picked up by those awful
Seining nets that you can't see through,
But then they throw me out back to the bay
Where I belong.**

By Justin

Justin studied the salt marsh; silverside fish were one of the consumers he researched. While mature silverside fish can also be found in the bay zone, young silverside fish are more common in the marsh, and we found many the day Justin's group went seining. His poem shows that he knows the fish's place in the food chain; he also clearly understood the unique circumstances of its habitat and behavior, when he writes: "I swim around all year until there is a/Spring tide and the salt marsh overflows and/I go zooming out to the bay like a silver bullet." This poem was more typical of sixth grade writing than Elizabeth's; nevertheless, it was rich in detail and poetic devices, not the least of which was Justin's effective use of metaphor in the above-quoted lines. He, too, gave careful thought to the use of line breaks and details. In his portfolio, Justin wrote, "I explained everything I knew about the silverside fish in a poetic way. I also said all the troubles that the silverside fish would encounter such as seining nets and spring tides."

Tasmanian Wolf

**He is the king of the desert.
His jaw is the size of a hippo's
He is swift and crafty as a tiger,
Sly as a fox and smart as an elephant.
He races by like a Ferrari chasing the rabbit,
The wolf gets closer and closer.
And then, the rabbit's gone.**

By Olav

Olav chose to research an animal we found on a website about Australia, rather than one from *Walkabout*. The series of metaphors communicate what he learned from his research: the animal's place in the food chain ("king of the desert"), its oversized jaw ("the size of a hippo's"), and its adaptations and predatory diet ("He races by like a Ferrari chasing the rabbit"). Olav uses simple language and a straightforward list structure for this poem. Young writers frequently rely on what we would consider to be clichés; nevertheless, words such as "sly," "swift," and "crafty" are not in their everyday vocabulary. Because Olav was able to draw on both disciplines, the poem is richer than it might have been.

Why the Collaboration Worked

Teachers frequently shy away from collaboration in the classroom, fearing it will take too much time from their own curricula. However, we found that our collaboration did not increase instructional time; rather time was used more efficiently, because frequently lessons served learning in both disciplines.

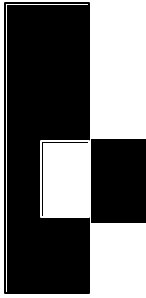
Teachers may also be reluctant to collaborate, fearing that they will compromise the integrity of their own curriculum. However, we did not find this to be true because, we think, the collaboration was authentic and well grounded in theory and practice. Focusing on common skills provided students and teachers entry points for science and poetry. The students had more practice in applying the skills of close observation, note taking, and metaphor making than they would have in just one or the other subject area. Even if we had separately covered the same material, we don't think the

mere duplication of effort would have had as powerful an effect on learning that the coordinated effort had.

The collaboration also provided scaffolding for students who felt they were better at one subject than the other. For example, a student who saw herself as “good” in science but not in writing could approach these assignments primarily from her science strengths. Likewise, the student who loved to write poetry but lacked confidence in learning science could focus on that aspect. The collaboration in effect raised the bar in both classes for quality of student learning. Students’ writing in science was richer and more evocative of their understanding. It opened up doors to description, making students take closer looks and ask themselves questions that otherwise may not have been asked. (*The Private Eye* curriculum does extend the model to theorizing, asking why a metaphor works.) In language arts, students had a new source of information to draw upon for their animal poems, and the results are more effective, interesting, and often sophisticated. In asking our students to be both poets and scientists, we found that, in the words of Edward Abbey, they possessed the ability to communicate to us their sense of love and wonder at what they had discovered.

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“Plerk,” “Plabor,” and a Conventional Caper: Redefining the Work and Play of Poetry Within the Discipline of English

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Despite Wendy Bishop’s call for all writing teachers to investigate “the basic commonalities of writing a poem and writing an essay” (190) few of us within the discipline of English have attempted to transgress current intradisciplinary boundaries to reintegrate the seemingly discrete textual practices we associate with either composition-rhetoric or creative writing. In most cases, we have allocated the responsibility of teaching the production of different forms to different curricular locations. Instruction in the writing of poems is most often reserved for upper- or lower-division creative writing electives; instruction in the writing of essays is usually considered the domain of the first-year composition course. Both these forms and the academic enterprises that have usurped them have lived divided institutional lives with some but little protest. As a result, composition-rhetoric has been allowed to remain the industry of rhetorical and discursive production and creative writing the respite of aesthetic and formalist recreation. Because, in higher education, the poem and the essay have been firmly entrenched within these seemingly incompatible enterprises, their functions have been restricted, their possibilities limited.

Poems, under the fine arts model and extended New Critical paradigm, which have long dominated creative writing pedagogy, continue to be defined as isolated objects of art designed to provide audiences with pleasure and entertainment. Creative writing students are encouraged to use this genre to demonstrate their mastery of craft through formal and stylistic “play.” In other words, they are asked to experiment

with poetic conventions in order to produce an aesthetic object made of words, or what Mary Oliver calls "a well-made thing [that] gives pleasure through the authority and sweetness of the language used" (58). While this "play" or experimentation requires students to concentrate on the formal artistry of the poems they produce (i.e. how they might deploy devices of sound or image), it requires them to pay less attention to the social or persuasive purposes of these texts (i.e. what they might want their poems to do in the world—other than be appreciated for their artistry). In its worst manifestations this kind of "play" appears frivolous, a kind of fun without consequence, without social significance, and without communicative purpose. In *A Poetry Handbook*, for instance, Oliver removes the play of poetry from the realm of interpersonal transaction: "It is no use thinking, however, that the writing of poems can accommodate itself to a social setting...the poem requires of the writer not society or instruction, but a patch of profound and unbroken solitude" (117). And in *The Poet's Companion*, Kim Addonizio and Dorianne Laux define poetry not as a discursive act but as "irreducible art" (22). These and other contemporary poetry handbooks do little to challenge—and often reassert—Archibald MacLeish's famous definition of the poetic function as an exercise in beautiful uselessness: "A poem should not mean / But be" (Lines 23-24).

While the creative writing enterprise has continued to divorce poetry from social activity by recycling MacLeish's "Ars Poetica," composition-rhetoric, since its 1980s "social turn," has displayed a renewed sociological interest in the relationship between academic writing and society. The essay, within this enterprise, is increasingly being valued for its communicative, discursive, and rhetorical functions. The genre is used to demonstrate composition students' performance of academic "work" and, with increasing frequency, it is becoming associated with a slightly different connotation of this term. Often, the essay topics assigned to students require them to investigate how writing "works" to shape subjects and social reality. In "Taking the Social Turn: Teaching Writing Post Process," John Trimbur describes this trend within composition as an effort to represent "composing as a *cultural activity* by which writers position and reposition themselves in relation to their own and others' subjectivities, discourses, practices, and institutions" (109). Increasingly,

the activity of writing essays is being used in an effort to prompt students to self-consciously examine the work their own and others' writing performs within the contexts of various social-discursive communities. Writing within composition-rhetoric often requires students to investigate specific links between language use and the conditions or distributions of power within literate cultures. Composition pedagogy, then, is often defining its work in opposition to stylistic play and moving toward more expansive concepts of cultural literacy, or what John Schilb defines as “true literacy.” Within his and others' proposed future for the enterprise of composition-rhetoric, writing an essay means “examining one's society, not simply manipulating surface features of text” (187).

In short, the commonalities between the poem and the essay, as defined by their institutional homes, appear hard to find. Within the culture of the English department, their pronounced differences are not easily reduced to structural conflicts like line vs. sentence or stanza vs. paragraph but rather reflect the functions each writing enterprise within the discipline has assigned to each form. The functional differences between the poem and the essay, then, are less innate or universal and more emblematic of a conflict created by the institutional division between creative writing and composition-rhetoric. This severance has enabled a kind of bifurcated thinking that theorizes writing as either cultural work or stylistic play but rarely encompasses both. Because the two institutional bodies responsible for the production of texts remain severed and because we, as English teachers, are often hired to teach in either one or the other location we have not experimented extensively with using poetic play as a means of encouraging students to perform consequential cultural work. We recognize that the essay has somewhat arbitrarily become the preferred medium for performing sociological analysis or evidencing cultural labor although it is not inherently better suited for this task than any other form, be it a comic strip, short story, or sestina. Nonetheless, while we make it a somewhat standard practice to ask students to investigate constructions of race or sexuality through the writing of essays, on rare occasion do we ask students to investigate the politics of personal or social identity by exploring the conventions of poetry.

