

Interconnections, Relationships, and Environmental Wholes: A Phenomenological Ecology of Natural and Built Worlds

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Ecology, both as a science and as a world view, emphasizes the study of relationships, interconnections, and environmental wholes that are different from the sum of their environmental parts. “Special qualities emerge out of interactions and collectivities,” writes intellectual historian Donald Worster (1994, p. 22), in his *Nature’s Economy*, a history of ecological ideas in the Western world.¹

The central question I address here is this: What do the relationships, interconnections, and environmental wholes of ecology become in a phenomenological perspective?² To examine this question, I consider one phenomenon from the natural world—color—and one phenomenon from the human-made world—lively urban places. I think it important to offer an example from both natural and human worlds because a “phenomenological ecology,” as it might be called, must be responsive to all lived relationships and interconnections, examining and describing the ways that things, living forms, people, events, situations and worlds come together to make environmental and human wholes (Riegner 1993, p. 211-12; Seamon 1993, p. 16).³

By “lively urban places,” I refer to city neighborhoods and districts that provide easy access for pedestrians and generate, just by being what they are, chance face-to-face encounters, sidewalk life, and a sense of taken-for-granted safety because many people are present. To discuss a phenomenology of lively urban places, I turn to my own work on the bodily dimensions of environmental experience and action, especially as the lived body comes to know its everyday environment through the regularity and routine of extended time-space patterns contributing to the transformation of physical space into lived place. I also emphasize, after architectural theorist Bill Hillier (1989, 1996; Hillier and Hanson 1984), that the physical structure of place, particularly the spatial configuration of pathways, plays a major role in establishing whether streets are well used and animated or empty and lifeless. In terms of relationships, interconnections, and environmental wholes, this discussion of lively urban places indicates how a particular fit between people and world contributes to a larger whole of interpersonal encounter, sociability, and place attachment.

To discuss a phenomenology of color, I turn to the remarkable proto-phenomenology of German dramatist and poet Johann Wolfgang von Goethe (1749-1832), who—more than a hundred years before Husserl formally laid out the phenomenological enterprise—devised a qualitative way of seeing and

understanding that can rightly be called a phenomenology of the natural world. Most significantly for a phenomenological understanding of relationships, interconnections and environmental wholes, Goethe's work demonstrates how light and color involve an underlying "belonging" seen in perceptual presence but only understood through a moment of insight in which all the parts are understood together and have a fitting place.

A Geography of the Lifeworld

To move toward these phenomenologies of lively urban places and color, I want to provide some autobiographical background as to how I have become interested in two phenomena that, at first glance, might seem entirely unrelated thematically or conceptually. In the fall of 1970, I arrived as a graduate student at Worcester, Massachusetts's Clark University, where the two largest graduate programs are Psychology and Geography. In the early 1970s, there was an effort at Clark to capitalize on the combined strengths of these two graduate programs and to establish an interdisciplinary doctoral program in environment-behavior research, a field of study that might most succinctly be defined as the study of how the physical and built environments contribute to human well being.

At that time, most programs in the human and social sciences were largely positivist and emphasized deductive theory, hypothesis testing, measurement, and quantitative demonstration. In environment-behavior research, *a priori* theories and concepts predominated, and I was exposed to such conceptual points of view as cognitive mapping, environmental perception, territoriality, theories of environmental preference, and the like. To me as an academic neophyte, these theories and concepts seemed too often reductive, cartoon versions of the lived richness of my own environmental actions, experiences, and situations.

Fortunately for me, in 1970 there also arrived at Clark a young faculty member named Anne Buttimer who, through the Continental traditions of phenomenology and existentialism, was seeking a more comprehensive and thoughtful way of understanding peoples' day-to-day actions and experiences with their physical, spatial, and social environments (Buttimer 1976, 1987; Buttimer and Seamon 1980; Seamon 1987; Seamon 2004). She was especially interested in how peoples' lived links with place and environment might be understood through the phenomenological notion of *lifeworld*—the taken-for-granted fabric and dynamic of everyday life that largely happens automatically without conscious attention or deliberate plan. She argued that environmental aspects of lifeworld—for example, sense of place, social space, time-space rhythms and the lived dialectic between home and horizon—might offer a uniquely geographical and environmental contribution to phenomenological research (Buttimer 1976, p. 277).

