Excerpted from: Pearlman, Alison. *From Ground Rules to Horizon Lines,* Online essay written for "Interstices" exhibition, Kellogg University Art Gallery, California State Polytechnic University, Pomona, CA (© 2003)

(pg. 1) In January 2002, five colleagues and friends formed the collective "Interstices" and launched an unusual method of artistic collaboration. They divided into pairs randomly, leaving the fifth member to choose a partner from outside the field of art. Once assigned, the pairs were free to determine content, method, and even what counts as collaboration. Should "Interstices" continue after its debut at the California State Polytechnic University's Kellogg Gallery, the artists will rotate positions, adopt new partners and projects, and a different member will invite a new outsider.

(pg. 2) This exhibition of "Interstices" further deviates from art-historical precedent by its third pairing. Artist Nancy Macko chose to work with the mathematician Robert Valenza. Trans-disciplinary artistic collaboration is not in itself uncommon—that is, as long as participants come from closely related fields; most often this means within the arts. When artists join forces with people from distant spheres, it is usually not a true collaboration but rather a situation in which the artist has enlisted those with the technical expertise—sound engineers, Web designers, butchers, horticulturalists, and others—to help them realize their projects. Rare is the artistic collaboration that factors in a mathematician and then makes him a creative equal.

It's rare because it's risky. True, many professions today encourage flexibility. In academic and artistic fields alone, recent decades saw "interdisciplinary" pedagogy become entrenched in universities and traditional genres merge—from the fusion of fact and fiction into "faction" to stylish crossovers between "lowbrow" and "highbrow" art forms. But, as in the history of artistic collaboration, these overlaps tend to stop at allied siblings. The fields are close enough to mutually expand their domains without threatening the premises and basic methods of each. Most would recoil from the grand chasm between art and math. The risk of losing credibility and perceived relevance in either one discipline would seem too great. But, as we shall see, Macko and Valenza take this risk precisely to liberate each other from the boundaries of disciplinary experience and knowledge. For them, the potential to challenge ingrained habits and paradigms is too great to pass up.

(pgs. 4-7) By contrast to …, Macko and Valenza plan every key movement throughout their collaboration together. Each of the four works they present here thoroughly intertwines the two artists' concepts and sensibilities. Such enmeshment and agreement might be hard to come by for another pair consisting of an artist and a mathematician, but Macko and Valenza have in effect been collaborating for over thirteen years, building common ground by carrying on an intensive collegial dialogue, sharing readings and exploring intellectual affinities between themselves as representatives of their fields. This instance of their collaboration combines methods from math and art into results beyond the norms of either.