The renewed advent of introductory writing-in-the-disciplines courses, however, offers new possibilities for adopting

this very approach to education in English. A course titled neither “creative writing” nor “composition”—one designed to introduce English majors to the kinds of writing they might be expected to perform within their radically variegated discipline—would likely need to represent the forms and genres of both composition-rhetoric and creative writing, the poem and the essay. Within such a course, representations of the two writing enterprises and their key genres could feasibly remain separate, even juxtaposed. We might adopt Gerald Graff’s approach to teaching the conflicts and use the course to identify how and why creative writing and composition have historically defined the writing of poems and essays in such radically different ways, exploring issues of institution and ideology. In a single semester, we might require students to spend five weeks writing poetry according to the formalist strategies outlined in most creative writing handbooks, spend five weeks writing essays according to the rhetorical methods offered by composition readers, and devote the remaining several weeks to examining the underlying differences between writing practices. Recognizing, however, that the “conflict method” would likely sustain the artificial binaries created by the university, we might invent a more radical pedagogy and attempt to deliberately collapse or amalgamate composition-rhetoric’s and creative writing’s seemingly oppositional constructions of writing. Rather than relying on divided units of study within a semester-long class, we might offer a cohesive approach through a kind of intradisciplinary synthesis that presents students with a holistic view of writing as a simultaneously creative and critical activity, a kind of play-work. But how would such a synthesis be achieved? How might we attempt a fusion that combines poetic play and cultural work in a new approach to learning?

Hans Ostrom has offered a synthesis of work and play that presents a useful starting point. In “Grammar J as in Jazzing Around,” Ostrom theorizes the activity of writing by developing the concept of “plerk,” a neologism in which, he states, “work and play are fused.” He argues that writing teachers and students should rely on this deliberately conflated term to redefine their concepts of academic writing, and thus escape the “bored fatigue” often perceived to accompany the process of writing academic essays, which he associates with drudgery: “Though in one sense college consists of little ex-

cept writing, almost no one plays with writing. It's frequently grim work. With grim results. Mostly, college writing is a joyless affair.” He thus suggests that teachers of college composition challenge some of the static regulations that have, historically, defined their enterprise and encourages students to take improvisatory risks with their writing by contesting and altering the conventions of essays. Ostrom's neologism comes mainly in reaction to the perceived “current-traditional” legacy of composition-rhetoric, i.e. what many composition reformers have criticized as the enterprise's rigid definition of academic writing, overriding concern with error-correction, and upholding of inflexible writing rules. Like Winston Weathers before him, Ostrom seeks to provide composition students access to styles or grammars (associated with creative writing) that they might not otherwise encounter in required composition courses. He then encourages them to use their play with “alternate” conventions to enhance their academic prose through “spontaneous performances of language.” In these performances, he suggests that the improvisatory rhythms of jazz, hip-hop, and poetry can be used to construct serious and entertaining essayistic texts. He further suggests that “plerk” can make academic writing less formulaic and foreign. Speaking directly to students, he associates the term with games like hacky-sack, pinball, or “whatever thing you do easily” (77-78).

“Plerk” offers a convenient device for naming the amalgamation of “play” and “work” while at least expanding composition-rhetoric's approach to writing instruction. The term, however, could use further and revised definition, for under Ostrom's treatment, its implications remain limited. Although Ostrom's “plerk” offers an alternative to the rigidity of some forms of writing instruction, it provides a superficial definition of “work” and, by associating play-work only with easy and familiar activities, it risks trivializing the social and communicative complexities of writing. When Ostrom discusses work, he does not conceive of it as valuable labor or cultural practice, for he assumes an audience of resistant students who equate the labor of writing with “loathing,” “dread,” and “confusion” (78). He tries to accommodate these prejudices often by valorizing stylistic play at the expense of cultural work and in this sense risks importing not only the playful conventions of creative writing but also the frivolity sometimes associated with the enterprise. The implicit purpose

underlying the invention of "plerk" is not only to advocate essayistic writing that performs the work of poetry but, more significantly, to make writing appear easier and more fun to potentially resistant writers. While thus appealing to what he perceives as students' desire to learn through play, Ostrom does not discuss the real purposes or functions that writing (whether of poems, essays, or poetic essays) works to perform in the social sphere. Like many creative writing practitioners, he tames or mutes these functions by leaving them conspicuously absent. In short, he uses the concept of "plerk" to provide students the opportunity to "jazz around" with language and thus make the required task of writing essays appear more pleasurable and interesting; however, his discussion begins and ends with the surface stylistics of jazzing around.

I propose that we develop Ostrom's concept of "plerk" to elaborate a more thorough and balanced synthesis of play-work, one that encourages students not only to experiment creatively but also to ask themselves what work they are performing when they play with convention-making and -breaking. Thereby, we might prompt them to examine not only the improvisatory art of jazzing around but also the effects and consequences of their jazzing around. In retrieving the notion of work in Ostrom's "plerk," I do not mean to suggest, as John Schilb has, that we treat formalist and critical pedagogies as oppositional or abandon stylistic concerns in favor of some kind of rarified sociological and theoretical analysis, but rather that we explore the ways we can encourage students to examine their society and social identities *through* the manipulation of the surface features of text. It is this kind of activist "plerk," this kind of formal and cultural study, that might become the subject of our in-the-disciplines writing courses and permit us to reevaluate the writing of poetry as something more than merely a playful, formal, or frivolous affair.

I offer here an extended example to explain how I imagine a revised notion of "plerk" affecting our pedagogical treatment of poetry. Bobby Chen, a student in my introductory writing-in-the-disciplines class at SUNY-Albany recently submitted a poem that helped me better understand the relationship between stylistic play and cultural work, or, more specifically, the way that writers perform cultural work by playing with or manipulating stylistic conventions. The text,

which follows, he characterized as a list-poem, albeit one that offers a fairly unorthodox arrangement of text on the page:

flat down dog soup
sour soda O.J.
days yellow
spongy old tuna
watered hot chicken salad
flavor fried soy beef
shrimp w/pan sweet
with seafood
fun w/tea chips
noodles milk chow coffee

When I first encountered this poem, I felt rather puzzled and sought to understand the logic according to which the text was organized. Initially, I assumed that the poet was jazzing around with language in a kind of postmodern play, in which the relationship between signifiers was left ambiguous and relatively arbitrary. The work appeared to be centered on the activity of eating or describing food, but it also appeared to leave room for a multitude of voices and trajectories. In other words, what I perceived as a kind of ordered scattering of words across the page allowed me to read the text horizontally, vertically or randomly and generate multiple meanings from my various reading practices. Phrases like “Flat down dog soup,” “Flat sour days,” “Spongy old tuna,” and “fun w/tea chips” seemed equally permissible, equally pleasurable, and equally strange. I thus associated the list with the kind of radically open form and celebration of indeterminacy that has become a relative staple of 20th and 21st century avant-garde poetry since the advent of “Language” writing, and I wondered if the writer generated the text through some kind of chance operations. Remaining unsure of the specific procedure at play, I nonetheless enjoyed the freedom I was granted to roam through the items of the list

as well as the authority I was granted as a meaning-maker. While I wasn't sure that I understood the purpose of the list, I felt responsible to attempt a political reading and reverted to my familiar taxonomies, classifying the poem as an “open text” according to Lyn Hejinian's definition of the term: “The ‘open text’ by definition, is open to the world and particularly to the reader. It invites participation...It speaks for writing that is generative rather than directive. The writer relinquishes total control and challenges authority as a principle and control as a motive” (28). This category provided me a convenient way to make sense of the poem's politics, but because I couldn't help feeling that I was overlooking some structural design, I sought further clarification by engaging in several conversations with the poem's author.