My Clark dissertation, revised and published in 1979 as *A Geography of the Lifeworld* (Seamon 1979), focused on a wide-ranging phenomenon that I called *everyday environmental experience*—the sum total of peoples' firsthand involvements with the geographical world in which they live. By *geographical world*, I meant the everyday places, spaces, and environments in which people find themselves. My source of experiential descriptions was *environmental experience groups*, small groups of students and other interested participants who were willing to meet weekly to examine in their own daily experience such themes as movement patterns, emotions relating to place, the nature of noticing and attention, the meaning of home and at-homeness, places for things, deciding where to go when, and so forth.

Through a phenomenological explication of the more than 1,500 personal observations offered in these environmental experience groups, I eventually arrived at three overarching themes—*movement*, *rest*, and

encounter—that appeared to mark the essential core of everyday environmental experience. The section on movement examined the habitual nature of everyday environmental behaviors and argued, after French phenomenologist Maurice Merleau-Ponty (1962), that the lived foundation of these behaviors is the body as preconscious but intelligent subject. The section on rest explored people’s attachment to place and gave particular attention to at-homeness and positive affective relationships with places and environments.

The book’s final section on encounter considered the multifaced ways in which people make attentive contact with their world. Group observations indicated that this range of awareness extends from obliviousness and minimal attentive contact with the world at hand through watching, noticing, and more intense kinds of encounter where the experiencer, at least metaphorically, feels a sense of “merging” with some aspect of world. The last section of the book examined lived relationships and interconnections among movement, rest, and encounter and argued that their threefold structure offered one simple but integrated way to envision human environmental experience conceptually and to think about design and policy implications practically.

Habitual Bodies and Place Ballet

To move toward a phenomenology of lively urban places, I want to summarize the book’s conclusions on everyday movement, by which I meant “any displacement of the body or bodily parts initiated by the person himself or herself” (ibid., p. 33). One of the first themes that came forth in the environmental experience groups was the importance of habitual movement in everyday life. Group observations suggested that, regardless of the particular environmental scale at which they happen, many movements are conducted by some preconscious impulse that guides behaviors without the person’s need to be consciously aware of their happening. As one group member succinctly described the process of walking from her apartment to the university, “You get up and go without really thinking, you know exactly where you have to go, and you get there but you really don’t think about getting there while you’re on your way.” This observation points to a kind of automatic unfolding of movement with which the group member has little or no conscious contact. She has no recollection of the great number of footsteps, turns, stops, and starts that in sum compose the walks from home to school. She finds herself at her destination without having paid the least bit of attention to the movement as it happened at the time.

“Body-subject” is the term that Merleau-Ponty used in his *Phenomenology of Perception* to describe the intentional but taken-for-granted intelligence of the body indicated by the group observation just cited. “Consciousness,” he wrote (Merleau-Ponty 1962, pp. 138-39) “is being toward the thing through the intermediary of the body. A movement is learned when the body has understood it, that is, when it has incorporated it into its ‘world’, and to move one’s body is to aim at things through it; it is to allow oneself to respond to their call.... In order that we may be able to move our body towards an object, the object must first exist for it, our body must not belong to the realm of the ‘in-itself’.”

Though Merleau-Ponty said very little about larger-scale actions of body-subject in *Phenomenology of Perception*, observations from the environmental experience groups pointed to its versatility as expressed in more complex movements and behaviors extending over time and space.⁴ One such behavior indicated by group observations is what I called *body routine*—a set of integrated gestures, behaviors, and actions that sustain a particular task or aim, for example, washing dishes, driving a car, doing home repair, and so forth. Also indicated by group observations was what I labeled a *time-space routine*—a set of more or less habitual bodily actions that extends through a considerable portion of time—for example, a getting-up routine or a weekday going-to-lunch routine.