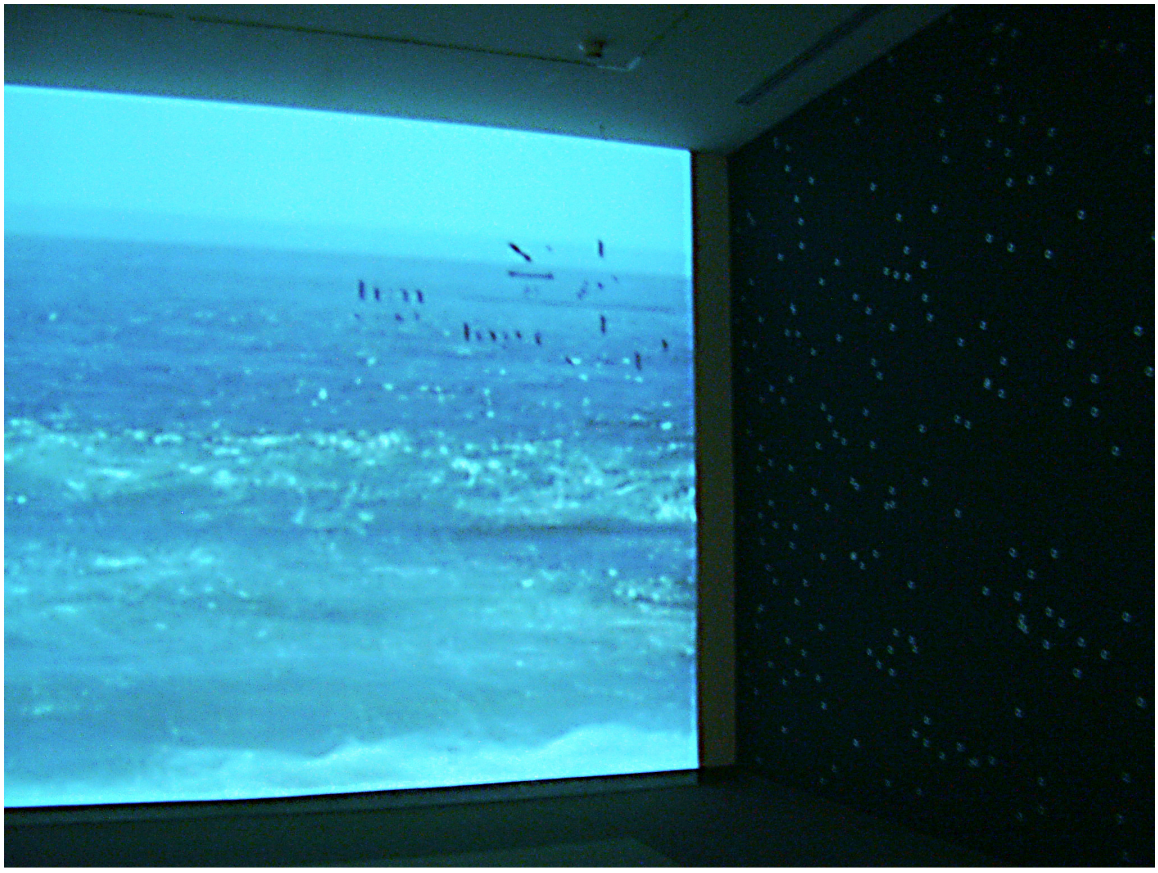
The title they give to their group of works, *Prime Deserts*, is a mathematical concept. A brief explanation of terms: The title refers to prime numbers, whole numbers divisible only by themselves and one. Prime desert refers to the sometimes long sequence of whole numbers in which no primes occur. There are infinite numbers of primes, and the length of intervals between them appears to be random.

Primes challenge mathematicians' need to define pattern. It is impossible to predict when the next prime will occur in a given sequence of numbers. One could say that, from the "close-up" perspective, primes are chaotic. From a "distant" perspective, however, mathematicians have developed a formula to express their regular recurrence.

The paradox of primes—their simultaneous existence as chaos and mechanism—demonstrates that our understanding of them is a function of perspective. This paradox is important because it applies to much more than primes and, in fact, well beyond math. All knowledge and experience depends on its frame.

This universal proposition becomes Macko's and Valenza's common point of departure. It finds dramatic expression in the first work to face the viewer upon entering their gallery. A large-scale video projection features the majesterial, moving ocean. The camera pans slowly from the nearby shoreline, where waves crash entropically into frothy fissures, and up to the distant horizon line, where waves undulate even-keeled. As the camera pans from bottom to top, near to far, the artists' superimpose the aggregate formula for primes, itself an elegant composition of symbols, and it travels up with the camera. Along the way, it morphs between opacity and translucency, mimicking

the oceanic rhythms. The two metaphors of ocean and formula meld to express an otherwise abstract concept in a viscerally mesmerizing form.