Through discussions with Bobby Chen, I discovered that the work-play here involved much more than randomness and the challenging of the writer's authority as the primary controller of meaning. Within this free-play or more accurately, this jazzing around with the conventions of lists, rested a kind of riddle about reading conventions and social/cultural identity. In several classroom conversations and in a later draft of the poem, the writer included the rather cryptic directions “repeat four times towards the center,” thus revealing more of an intentional strategy at work. I now understood, first, that the list was not generated at random but according to a very specific design, and second, that Chen was challenging my conventional reading practices more profoundly than I had realized. He was asking me to make sense of the items in the list by reading them diagonally. The first text box I was to read from the upper left corner toward the center of the page and the second text box I was to read from the lower right corner toward the center of the page. After struggling with these directions and receiving further guidance from the poem's author, I was able to make more sense of the list's wrap around patterns and generated the following phrases within the first text box:

**watered down O.J.
spongy hot dog
days old chicken soup
sour yellow tuna salad
flat soda.**

The lines of the second text box I read as follows:

**coffee w/tea
chips with shrimp flavor
seafood w/pan fried noodles
sweet soy milk
beef chow fun.**

Having decoded this patterning, I realized that what appeared was a juxtaposition between American and Asian food, a contrast between the sorts of unappealing dishes one might find in an American cafeteria or sub-par deli and those one might find in a Chinese fast-food establishment. “Chow” which I had originally read as a slang term for food, and “fun” which I had assumed signified recreational activity, now functioned as proper nouns, specifying a particular Chinese dish. Accompanying this playful punning and this conflict of cuisine was a more labor-intensive politic.

The poem revealed not only a juxtaposition of cultural appetites but also a juxtaposition of cultural reading practices that called into question the normalcy and ethnocentrism of my everyday reading habits. Written English is arranged to be read horizontally from left to right; most traditional Chinese languages, in contrast, arrange their characters to be read vertically from right to left. Chen, an Chinese-American who moved from Hong Kong to Queens, NY when he was in his early teens, speaks and writes Mandarin, Cantonese, and English; he thus fluctuates between the directional orientations of reading and writing practices, entering texts vertically, horizontally, and from either side of the page. His decision to arrange list-items diagonally might reflect the “in-between” state or reality of an individual who grew up within a flux of Chinese and British cultures in postcolonial Hong Kong and fairly recently moved to the United States. And it certainly reveals a contestation for textual power, for it prompted me to reexamine the ideological assumptions I brought to the text.

As I read and reread this poem, despite my initial presumption of its “openness” and my eventual knowledge of its preferred arrangement, I continually had to fight the tendency to read the lines horizontally. When I did read the lines from left to right, as I ordinarily would, I experienced a sense of unfamiliarity, one that might be considered poetic,

as it combines unlike words such as "noodle milk" or "days yellow," but that might also be considered deliberately disorienting. (Mis)Reading the poem in this direction led me into a kind of mild confusion, making my own native language appear strange to me. In order to make proper sense of the text or solve the riddle of its preferred meaning, I had to abandon the textual practices I took for granted and meet this Chinese-American author on his own terms—or at least halfway across the page. Through his arrangement, Chen reversed the roles of the players in an all-too-familiar scene. Instead of the nonnative English speaker having to decipher and adapt to the sometimes unfamiliar vocabulary and conventions of his second or third language, the native English speaker was made to decode the very language he professed. Otherwise he was to remain ignorant of the more conventional phrases coded within the syntax. Although required to write in English, Chen thus refused easy assimilation and instead forced me, as his reader, to compromise my own position and question my own norms as something other than neutral. In this manner, he performed profound cultural and activist work through what might appear a simple list of items (consisting of the kinds of food he complained he had to eat at the college cafeteria vs. those he ate at home) playfully arranged on the page.

We might call Chen's list-poem a "conventional caper" for it performs this work through what is really a minor manipulation of conventions, and this manipulation keeps readers engaged in the pleasure of a guessing game or riddle while it critically questions how the use of "standard" textual practices supports or challenges distributions of power. While synthesizing the activities of play and work, this caper falls without the boundaries of Ostrom's "plerk," for it not only jazzes around with stylistics but uses this jazzing around to engage in ideology-critique. Furthermore, the challenges undertaken by the writer and presented to the reader are not easy (as Ostrom suggests they should be) and in many ways prompt both reader and writer to carefully reexamine what is taken for granted as easy or familiar. For both parties, the text requires much labor, and we might say that it moves beyond "plerk" to perform a kind of "plabor," a playful and politicized labor that uses stylistic innovation to engage in much more than entertainment. In one sense, it could be argued that Chen's poem, as a finished product, requires too

much labor from its reader, for it assumes that an unsuspecting general audience might readily decode the pattern, which, without extra-textual guidance from its author, would likely remain hidden. Following what has sometimes become a workshop rule, one might further invoke the intentional fallacy and claim that the poem should not have to rely upon the writer to explain the intended meaning. Without getting carried away with the power-dynamics involved in such an assumption, I'd like to suggest just the opposite. Whether or not this poem remains readily accessible to an imagined, mute, general reader in an imagined, mute, general context is, in a way, superfluous to the issue of how the poem functions within its immediate discursive working context. The conversations that Chen's work provoked within my writing classroom were by no means extraneous, for they allowed me and my students to examine the complex power relations between (among other things) readers and writers, teachers and students, majorities and minorities. Such conversations, I argue, lead toward a positive re-imagining of poetry within writing classrooms, for when a poem-in-process provokes questions about how it should be read, it enters a transactional and dialogic space; within this space it becomes neither art object nor polemic but a locus for discussion about the very relationship between not only intention and result but, more significantly, craft and culture. It opens up connections and contestations between the work and the world, and it can be used to make the specific topic of how poets and writers use stylistic play to attempt cultural work the central subject of our classes.

I celebrate Chen's writing here not only because I find it a sophisticated and engaging text that has helped to educate me about the connections between play and work, writing conventions and cultural practices, but mainly because I find it emblematic of the kind of “plabor” that writers continually perform on their own accord and that we might better attempt to talk about and encourage in our in-the-disciplines writing classrooms. Most writers, like Chen, do not engage in their textual experiments solely in an effort to master formal conventions or create functionless *objets d'art*; nor, when writing, do they abandon formal and stylistic concerns in order to perform artless activism or formulaic critique. Such practices anywhere apart from the English department would seem abnormal. Rather, as Chen's conventional capser demonstrates, these concerns remain so fundamentally inter-

twined as to be inseparable. To attempt to read Chen's or others' poems (whether completed or in process) through a lens that separates formal and stylistic features from political intent or effect would be to perform a radical disservice to both text and author. And yet that is what we have made standard practice within the divided discipline of English. I hope that as Chen's caper inspired me to work without my familiar categories and reflect on my own pedagogy, my presenting it to a wider audience might encourage more English teachers to rethink the classroom practices the divided status of composition-rhetoric and creative writing has urged us to adopt. Chen's poem, for me and I hope for others, evidences a need to reinvent the teaching of writing in a way that pays more careful and generous attention to writers' play-work. Whether we continue to name this activity "plerk" or rename it "plabor" or call it something else entirely, we can make the synthesis of terms represented by these neologisms both the subject and practice of our in-the-disciplines writing classes and thereby blur the hard line the academy has drawn not only between the poem and the essay, but also the formal and the cultural, the aesthetic and the ideological.

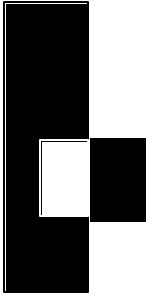
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Unsettling Knowledge: A Poetry/Science Dialogue

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Next

**It's not easy not to drown in
the same question twice.**

**Step lightly
against it, boulder to**

**shoulder, slide out,
slip down.**

**What bears
repeating is the way**

**the handlebars' streamers
went wild in the wind,**

**rounding the corner
where the hydrant
sprayed its slick
across the sky.**

***Sans teeth, sans eyes—*
What was the question,**

**and who was it for?
The generic white vase**

**with its purple lip
pressed against the bookcase?**

**What contains is contained
in a matter of moments**

**only to be dispersed
like milkweed vessels**

**in a manner of vestibules.
Nanoseconds foretell**

**another black hole
where the newly disappeared
reassemble their luxuries
by the airport van.**

**Such stock in
securities as we**

**exchange, begin to
displace us (baryons, mesons,**

**hyperons, quarks), I meant
to say *use*, unmentionable**

**values, dementias,
forms, multi-**

**mensions to come
beyond particles, waves.**

In *Writing and Revising the Disciplines*, a collection of essays on writing and disciplinarity in the sciences, social sciences, and the humanities, I asked nine distinguished Cornell colleagues to situate their current disciplinary writing practices in relation to field-specific continuities and shifts over the course of their respective careers. Extending this collaborative investigation to the area of poetry, the discipline (or as I prefer to think of it the “anti-discipline”) at the core of my own academic career, the present article features the trans-disciplinary reflections of Roald Hoffmann (a Nobel chemist, poet, and contributor to *Writing and Revising the Disciplines*), and Alice Fulton, (a MacArthur prize-winning poet whose work

has been strongly influenced by chaos and complexity theory), concerning poetry's relation to scientific inquiry.