Most important for the phenomenon of lively urban places, group observations suggested that, in a supportive physical environment, individual body and time-space routines may fuse together in a larger whole, creating an environmental dynamic that I called, after the earlier observations of urban critic Jane Jacobs (1961, p. 50), a *place ballet*—an interaction of time-space routines and body routines rooted in space, which often becomes an important place of interpersonal and communal exchange and meaning.

Place ballet may occur at all manner of environmental scales—inside, outside; at the level of neighborhood, street, public space, building interior, and so forth. A popular and well-used plaza like New York City’s Greenacre Park may be the scene of place ballet (Whyte 1980), or it may be an animated stretch of city street (Jacobs 1961), or a weekly outdoor market (Seamon and Nordin 1980), or a popular café or tavern (Oldenburg 1989). Place ballet should not be envisioned as a regimented ensemble of robotlike participants moving about in mindless precision but, rather, as a fluid environmental dynamic that allows for temporal give and take as participants are present more or less regularly, at more or less the same times. Newcomers, outsiders and infrequent participants may contribute to place ballet, but its foundation is some degree of environmental and temporal regularity founded in body-subject.⁵

Spatial Configuration and Place Ballet

I next want to examine how qualities of the world, particularly its physical, potentially-designable features, might sustain and enhance the time-space manifestations of body-subject, particularly place ballet. One body of work significant for addressing this question is architectural theorist Bill Hillier’s theory of *space syntax*, which provides convincing conceptual and empirical evidence that the physical-spatial environment plays an integral part in sustaining active streets and an urban sense of place (Hillier 1996; Hillier and Hanson 1984).

Though Hillier’s work is not phenomenological, it has crucial significance phenomenologically because it demonstrates how a world’s underlying spatial structure, or *configuration*, as Hillier calls it, guides particular actions and circulations of human bodies moving through that world and, how, in turn, a self-conscious understanding of this human world/physical world intimacy might lead to environmental design and policy that supports a stronger sense of place and community.

In his work, Hillier asks whether there is some “deep structure of the city itself” that contributes to urban life (Hillier 1989, p. 5). He finds this deep structure in the relationship between spatial configuration and natural co-presence—that is, the way the spatial layout of pathways can informally and automatically bring people together in urban space or keep them apart: “By its power to generate movement, spatial design creates a fundamental pattern of co-presence and co-awareness, and therefore potential encounter amongst people that is the most rudimentary form of our awareness of others” (Hillier 1996, p. 213). I have already argued above that the lived basis for this human movement and co-presence may be in many instances the regularity of habitual bodies. Drawing on Hillier’s work, we can examine how these habitual bodies make use of or do not make use of particular pathways, largely because of the particular spatial configuration of those pathways.

In seeking to understand the ways that pathway configuration relates to human movement, co-presence, and encounter, Hillier develops the concept of *axial space*, which relates to linear qualities of space. Axial spaces are illustrated most perfectly by long narrow streets and can be represented geometrically by the maximum straight line that can be drawn through an open space before it strikes a building, wall, or some other material

object. For example, the axial map for the small southern French village of Gassin, one of the first settlements that Hillier studied, is illustrated in figure 1.

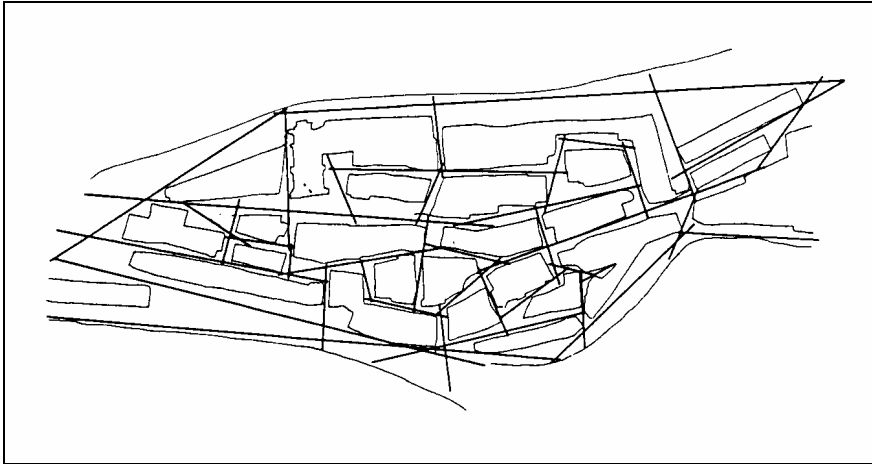


Figure 1. Axial map for the small French village of Gassin generated by drawing the longest possible lines through the settlement's outdoor fabric of streets, plazas, and other public spaces (from Hillier and Hanson 1984, p. 91).