PRIME DESERTS, Nancy Macko/ Robert Valenza © 2003 Installation View
LEFT: *Dirichlet's Ocean*, projected video (5:00), 14 X 33', 2003
RIGHT: *Prime Starfield*, vinyl decals on painted wall, 14 X 26', 2003
Kellogg University Gallery, California Polytechnic University, Pomona, CA
photo credit: Rhead Lown Photography

The work additionally reminds us of something math and art share: they both appease our human frustration with the many infinites that elude us. The horizon is as elusive as reaching the last prime. Yet symbolic constructions such as the horizon *line*, recurrent in the history of landscape art, and the aggregate formula, a staple of math, put the world into graspable frames.

Macko and Valenza then ask themselves: if knowledge and experience are a matter of perspective, how can art and math enrich each other's? The pair's other three works address this question by requiring both artists to contribute mathematical and aesthetic decisions throughout the creative process. One work consists of a 14 ft. by 26 ft. wall, painted graphite gray, onto which the artists affix clusters of white reinforcements (circle-within-a-circle figures reminding us of math's tendency toward aesthetic abstraction). The artists generate the pattern of these clusters by a spreadsheet application that uses formulae to project primes onto a plane. The artists found all of the consecutive primes over an interval of about 10,000 integers, and let them form constellations along the plane according to their projected pattern. The "slice" of primes they chart here starts in the integer territory of over four billion, which yields a pattern they find particularly aesthetically pleasing. In this work, the spatial distribution of the primes is mathematically determined, but other choices—including featuring this exact sequence of primes and graphing them along a plane that echoes the horizon line of their distant ocean view on the adjacent wall—are aesthetic.

Art and math also join forces on the opposite wall of the same dimensions, painted white, and onto which they adhere colored reinforcements. These appear as discrete, if dynamically inter-penetrating, clusters. The number of reinforcements in each cluster must equal a prime number, and each cluster must represent a different prime number.

Yet the clusters' dependence on math ends there. The arrangement of reinforcements within each cluster and the placement of clusters in relation to each other derive entirely from both artists' aesthetic judgment.

PRIME DESERTS, Nancy Macko/ Robert Valenza © 2003 Installation View
LEFT: *Prime Clusters*, vinyl decals on wall, 14 X 26', 2003
RIGHT: *Dirichlet's Ocean*, projected video (5:00), 14 X 33', 2003
Kellogg University Gallery, California Polytechnic University, Pomona, CA
photo credit: Rhead Lown Photography

Finally, Macko and Valenza create a DVD for display on the self-illuminating monitor of a DVD player mounted on a shelf. When the visitor touches *play*, the work loops through a series of otherworldly tableaux. In each one, constellations of a particular icon in a distinct color materialize over a backdrop image, in most cases botanical textures that have been digitally transformed by sequences of filters. Groups of that icon appear in succession, reminiscent of the oceanic rhythms pictured on the opposite wall. The icons move animatedly around the screen and over the image until the final constellation of icons materializes and pauses. The ending accumulation always equals a prime number. Here, too, aesthetic choices commingle with mathematic determinants. While prime numbers define the limits of these constellations, all else is aesthetically based: the look of the background, the icons, the rhythm and movement by which they appear, the anthropomorphic "character" they take on as the little luminaries move into place, and even the decision about what prime number each tableau should make is final.

Macko's and Valenza's various deviations from art and math leave us to wonder whether or not the break from the methodologies of a given field leads to a loss of rigor or, on the contrary, to a quantum leap beyond stagnant paradigms. Systems of knowledge, including disciplinary languages, tend to be tautological. The truths found in each discipline are in part a function of the methods and assumptions underpinning those disciplines. This lends rigor to the search for knowledge; at the same time, however, it also traps the search for knowledge within the boundaries of disciplinary methods and assumptions that go unquestioned. Breaking with disciplinary structures is risky business, but Macko and Valenza counter with productive and imaginative leaps. Valenza recognizes the importance of inner experience that mathematical discourse does not countenance because it appears chaotic from the perspective of math. Macko acknowledges that some degree of formulaic regularity may structure what artistic discourse so often romantically relegates to the chaotic realm of the unknowable.