While the stock of science, both literally and figuratively in the increasingly corporate university as in the culture at large, continues its inexorable rise, the fortunes of poetry have longed seemed continually in question. While poetry was for Ezra Pound the quintessence of literature and thus "news that STAYS news,"¹ it was for Charles Baudelaire a half-century earlier, as he suggests in the prose poem "Le joujou du pauvre" ("The Poor Child's Toy"), a kind of luxury object or toy of privilege² (Pound 29; Baudelaire 304-305). Where W. C. Williams famously observed (but on what "evidence"?) that although "It is difficult / to get the news from poems / men" [presumably women too?] "die miserably every day / for lack / of what is found there" ("Asphodel, That Greeny Flower"), W. H. Auden declared, no less famously, that poetry "makes nothing happen" (Williams 318; Auden 52). Culturally coded both within and beyond the academy as antithetical to each other, if not mutually exclusive, poetry and science have come to be perceived in our time (though this perception needs historicizing and complicating, to say the least) as occupying extreme positions along a continuum of so-called "subjective" and "objective," "personal" and "impersonal," "soft" and "hard" modes of inquiry. Indeed, when it comes to poetry, even the term "inquiry" itself tends to give way—as in the newly adopted categories of Cornell's recently revised distribution requirements—to the "expressive." To address concretely this perceived oxymoronic relation and explore what investments and issues may be at stake in their own diverse practices, I asked professors Hoffmann and Fulton to reflect on writing, science, poetry, and their respective locations within the academy by focusing on an exemplary poem or two (or excerpts of selected poems) in which the relation between poetry and science is at issue in their own work. In initiating the exchange, I suggested the following questions, intended not as a template or sequence of response, but as a generative frame:

What do you hope to accomplish in writing poetry, both for yourselves and for your readers? With the rise of Creative Writing as a specialized discipline within the academy over the past several decades, how are we to understand poetry's place within the broader curriculum? What is its received or ideally imagined location in relation to other genres, discourses, and disciplines, as also to the culture at large beyond the uni-

versity? What questions do scientific inquiry pose for poetry in the present context? Are these questions appreciably different now than they were at the beginning of your careers? If so, how? How have your fields evolved over time, and how have the cultural roles of science and poetry changed, if at all over the course of your career? As deconstruction has made us all aware, the positioning of two terms in relation to each other tends to imply a hierarchical relation. In thinking what is called “science” (but we might think here of the more inclusive German term, *Wissenschaft*) and what is called “poetry” together, are we necessarily involved in privileging one over the other? Does science have anything yet to learn from poetry, or is poetry in an unavoidably subservient relation to science, in a certain sense “mute,” unable to speak back to it? Bearing in mind the cross-disciplinary scientific/poetic practices of a figure like Goethe, to take one conspicuous example, or more recently the preoccupations of a figure such as Martin Heidegger with questions of writing, disciplinarity, science, philosophy, language, poetry, instrumentality, and cultural usefulness, how would you respond to Heidegger’s question: “What are poets for?” (“Wozu Dichter?”). Has the answer to this question changed in the half-century since he asked it, in the two centuries since Hölderlin provided for Heidegger an exemplary instance? How would you see your own poetic practice, your own diverse practices of writing and/as cognition, as also the ways these practices have been disciplinarily and institutionally inflected by your positions as teachers in particular fields (“Chemistry,” “Creative Writing”) within the university? What kinds of response to your work do you find most gratifying, or perhaps most disappointing? What does poetry have to say to science and vice-versa? What kinds of conversation and exchange, what kinds of purposes and audiences, do you understand yourselves to be participating in and contributing to in writing poetry informed by questions of science?

As is clear from the differing stances of my two Cornell colleagues in relation to these and related questions, the stakes involved in foregrounding relations among poetry, poetics, and disciplinarity are likely to depend to a significant degree on disciplinary location. From my perspective as a comparatist specializing in modern and contemporary poetry, Associate Dean and Director of Writing Programs in Cornell’s College of Arts and Sciences, and Director of the Knight Institute for Writing in the Disciplines, as well as a writer of poetry, my

interest in poetry and science reflects my concern with poetry's place among competing discourses within and beyond the academy. In "Writing Writing," the afterword to my forthcoming *Local Knowledges, Local Practices: Writing in the Disciplines* (University of Pittsburgh Press, 2003)—a version of which originally appeared as "Poetry, the University, and the Culture of Distraction" in a special issue I edited for *Diacritics* entitled "Poetry, Community, Movement"—I have explored poetry's current and potential role in higher education—concluding, as the present essay begins, with my poem "Next"—in the context of Cornell's discipline-specific approach to writing and writing instruction and the reigning "culture of distraction" that overdetermines intellectual work both inside and outside the academy.

My interest in the relationship between poetry and science stems in this context from a desire to encourage lovers of poetry to engage with the perspectives and practices of other disciplines and with the intellectual life of the university and of the broader culture more generally. If poetry is to counter effectively what Perelman called its "marginalization," both within and beyond the university, it must resist its own aestheticization—its fetishization as cultural adornment and/or purely affective expression—and enrich its capacity to contribute meaningfully to the vital conversations that concern the culture at large. As the contributions of my two Cornell colleagues suggest, poetry can scarcely find a more important conversational partner for exploring its capacity in this regard than the hard sciences, which reign, together with their double or twin, technology, as the dominant discourse of our time both within and beyond the university. Given the actual fiscal dependence, not only of poetry or even the humanities, but of higher education generally, on revenues generated by science and technology, as both Hoffmann and Fulton understand, it would be a myopic poetry practice indeed that did not seek in some measure to engage poetry and science in conversation, to see what each has to say to the other. It is heartening, in this regard, to see the implicit dialectic that emerges in what follows between Hoffmann's appreciation of the value of poetry as an imaginative practice to the practice of formulating and explaining science, and Fulton's recognition of the potential means and materials science offers for poetry to expand its scope and vision and deepen the intellectual, affective sophistication of its engagement with the world. In the poems

of my “Coda: In Lieu of an Ending,” with which the present collaboration formally concludes, as in the e-mail exchange professors Fulton and Hoffmann have agreed to include as an Appendix, the possibilities for further extending this dialectic, in verse and in prose, continue to unfold.

Roald Hoffmann

I'm a scientist and a poet. Within my field, chemistry, I do not write of my research in an explicitly (I would say “superficially”) poetic style. That will not do—it would be too much of a shock; people (if I could get by the editors) would focus on the style rather than the substance. Moreover, as a theoretician peddling a certain worldview, I'm anyway engaged in seduction and subversion. I do not want to have people notice the way I sneak in new ideas. My subversion of the ossified scientific article genre is more subtle, incremental, and subdued.

But actually there is a poetic element in my science. My *métier* is theoretical chemistry—obtaining quantum mechanical knowledge of where electrons are in molecules, and extracting from that knowledge rationalizations, trends, and predictions of the shapes and reactivities of molecules. The poetry, comfortably ensconced in the cognitive framework of chemistry, is in shaping concise, portable, perhaps elegant explanations. It's in the drawing of unexpected connections (so close to metaphor) between things that at first sight might seem unconnected. An example, making sense to chemists, is the similarity (not identity) I proposed of the disposition of electrons in the very organic methyl radical (CH_3) and the very inorganic trisphosphinocobalt fragment ($\text{Co}(\text{PH}_3)_3$). Surprise, economy of statement, structures of similarity and difference—these are the poetic elements in my science.

When I began to write poetry I had naive notions that I could talk of science, maybe teach it, in poetry. Science eventually entered my poetry but in other ways. First there was the language of science—a natural language under stress, therefore inherently poetic. Under stress, because science is continually forced to express new things with the same old words. And to define things in words that refuse to be unambiguous. I spot found poems in this language of science.

I also began to see metaphor, for free, and floating all around in science. Reaching a balance where that metaphor was not used gratuitously, but had meaning both within science and as poetry—that hasn't been easy.