Partly through quantitative and computer analysis, Hillier concludes that axial spaces are significant for understanding a settlement's *global* pattern—that is, the way the particular spatial configuration of a pathway fabric lays out a potential movement field that draws people together or keeps them apart.⁶ *Natural movement* is the term Hillier uses to describe the potential power of the pathway layout to automatically stymie or facilitate movement and such related environmental events as co-presence, co-awareness, informal interpersonal encounters, and animated street activity (Hillier 1996, p. 161).

To establish precisely the amount of natural movement that a particular pathway configuration potentially generates, Hillier introduces the concepts of *integrated* and *segregated* pathways. As illustrated in figure 2, the former is a pathway that makes itself readily accessible to many other pathways and therefore is *shallow* in relation to them. In other words, many other pathways and the users on these pathways feed into this pathway, thus it is well integrated in relation to the surrounding grid structure and more than likely a well-used route along which many people travel. In contrast, few or no other routes feed into *segregated* pathways, which are poorly accessible and *deep* in relation to the surrounding grid. Segregated pathways typically are dead ends or elements in treelike grids; one thinks, for example, of the “cul-de-sac and loop” pattern of low-density, automobile-dependent suburbs, or the hierarchical circulation layouts of many modernist housing estates.

To measure and map the relative integration of all pathways in a particular pathway system, Hillier develops a quantitative procedure that he calls *measure of integration* (Hillier and Hanson 1984, pp. 108-09). One product of this procedure is an integration map like the one for Gassin in figure 2, which summarizes the integration values for all pathways in the village. The streets marked by solid lines depict the village's *integration core*—those streets that have many other streets feeding into them. These streets have the most chance for being alive with street activity, public life, and commerce. In contrast, the hatched lines identify Gassin's *segregation core*—the streets that deflect activity away from themselves and therefore indicate pockets of quiet and seclusion that are typically residential in character.⁷

Integrated and segregated pathways

- *Integrated pathways:* pathways that make themselves readily accessible to other pathways. In other words, many other pathways feed into them.
- *Segregated pathways:* pathways that do not make themselves readily accessible to other pathways. In other words, few or no other pathways feed into them.

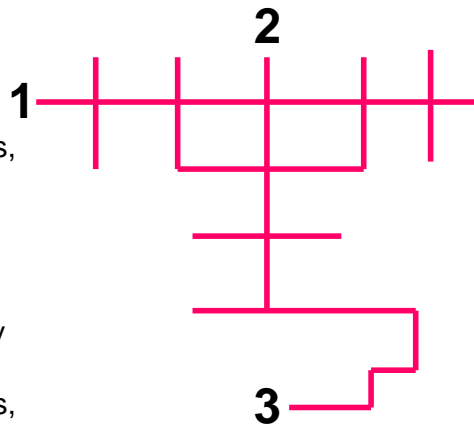


Figure 2. Integrated and segregated pathways. In this hypothetical street grid, street 1 is the most integrated pathway, since five other streets feed into it. On the other hand, street 3 is most segregated, since it is a dead end. Street 2 is more integrated than street 3 but less integrated than street 1. All other factors being equal (e.g., density, placement of functions, and building types), street 1 should carry the most pedestrians (see endnote 6).