Here are two of my poems in which science figures:

Maya-Spectra

In the Popol Vuh, the Council Book of the Quiché Maya, Hunahpu and Xbalanque are the conquering and playful twin heroes, and players of the Mesoamerican ballgame, in which a rubber ball is hit with a yoke that rides on the hips. They are challenged to a lethal ballgame by the twelve lords of Xibalba, the death-dealing rulers of the underworld.

The bright beam, sent caroming
off four mirrors of the optical
bench, into the monochromator,

penetrates, invisible but intent; like
the mosquito off on his spying
errand for Hunahpu and Xbalanque,

sly heavenly twins of the Popol
Vuh. For that light means to sting
too, inciting the electron clouds'

harmony with a ball, a wave,
to a state-to-state dance; while
the mosquito flies - in dark rain,

the sun yet unformed - down the Black
Road to Xibalba, bites the false
wooden idols, registering their blank

of an answer, on to the first, who,
god-flesh-bit, cries out, jumps
and the next dark lord calls

"One Death, what is it, One Death?"
which in turn the mosquito records;
from the light is drawn energy,

like blood, leaving on a plotter
a limp signature of H bonded to C;
sampling down the row of heart-

reeking gods: Pus Master, Seven Death,
Bone Scepter, Bloody Claws. The row,
stung, name each other, as do
carbonyl, methyl, aldehyde, amine
prodded by the beam, caught in the end,
like the ball in Xbalanque's yoke.

The losers are sacrificed, the twins win
and life is made clear by signals from within.

Quantum Mechanics

**Beginnings
are always
classical.
It's chemis-
try after
all - to burn
a log needs
to be near
another.
It's at its
most spooky
while growing.
What one may
see, so does
the other;
there being
no evi-
dence entan-
glement falls
off with sep-
aration.**

**Mature, it
isn't fazed
by singu-
larities,
a theory
that can ac-
comodate
boundary
tensions.**

**And how will
it end? Like
a love, in
a world de-
monstrably
false, in the
vacuum,
its place filled
by the new.**

“Maya Spectra” is a riff of little substance. Just fun. My problem in the poem is that I’m imposing on the reader two (probably) unfamiliar fields of knowledge—Maya mythology and analytical spectroscopy. Note my desperation in providing an explanatory epigraph. I had the conceit that the playful tone of the heavenly twins fooling the nasty twelve lords of Xibalba via their mosquito stratagem might actually be of use in explaining (oof, here’s that heavy word) to people how spectroscopy is used to “interrogate” molecules and reveal their secrets. Shades of Francis Bacon’s metaphor of vexing nature... My other small stratagem was to see if by accepting the strange *names* of Maya mythology—those of the twelve lords of Xibalba, the twins—I could ease the way for the reader to also dance with the sound of apparently strange scientific terms. You have to decide if it works.

“Quantum Mechanics” is much more serious stuff. My problem here was to say reasonable things about the evolution of quantum mechanics in the 20th century, while getting away with something no serious quantum mechanic would dream of doing—seeing the parallel to a love. But...withholding, if I could, the realization in the reader of that parallel being drawn (hey, drawing parallels is a scientific metaphor!) until the poem was near its end.

In my mind, the poem began with reading in *Physical Review Letters* of some recent experiments (related to Schrödinger’s Cat arguments) that seemingly showed that entanglement (cat dead, cat alive) did not fall off with distance. Isn’t that a poem by itself? Do we need more proof of the natural connection of science and poetry?

Alice Fulton

Jonathan asks what pertinent questions scientific inquiry poses for poetry today, and whether these questions have changed during the course of our careers. I thought I’d respond by describing some aspects of science that have attracted my interest and infused my poetics over the years.

Around 1985, I happened across the chaos or fractal theory of Benoit Mandelbrot, which showed that many phenomena thought to be irregular or chaotic (the coastline of Britain, tree bark, cracks in mud, the firing of neurons, the distribution of galaxies...) actually have pattern and shape. In the 1980s, a small but vocal faction of poets were insisting that only poems written in traditional meters and forms (such as

blank verse or sonnets) have structure. When I happened upon fractals, I thought they offered a good analogue to free verse: a dynamic, turbulent form between perfect chaos and perfect order. Fractals offered a way to imagine and construct answers to questions about structure that—for good or ill—dominated the discussions of the day. In 1986, I published my first essay on fractal poetics, “Of Formal, Free, and Fractal Verse: Singing the Body Eclectic.”

In the 1990s, fractal theory was subsumed within complexity studies, a field that draws upon physics, artificial intelligence, mathematics, biology, and other disciplines as a means of understanding turbulent systems. Throughout the '90s, my conversations with John H. Holland, Professor of Complexity at University of Michigan, suggested directions for postmodern poetics that I explored in a second essay, “Fractal Amplifications: Writing in Three Dimensions.” Like chaos theory, complexity emphasizes dynamic rather than static structures: eccentric forms balanced between strict, Euclidean order and raging entropy. In the '90s, as now, poetry needed to consider large questions of power, equity, and beauty as a means of checking its propensity for lyric narcissism. Complexity studies suggested ways to move beyond formalist, confessional modes into realms that encountered suffering beyond the self: the inconvenient knowledge at the heart of justice and loveliness.

Complex adaptive systems, as described in Holland's book *Hidden Order: How Adaptation Builds Complexity*, have no master plan: no center or hierarchy. They are open, exploratory, inclusive. Rather than seeking equilibrium or stasis, they continually unfold and “never get there.” There is no there. The space of possibilities is so vast that a dynamic structure can't declare an optimum. In poetry, the optimum might be analogous to the sublime. Rather than a single transcendent lyric ultimate, complexity suggests a sublime that happens here and there as part of the ongoing, a plurality of optimums in-between other textures and gestures. Moreover, the eternal process of complex systems, their continual unfolding and surprise, suggests a maximalist aesthetic large enough to include background as well as foreground.

In *Hidden Order*, Holland notes that when reading formal structures we decide to call some aspects irrelevant: we agree to ignore them. “This has the effect of collecting into a category things that differ only in the abandoned details” (11).

The form of Petrarchan sonnets, for instance, differs only in those structural aspects we choose to overlook. These effaced elements become the ground that allows the dominant figure to emerge. The poetics I've termed "fractal" is concerned with the discarded details—overlooked aspects of structure, and more importantly, the dark matter of content: knowledges that remain unspoken because to attend to them would be inconvenient, if not dangerous. In such a way the tenets of complexity theory can suggest ethical as well as aesthetic dimensions.

Of course, it takes more effort to notice blind spots than to reify what is already visible and acclaimed. But rather than being culturally correct, popular and cute, poetry needs the courage to go against the grain. I don't mean to suggest contrariness as a good thing in and of itself. I guess I'm answering Heidegger's question, which Jonathan put before us: "What are poets for?" I've always slightly mistrusted the utilitarian tone (or assumptions) of this query. Yet the question provokes a valuable examination of intent. Let me try to answer. I believe the poet's purpose is to revise language into a vehicle of unsettlement capable of dismantling assumptions that suppress justice and contaminate love. In practice, this means poets must risk their necks in the name of fairness (i.e., equity and beauty) rather than play it safe. I hate this requirement of poetry, but it is the only justification for spending one's life in league with it.

In the mid-eighties, it seemed almost enough to re-imagine the structure of free verse by way of fractal descriptions. But even then, I thought a poetics limited to formal concerns would be deeply lacking. Science is most important to poetry when it suggests something about content rather than form. Whatever science has to teach us about suffering—how to voice it while still keeping poetry poetry—is the most important lesson. Let everything else be en-route to this eloquence, this process of difficult witness. Of course, a poetry directly concerned with suffering is in some sense political. And "political poetry," in particular, needs to go in fear of polemics. In the 90s, the behavior of complex adaptive systems, as described by John H. Holland, suggested ways to reconfigure structure so that form itself might signal content, eliminating the need for didactic explication and helping poetry retain its ineluctable subtlety.

As I learned about complex systems, I also become acquainted with the thinking of Karen Barad, a feminist physicist who writes on the philosophy of science. In her essay "Meeting the Universe Half-Way" (*Feminism, Science, and the Philosophy of Science*), Barad moves beyond binary constructions (nature/culture, objective/subjective) to suggest that knowledge arises from the "between" of matter and meaning. Her theory of agential realism offers an alternative to objectivist accounts of scientific knowledge, in which "what is discovered is presumed unmarked by its 'discoverer'.... Nature has spoken" (187). Neither does she side with subjective social constructivist views that fail to account for the effectiveness of mathematics or admit that materiality matters. Rather than taking sides in the duel between dualisms, Barad theorizes the nature/culture and object/subject binaries "as constructed cuts passed off as inherent" without denying the efficacy of findings that might arise from such categories (188).

Heisenberg's uncertainty principle challenged the Cartesian split between agent and object by suggesting that the observer does not have total control of matter: the world bites back. "Neither does the object have total agency, whispering its secrets, mostly through the language of mathematics, into the ear of the attentive scientist," Barad writes. "Knowledge is not so innocent...." Thus "nature is neither a blank slate for the free play of social inscriptions, nor some immediately present, transparently given 'thingness.'" Nature is slippery: a neither-nor. Light cannot be both particle and wave. Yet it is. The two categories dismantle one another, "exposing the limitations of the classical framework ... Science is not the product of interaction between two well-differentiated entities: nature and culture." Rather, "it flies in the face of any matter-meaning dichotomy...." As Barad sees it, subjects and objects both have agency without having the "utopian symmetrical wholesome dialogue, outside of human representation" posited by objectivist accounts (188). She proposes "not some holistic approach in which subject and object reunite ... but a theory which insists on the importance of constructed boundaries and also the necessity of interrogating and refiguring them." Her theory of agential realism calls for "knowledges that reject transcendental, universal, unifying master theories in favor of understandings that are embodied and contextual" (187).

The work of feminist scientists and philosophers (such as Sandra Harding, Donna Haraway, and Karen Barad) critiques the authority of science, which—like every powerful belief system—needs such self-scrutiny lest it becomes smug and claustrophobic. Of course, the categories unsettled have enormous real world consequences, as when the association of women with nature and man with culture undermines women as artists, thinkers, and human beings. Binary constructions of reality, unchecked by skepticism, have a pervasive, destructive magnitude. When one considers their effects, it's evident that the questions posed are ones literature needs to address, until the world is just—which is to say, forevermore.

Jonathan has asked us to focus on examples from our own poetry that (latently or manifestly) address science. The title of my most recent book, *Felt*, suggests the immaterial past tense of the verb “to feel,” and the material noun, meaning fabric or textile. I'd thought I'd trace the word “felt” through the book's first section as an arbitrary means of showing some ways that science permeates my work. Proximity is one of the book's obsessions. The word “felt” first appears in these lines excerpted from the opening poem, “Close” (as in “near”):

**Though we could see only parts of the whole,
we felt its tropism.**

Though taken from the vocabulary of science, “tropism” is a word most nonscientists will know. The first definition, as found in *Webster's Ninth New Collegiate Dictionary*, is “an involuntary orientation by an organism or one of its parts that involves turning or curving by movement or by differential growth and is a positive or negative response to a source of stimulation.” I'm not sure about “involuntarily,” which seems to imply agency thwarted. It's true that a plant can't help its leaning toward the light, but that orientation seems neither voluntary (chosen) nor involuntary (against the plant's wishes). Perhaps agency, as in Barad's theory, is an interaction located between the plant and the light, or as the poem would have it, between us and “the whole.” The lines suggest the universe as a great organism leaning toward or away from us, reacting to and with us. We can see only parts of this structure; there is no unifying vision or complete essence possible; rather we're left with dribs and drabs of truth, inflected by our time, position, and instruments of perception. Of course,

a “trope” also is a figure in a literary work. I suspect that the “tropism” of science and the “tropes” of literature both derive from the Greek *tropos*: turn, manner, way, style. To feel the trope of “the whole” is to sense affect or manner in the universe, to intuit a cosmos with style, an aspect of poetics often regarded as suspect or superficial.

The word “felt” next appears in “Maidenhead,” a poem that blurs hymen and mind, suggesting the brain as the ultimate private space. Here Emily Dickinson’s spinsterhood, her fetishized white dress, and her mind’s spectacular solitude, merge with the life of a 17-year old girl. I cite well-known Dickinson lines throughout, omitting quotation marks so that her words will blend into the ground of the text, enacting the blurring that is part of the poem’s interest. Dickinson was fond of gem imagery, and “Maidenhead” lifts one of its recurring metaphors from the optics of gemology. In the following “felt” passage, however, the optics of contemporary medicine are juxtaposed to a line from Dickinson’s poem 280:

...There is a lace

**of nerves, I’ve learned, a nest of lobe and limbic
tissue around the hippocampus, which on magnetic
resonance**

**imagining resembles a negative of moth.
She felt a funeral in her brain....**

The technical aspects of science, its highly analytical language, the specificity and exactitude of its instruments, such as the MRI, offer fresh perceptions for poetry. To cite another instance, while reimagining the myth of Daphne and Apollo for my book *Sensual Math*, I became enthralled by a technical book on deviant wood grains. This dry text offered a fresh take on Daphne’s prospects after she’d turned into a tree. It also helped me to imagine her transformation from the tree’s point of view. As to the Dickinson quote, her poem 280 actually begins “I felt a Funeral, in my Brain...” I took the liberty of changing the person from first to second. I also switched Funeral and Brain to lowercase type and removed the midline comma caesura, modifications that flattened the line, embedding it within its surround (128).

The next appearance of the word “felt,” also in “Maidenhead,” invokes scale, a concept dear to fractal science:

**...The phantom pains,
escaping diagnosis, led to bolts of shock—
and tines of shudder—volting through
her mind, my aunt's, that is—stricken into**

**strange, her language out of scale to what
she must have felt, and Dickinson's metaphors—**

And then a Plank in Reason broke—no help.

Geometric fractals repeat an identical pattern at various scales. That is, the fractal's smaller parts replicate the form of the entire structure, turned around or tilted a bit, and increasing detail is revealed with increasing magnification. (A little like the relation of "felt" the word to *Felt* the book.) Fractals have a substructure that goes on indefinitely, replicating itself in various dimensions. This recursiveness revises hierarchical relations to suggest new dimensions of figure and ground. In the passage quoted, language is said to have scale, a size or dimension relative to the feeling it seeks to express. There is always a gap between intention and words, or sign and signifier: language is such an imperfect instrument. Yet poetry sometimes aims to make a language commensurate to feeling, impossible as that is. In addition to capitalizing the first word of every line, Dickinson used uppercase letters within her lines, in effect changing the scale of selected words. The midline capitals in the line quoted (again from poem 280) magnify Plank and Reason while underscoring their symbiosis. The words leap from the line and assert themselves with the authority of proper nouns. This personified quality, along with the enlarged scale of Plank and Reason, helps create the sense of terror in Dickinson's terrific poem.

Felt contains two poems that work the textile as metaphor. The book's first section closes with one called "Fair Use," which I'll quote below in full. "Fair Use" draws upon the idiosyncratic properties of felt cloth to describe both the interconnectedness of what-is and the qualities of my only mystical experience. Until this poem, I'd never written about it, maybe because epiphanies are so Romantic, so prepostmodern. Epiphany! What a word. But there you are. Chancing embarrassment is part of this too. Epiphanies are wont to exist outside of time, space, and social constraints.

Yet, to riff on Barad, transcendence is not so innocent. “My moment of brocade” (Dickinson, poem 430) was laced with specifics: I understood that I was all others, including specific others (206). The poem’s first sentence likens the glittering material of a sofa with the immaterial glittering of the speaker’s mind or being during the moment of “trans-ferment.” But the head undergoing revelation is also a head with a hairstyle: a ’60s flip. “Flip” (as in flip out or lose control) turns epiphany, for the span of one word, into a thing of its time, slangy, girly, so that the instant of understanding, like Barad’s description of knowledge, is “embodied and contextual.” Kennedy and the TV set also infect the lyric moment with time and specificity. In fact, it wasn’t as if I transcended the mundane so much as saw more deeply into the dross material of everything. Speaking of dross, fabric is said to have “a hand,” meaning weight or texture, and I tried to imbue enlightenment with this material quality via the line about “Incandescence.” “Fair” in the title is meant to connote both justice and beauty, co-creative qualities, surely, that require each other to exist.