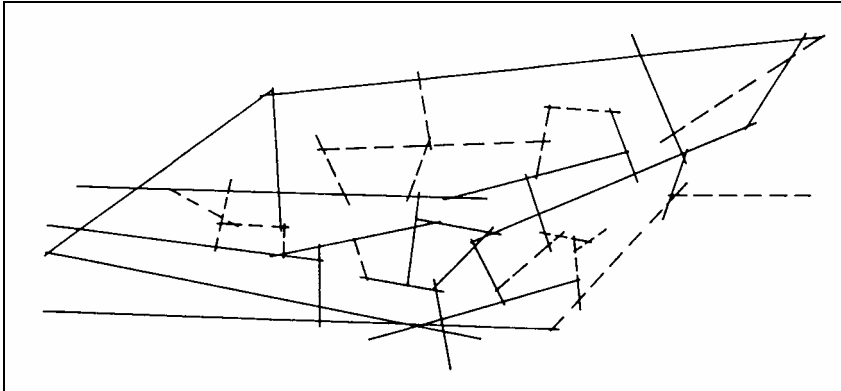


Figure 3. Gassin's "deformed wheel." Note that the streets of greatest integration (and thus most potential movement) are marked by the solid lines, whose shape roughly suggests a wheel and spokes; in contrast, the hatched lines indicate streets of greater segregation, which, overall, are residential and between the more active thoroughfares (from Hillier and Hanson, 1984, p. 117).

Hillier next considers whether these lines of greater and lesser integration indicate some deeper configurational structure underlying the settlement *as a whole*. In fact, after studying the integration and segregation cores of many settlements, both Western and non-Western, Hillier concludes that such a larger global structure exists, which he calls the *deformed wheel* (see figure 3). The rim, spokes, and hub of this wheel are the pathways with high integration values (in figure 3, the solid lines). Typically, these streets are the most used by a settlement's residents and are also the main entry routes and therefore used by "outsiders"—for example, a farmer bringing his produce to weekly market or tourists exploring the

settlement. Also, most of the largest public spaces and location-dependent uses, like shops, are on the most integrated streets of the deformed wheel, since these streets are the places of greatest movement.

In the interstices between the most active streets are typically the most segregated, less used pathways (in figure 3, the hatched lines). Hillier concludes that, for many traditional settlements, the most active areas about the quietest areas: the places of street life, publicness, and strangers' mixing with residents are a short distance from the more private areas used mostly by residents only. Movement and rest, activity and place, journey and dwelling, difference and locality, publicness and home, lie apart yet together!

In regard to cities, Hillier demonstrates that most urban pathway systems have traditionally been an integrated fabric of smaller deformed wheels (usually associated with designated neighborhoods and districts—for example, London's Soho, Bloomsbury, or City), whose most integrated pathways join together to shape a much larger *deformed grid* that founds the dynamic of natural movement for the city as a whole (Hillier 1996, chap. 4). “[E]ach local area,” explains Hillier (*ibid.*, p. 171), “has its heart linked to the supergrid lines that surround it by strong integrators. These form an edge-to-centre structure in all directions, and the less-integrated areas are within the interstices formed by the structure....”

Hillier is highly critical of most twentieth-century urban design and planning because it often eviscerated this relationship between local and global integration by replacing integrated pathway configurations with treelike systems of segregated pathways. The long-term result is that these “spatial designs create serious lacunas in natural movement,” which in turn undermines the informal sociability of streets and neighborhoods and may in time attract “anti-social uses and behaviours”—for example, unsafe streets and higher crime rates, particularly in the mazelike pathway systems of many post-World War II public housing projects (*ibid.*, p. 178). From a place ballet perspective, one can say that the possibility of individual habitual bodies easily coming together in co-presence has been greatly compromised because the particular pathway configuration does not direct movement from less integrated pathways onto more integrated pathways that would then become spaces of animated pedestrian activity.

Relationships, Interconnections, Wholes, and Place Ballet

What does the above discussion of lively urban place as interpreted through place ballet and space syntax say about relationships, interconnections, and environmental wholes interpreted phenomenologically? First, in terms of relationships, one can say that place ballet automatically gathers time, space, and peoples' needs through the taken-for-granted unfolding of bodily regularity. Both the result and source of this tacit unfolding is a series of automatic interconnections: between an individual's routine and others' routines; between those routines and the settings, origins, and destinations in which and for which the routines unfold; between body-subject's actions and a supportive spatial configuration incorporating some pathways that are well used and lively and other pathways, traditionally residential, that are less used and quiet. The result is an environmental whole that is integrated, ordered, alive, and a new entity of place considerably different from its human and environmental parts.