Fair Use

**As for the sofa, its fabric is vermiculite,
glittering, as is trans-
ferment. My head’s already in its sixties flip,
Kennedy’s already dead. Incandescence
has a heavy hand. For all I care,
the TV might be an airshaft**

**when the statics of *is* widen and show everyone
meshed, a fabric of entanglement ==
my consciousness felted with yours,
although I didn’t know you then.**

**It is not metaphorical, the giver is
literal beyond prediction about this:
what happens to others happens to me.
What joy, what sad. As felt**

**is formed by pressing
fibers till they can't be wrenched apart,
nothing is separate, the entire planet
being an unexpected example.
Is this fair use, to find**

**the intergown of difference
severing self from == nonself == gone.
I grasp the magnetism between
flesh and flesh. Between**

**inanimates: the turntable's liking for vinyl,
the eraser's yen for chalk,
the ink's attraction to the nib.**

**What lowercase god sent this
== immersion ==
to test my radiance threshold?
From then till never == time, space, gravity
felted to a single entity,**

**though the backlash of epiphany wasn't all epiphany's
cracked up to be. Synthesis is blistering.
I've often wanted to get rid of ==
it. I couldn't get rid of it. It**

**resists wear and as it wears, it stays
unchanged. There is no size
limitation. It
expands equally in all directions as more**

**fibers are pressed in. No matter how stripped
of cushion, needlefelted, one
becomes there's no unknowing what**

**can be compressed a thousandfold
undamaged, won't ravel, requires no
sewing or scrim. What is**

**absorbent, unharmed by saturation.
What draws and holds, wicks, that is,
many times its weight in oils or ink.**

**Listen, I didn't want your tears in my eyes.
I wanted to keep my distance, put a silence
cloth == ironic == lining == frigid == interfelt ==**

**between us. My
students == teachers == parents == children ==
get your hearts out of mine,**

**I wanted to say. It can be hard
enough to drill or carve or turn
on a lathe. It can be sculpted.**

**It dyes well. The colors lock. At times
I've prayed that the unfrayable gods who gave it
would give it to a rock.**

“Needlefelted” and the verb “wick” come from the felt making industry, as do the descriptions of felt’s marvelous properties. But I think the poem also contains some quasi-scientific neologisms—trans-ferment, intergown, radiance threshold, interfelt—of my own devising, though I’m not entirely sure I devised them. The “between,” so important to feminist philosophies, figures here as the space where everything happens. This interstitial realm is part of what I hope to signal by the double equal sign == that appears throughout “Fair Use.” In *Felt*, I’ve tried to get this punctuation mark, which I’ve called the bride or sign of immersion, to work syntactically and suggest aspects of content. By the end of the book, I hope the sign will have, to some degree, defined itself. Ordinarily, punctuation marks affect the rhythm of the sentence but have no meaning; we efface them as we read, allowing only words to figure. The == sign reverses this relation of ground and figure by calling attention to itself, juggling the poem’s depth of field. In “Fair Use,” I hoped the visual effect might be as if the page were turned inside out, so the seamy side showed, the stitching. I also wanted the == sign to be one of those “constructed boundaries” that gets in the way of holistic union. If, as the poem says, synthesis is blistering, then == is a blister. I’ve often wanted to get rid of == it, the poem says. I couldn’t get rid of it. And in that way, it’s like conscience. Inconvenient. Sterling. Controversial. Mysterious. Impolite. Annoying. Sublime. Limiting. Rich. Awkward. Impolitic.

In closing, I'll respond briefly to Jonathan's question, concerning poetry's relation to other disciplines and to the culture at large. Poetry is an absorbent art: maybe it can include other fields more readily than they can include it. In any case, it doesn't have to defend itself or be "for" something: it isn't obviously pragmatic. It's playful, having qualities of the joke, in that the "point" happens between the lines. It also has the famous "elegance" of good science. Writing poetry is probably the best way to teach people to love language and words. But whether it's needed or found or appreciated within academe, poetry will continue. It's a force, a pleasure. A beautiful complexity. Beginning poets often blame poetry for its peripheral status. But it seems to me that our culture's lack of appreciation for poetry says more about cultural deficiencies than it does about poetry. What would it mean to be popular in a context that mostly prizes formulaic, easy reads? Can any art retain subtlety, ambiguity, courage, integrity, and endear itself in such a context? Can any art question cruelties that make us comfortable, upon which our culture rests, and expect to be rewarded? When you imagine what poetry would have to do and be in order to be central, it seems poetry's marginal standing is one with its circumference: its strength.

Coda: In Lieu of an Ending . . .

If good theses make good neighbors (and do they?) within, between, across the academy's "fields" (ag/ed lexicon), as elsewhere, something there is in the encounter between science and poetry that inspires—from my dual perspective at least as a specialist in poetry and Director of the Knight Institute for Writing in the Disciplines—some mischief. What's proper to the properties, we might ask, of poetry and science, one or the other, one in, with the other, one not as the other, both and? In the diverse lexicons and discourses of science—astronomy, biology, chemistry, geology, physics, zoology—a stone's throw away is the perfect Metaphor, that is, if metonyms don't get in the way . . . If the value of science is taken to reside primarily in its service to technology, what's the use of/ in poetry = = as = = of writing "across the curriculum"? What kinds of writing do we want from our students, and what does poetry have to contribute to our goals across the disciplines, beyond being an "object de luxe," or mere ornament, beyond "self-expression"? What kinds of inquiry does poetry propose and proffer? What gets included and excluded under that

name? Assuming, as we say, “for the sake of argument,” that the values and uses of poetry and science are not singular, as my colleagues’ examples and reflections above demonstrate (but which parts are “examples,” which “reflections”?), that they are instead plural, overlapping, interrelated, intersecting, uncontainable, I close not with what is called (perhaps too uncritically) “exposition,” or “commentary,” or “analysis,” but with four poems, in verse, in prose, and in between:

Gums, Squirms, and Squeals *after Jared Diamond*

**Wheat, barley, rice, pulses.
Goats, sheep, cows, pigs.
Question. Thesis. Development.
Claims. Evidence. Conclusion.**

See Words

**Cells within cells. The celebrities celebrated. Celibates
sealed uncertain news. Selective service, sealed in their
sediment. Celluloid cellulite’s cell of fame.**

Juncture

**Deep space motive, quadrant nine. There on the graph,
the still point vanishes. Vectors catch a glimpse of rose.
One corner grasps it. That place where the jewel erupts,
unfolds. Where negative counters. Starved, in hiding, the
child’s eyes match the camera’s lenses. Pulled back,
longing, Hubble calm.**

Prescription

**Precisely because this will be of no use to you, you will
find it essential. It contains no calories, no fats, no
proteins, no nutritional value of any kind, no value-
added, no artificial ingredients, no fortified nutrients,
no sources of vitamins or minerals. Like the neutrino, it
bears the incalculable weight of the universe, inside out.**

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Appendix

E-mail exchanges of Alice Fulton (July 8, 2002) and Roald Hoffmann (August 3, 2002)

Dear Roald and Jonathan,

I was struck by three words in Roald's piece, so I thought I'd send some questions and preliminary thoughts as a means of continuing the conversation.

The three words that I'd be interested in pressing further are "style," "prediction," and "natural":

Style: Your first paragraph, Roald, addresses the question of style in science. I wondered if you could say more about the word "style." What does that term mean to you? Do you think differently about style (or the perhaps synonymous terms linguistic surface or poem plane) when writing poetry? You make a distinction between style and substance in the context of scientific writing. In your view, does this difference—between style and substance—exist in poetry also?

For my part, I've come to think that style is part of substance. The poem's surface (effects that call attention to language) is perhaps its most material or substantive aspect. In other words, the ways in which language makes meaning, its textures, syntax, grammar, etc. are part of the subject or meaning for me rather than conduits for meaning. The surface is a good part of the subject. Yet surface connotes superficiality, and so I prefer the term poem plane (analogous to the picture plane in painting.) Just as we understand the painterly effects of the picture plane to be part of the painting's meaning, I hope we might understand the linguistic effects of a poem to be part of its meaning. Poetry distinguishes itself from the scientific article by means of a surface that draws attention to its ways of making meaning; poetry foregrounds the stuff of language itself; its surface gets in the way, gets in your face and demands to be read as a facet of meaning. Readers of poetry are supposed to be distracted by the line, visual placement of words on the page, textures of language, prosodic effects, various dictions, etc. If, as Roald suggests, scientific writing today aims to be a transparent tool for meaning (pragmatic, utilitarian?), poetry (to varying degrees) goes the other way: toward nontransparent, resistant planes. The poem plane

or linguistic surface asks readers to stay with it, be with it, know it, chew it, ruminate upon it, before or in conjunction with knowing the meanings it gradually yields. Scientific writing (as Roald describes it) seems analogous to water: we drink it, it's important, necessary. But poetry is analogous to wine. It calls attention to the materiality of nourishment: the bouquet, nuances. We don't gulp wine to hydrate ourselves. We smell it, savor it, analyze its notes and drink it for pleasure. If scientific articles were to give the surface its own life and importance, that layer of meaning would detract from the information the article exists to provide. Yes. But poems don't exist to provide information; perhaps they exist to provide an experience, cerebral or emotive. So, to end my ramble on a coherent question for Roald: does style work differently for you when writing poetry?