What I'm suggesting here is that a phenomenology of lively urban places indicates how a particular fit between people—specifically, habitual bodies—and world—specifically, particular pathway pattern—supports physical co-presence and potential encounter that may facilitate sociability and a sense of community and neighborhood. Hillier's demonstration of how a particular pattern of spatial configuration—the deformed grid—has the potential to found a nexus of lively pedestrian movement

illustrates in a remarkably new way the basic phenomenological principle that people are immersed in world as world is immersed in people.

In relation to habitual bodies meeting in space that is transformed into place, Hillier's work concludes that a major need is *permeability*—the relative accessibility of a place, which in turn relates to the number of alternative routes running through that place and the potential amount of human movement, exchange, and interaction thus facilitated. Such an interconnected pathway network, on one hand, encourages ease of access and greater spread of movement; on the other hand, a permeable network discourages inefficient movement and the frustration of impenetrability. Design-wise, the setting most likely to facilitate place ballet involves well-connected streets, small blocks, mixed uses, and humanly-scaled buildings whose footprints, entries, and windows have a direct relationship to the sidewalk and street (Bentley et al. 1985).

In today's American context, where the minimally permeable, low-density, functionally-separated suburb is the norm, the need is fine-grained, mixed-use, gridded neighborhoods that potentially have the power to rekindle informal interpersonal interactions, lively streets, and neighborhood place ballet. One controversial example is the "New Urbanism"—a design effort to create walkable, mixed-use neighborhoods with coherent public spaces sustaining informal sociability (Bothwell et al., 2002, Katz 1994, Robbins 2004).

Having considered lively urban places as one way to focus the phenomenological meaning of relationships, interconnections, and environmental wholes, I next turn to Goethe's way of science as a means to explore a phenomenon of the natural world—the appearance of color. With that discussion in place, I can conclude by seeking broader implications of my two phenomenologies, thus identifying more general qualities and patterns of relationships, interconnections, and wholes examined phenomenologically.

Goethe's Way of Science

In 1972 while I was a graduate student at Clark University, I had the opportunity to meet and briefly study with physicist Henri Bortoft, who would eventually write *Wholeness of Nature* (Bortoft 1996), without a doubt the single best explication of Goethean science, especially as it has significance for environmental education and ethics.⁸ After that brief encounter, which opened me to a new style of phenomenology, I carefully followed research in Goethean science and, in 1998, with physicist Arthur Zajonc published *Goethe's Way of Science: A Phenomenology of Nature*, an edited collection providing examples of recent Goethean research involving such phenomena as plants, animals, and the movement of water.

Though Goethe is much better known as a superb poet and playwright, he also produced a considerable body of scientific work that focused on such aspects of the natural world as light, color, plants, clouds, weather, and geology. In its time, Goethe's way of science was highly unusual because it moved away from a quantitative, analytic approach to the natural world and emphasized, instead, an intimate firsthand encounter between the student and thing studied. Direct experiential contact coupled with prolonged, attentive efforts to look and see became the basis for descriptive generalization and synthetic understanding.

To illustrate Goethe's approach to seeing and understanding things in nature, I want to focus on his work dealing with light and color because it offers perhaps the clearest explication of Goethe's phenomenological method. Skeptical of Newton's color theory (which claimed that colors are contained in

colorless light and arise, for example, through refraction in a prism), Goethe began his studies of color in the late 1780s and published the results of his work, *Theory of Color (Zur Farbenlehre)*, in 1810 (Goethe 1970, Goethe 1988). The crux of his color theory is its experiential source: rather than impose theoretical statements (as he felt Newton had), Goethe sought a means to allow light and color to reveal themselves directly through our own human experience.

To understand Goethe's style of looking and seeing, I want to focus on the prism experiments in part two of *Theory of Color*. These easy-to-do exercises are a helpful way to introduce students to phenomenological looking because a phenomenon is present—the appearance of color in a prism—which, on one hand, most people are unfamiliar with yet which, on the other hand, can be readily examined, described, and verified through sustained work with the prisms. Table 1 indicates the kind of questions one should keep in mind in doing these experiments and, for that matter, all Goethean science.

Goethean Looking and Seeing: Questions to Keep in Mind

- What do I see?
- What is happening?
- What is this saying?
- How is this coming to be?
- What belongs together?
- What remains apart?
- How does this belong together with itself?
- Is it itself?
- Can I read this in itself?

Table 1. Questions to keep in mind for Goethean looking and seeing.

Participants are asked to begin by simply looking through the prism, seeking to become more and more familiar with what is seen. They record their observations in words and colored drawings. Ideally, the experiments are done by a group of four or five, so that participants can report their observations to each other and bring forth descriptive claims that other participants can then confirm or reject, drawing on their own looking and seeing. Gradually, the group moves toward a consensus as to exactly how, where, and in what manner colors appear.

Let me emphasize that this process of seeing accurately is not easy or fast. Many participants first starting the exercise expect to see color everywhere or, with vague memories of high school physics in mind, expect a full-color rainbow to appear, which in fact does not readily happen. Once participants bracket their expectations and begin to really look at the colors as they actually appear, participants often present observations that are vague or incorrect: for example, "I see a halo of color around all objects" or "colors only appear where there is light." Neither of these observations is correct and indicate the misreading and imprecision into which beginners can fall.

In short, this process of looking requires continual presentation, corroboration, recognition of error, and correction. Eventually, however, group members can establish a thorough picture of their experience of

color through the prism and end with a set of generalizations like the accurate descriptive statements presented in table 2.

Looking through a Prism: Exemplary Descriptions

- Black, white, and uniformly pure surfaces show no color through the prism; rather, colors only appear at edges, which can be defined as places of contrast made by darkness and lightness.
- Colors, however, do not appear along all edges; rather they appear only along edges that are more or less parallel to the axis of the prim.
- The more marked and strong the edge of darkness and light, the brighter and more lively the colors.
- Usually, the colors at the edges arrange themselves in two different groups: a yellow-orange-red group; and a blue-indigo-violet group.
- Less frequently, the colors green and magenta appear.

Table 2. Some examples of accurate descriptive statements arising from looking through prism.

Seeing and Understanding Broader Patterns

The general exercise of looking through the prism just described is excellent for introducing students to the effort, care, and persistence required in Goethe’s approach to looking and seeing, but his aim is considerably larger: to discover a theory of color that arises from the colors themselves through our growing awareness and familiarity of them. Here, we move into a stage of looking and seeing that explores the wholeness of color by describing in what ways colors arrange themselves in relationship to each other and to the darkness-lightness edge that, as discovered in the prism exercise just described, seems to be a prerequisite for any colors to arise at all.

To identify such patterns and relationships, Goethe presents a series of experiments using a set of cards with black and white patterns that are to be viewed carefully through the prism and then to be recorded accurately. The cards to be discussed here are illustrated in figure 4, and instructions for their use is provided in table 3.

The value of the cards in these experiments is that they provide a simple way to direct the appearance of color and, thereby, provide a more manageable and dependable context for looking and describing. Rather than seeing color along any edge, participants are now all looking at the same edge displaced in the same way so they can be certain that they will see the same appearance of colors.

In regard to card A, for example, we begin with the white area above the black and, through the prism, look at the white-black horizontal edge in the middle of the card. If the image that we see is displaced by the prism below the actual card, then at the edge we see the darker colors of blue above violet (see figure 5). If we turn the card upside down so that black is above white, we now see something quite different—a set of lighter edge colors that, from top down, are orange-red and yellow (see figure 6).