Prediction: Roald mentions prediction as one facet of his work in theoretical chemistry. It seems to me that science's ability to prophesize (to use an old word) is one reason for its ascendancy. The poet used to be the prophet; the scientist has taken on that role. The wish to forecast is ancient; the ability to predict an event still has a latent aura of magic. If we can see something coming, we can control it. Indeed, prediction is a form of control. Our fear—of nature, terrorists, epidemics—makes us long for prediction and the control it provides over forces that might otherwise do us in. No wonder we revere the form of learning that helps us control the calamities that might kill us.

Poetry makes no such claims. It's heartening to me that Roald thinks poetry matters; that he chooses it. What a high compliment, coming from someone who could devote all his energies to science. But if poetry no longer prophesizes, what IS poetry's claim? We might as well ask what is the claim of beauty, if by beauty we mean the widest euphorias and un-settlements, fresh enchantments and engrossments. Is poetry's wonder induced by words? Not just wonder. Pleasure, including the deep pleasure of thought. Poetry need not evoke or replicate emotion (make us laugh, cry, etc.) to be effective. But it must thrill, given a chance, given the time it demands. Just as science wants reproducible results, poetry wants reproducible delights. Yet a poem is a mystery machine. We can't explain it by breaking it down or taking it apart. The ineffable is part of the mechanism. Poems have layers, stratas of meaning, beyond explication. They seem bottomless, mys-

terious. Not muddy or incomprehensible but resistant and withholding. We sense that something lurks behind the linguistic veil. With each sighting, we get closer without ever quite reaching it. The sublime? Yes, if the sublime can be understood to operate within cultural and political contexts. If we can have a postmodern sublime that tries to perceive and revise its own blind spots: the cruelties, inequities on the periphery of transcendence.

Poetry's unnatural surface exists to slow the reader and resist the forward pull of narrative, of ending: poems resist the teleological drive to GET THERE. Thus, the effect of a poem is in the moment of reading. And so, while science, like narrative, is about what happens next, poetry is about what happens now.

Natural: What do you mean, Roald, when you call the language of science "a natural language?" Are some languages more natural than others? In calling the language of science a natural language, are you contrasting it with other languages that seem unnatural? (Computer languages?) Are you contrasting it to poetry? Is poetry unnatural in that the poem plane is wrought (i.e., is musical by design and differentiated from everyday speech to varying degrees)? Poetry uses formal devices (meter, line, grammar, syntax) to de-naturalize itself, make itself over, make meaning freshly. Poetry, then, seems artifice when compared to speech or transparent prose. But is poetry's artifice an extension or hyperbole of the unnaturalness of all language? Or, conversely, does the artifice of poetry arise from natural (biophysical) causes and drives? If so, poetry is deeply natural and the perception of it as artifice is perhaps puritanical and suspicious, an unfounded cultural assumption. I have thought of poetry as unnatural and revealed in that perception. But now I call it into question... thinking about the other side of the argument.

I am always wary of the word "natural" because it has been used to describe the way things are (rather than the way they might be.) That is, we often confuse what-is with what is natural. Thus it seemed natural that women were domestic, confined to the house, child-raising, etc. The ancient association of women with nature and men with culture seemed "natural." Heterosexuality seemed natural. And on and on—I'm sure you can cite many other examples. To transgress the bounds of natural is (in the eyes of culture) to be monstrous, aberrant. Yet "the natural" has often been a cultural con-

struct, a convenient means of maintaining the status quo: regulating business as usual. It follows that great social/cultural changes at first seem unnatural. (Till such changes are naturalized.) Culture then assumes things have always been this way and that a contrived imposition arose from nature. The imposed trait or quality is thought to be essential to the ur-quality of a being or object, part of its fundamental identity. I don't mean to suggest that nothing is natural. I mean only to speak to the ways in which nature has been used as an excuse for human wishes. Of course, humans are part of nature, not separated out or different. And in that sense, every single blooming thing (and things that don't bloom too) is (are) natural. Given this welter of association, in what sense is science a natural language?

Stylistically, predictably, unnaturally,
Alice

Dear Alice,

Your essay is beautiful, and the fullness of its content, and being granted by this exchange the gift of a reading of it, is the only thing that allows me not to feel too bad about the slight piece that I wrote. It's good to see the "more," in yours. It was wonderful to read "Fair Use" again, in this new context. Remind me to show you an unusual felt fabric I found at the Penland School of Crafts in June.

The statement you make of poetry's place, and your own evolution in the nexus of science and poetry is great. Let me make a couple of comments here that emerge from reading what you say:

1. You make good use of complexity theory and fractals (Incidentally, Benoit Mandelbrot will appear in my Entertaining Science series on Sept 1 in NYC. I've paired him with Emily Grosholz, who will read some of her poems on mathematical themes. Still looking for some music to go with that). I must say that I am skeptical of complexity theory, even as I all the time plead for a valuation of complexity in science, and rail against the simplicity of simple mechanisms, one enzyme, beautiful equations, the powerful hold over us of symmetry and order. There is probably a good biopsychological evolutionary reason that we, who represent a local defeat of entropy in our bodies ourselves, in our poems and the molecules

we make, that we should favor the defeat of entropy in our minds.

First, and less important, chaos studies/ catastrophe theory/ complexity are intellectually seductive in this terrible and beautiful world. Seductive in the bad sense of the word. Admit it.

In the real world of practicing chemistry, physics, biology, if you look at papers in meetings or journals (subject to fashion, yes) you find the number of papers in these fields small. OK, so science should not be a popularity poll. But I think there is more, and this is the second point: chaos/complexity/catastrophe are good at describing things. But they aren't *productive*, in the sense of stimulating experiments (or theories). They don't make many predictions either.

So there's my minor tirade against these fields. I would say they offer intimations of understanding, not much more. But yet you draw such interesting parallelisms from them...

I feel a little better about fractals.

2. Your statement of the poet's purpose is "to revise language into a vehicle of unsettlement capable of dismantling assumptions that suppress justice and contaminate love;" I think I know what you mean, and I approve of the inherently subversive nature of art (though I think artists get too easily drunk on this notion). But what you say somehow emphasizes the negative to me—"revise, unsettlement, dismantling" are the words you use. I feel as I write poetry—and I think others do too—that it is much easier to revise, unsettle, and dismantle than to create in the first place, come to true peace with, and construct. (Though the incredible thing about human beings is that even in negation they create. So something good even comes out of literary critics (I'm smiling?)). Might it not be a greater challenge to write honest poems of love's affirmation than its loss (if loss is the common condition; I'm projecting)? I also have trouble with "justice" as a natural category in the multicultural world.

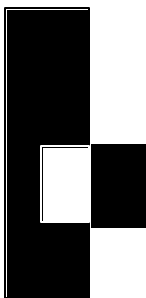
Somehow the statement you make seems more reactive (in a political sense) than affirmative of the creation of new meaning and emotion (which entails revising language, sure) through poetry. This is what "Fair Use" does.

Roald

I agree writing poetry is the best way to teach people to love language and words.

Endnotes

- ¹ Pound's famous dictum, "Literature is news that STAYS news," appears in *ABC of Reading*. The single quotes and capitalization are his. Over time, reflecting the centrality of poetry in Pound's oeuvre, in the retelling "Literature" became "Poetry."
- ² For an analysis of "Le joujou du pauvre" in the context of what I've called Baudelaire's "social re-inscription of the lyric," see my *A Poverty of Objects: The Prose Poem and the Politics of Genre* (Ithaca: Cornell University Press, 1987, pp. 106–109).



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