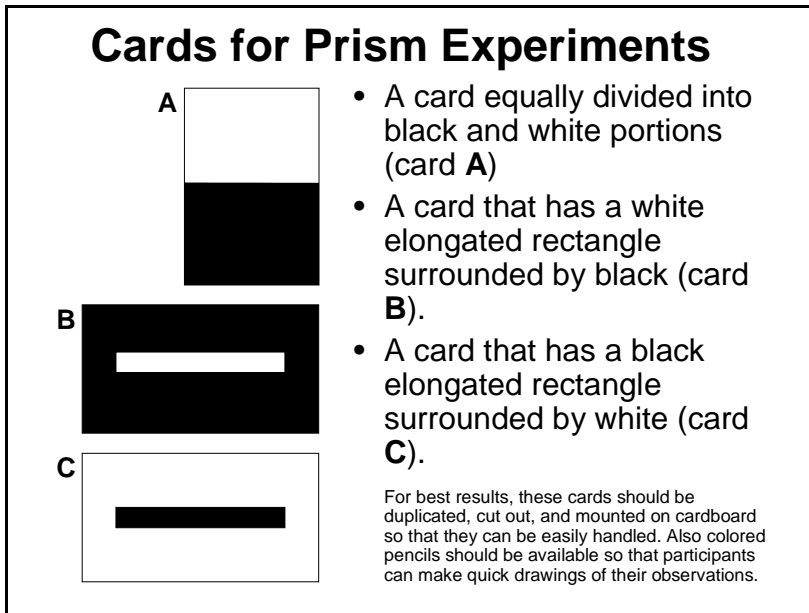
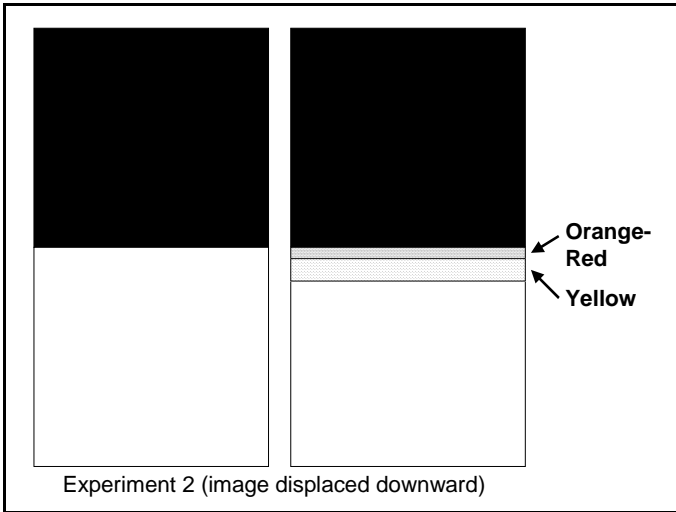
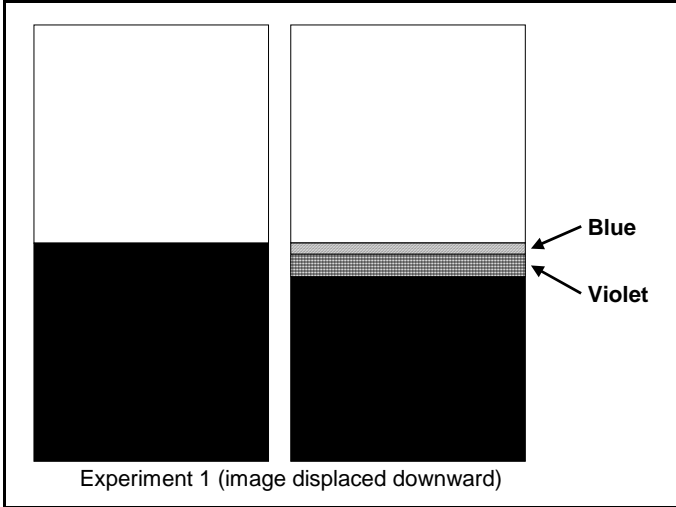


Figure 4. The three cards to be viewed through a prism (Goethe 1970).

Five Prism Experiments

- **Experiment 1.** Hold card **A** with the white area above and black below. Making sure that all participants' images are displaced by the prism in the same direction (i.e., either above or below), locate the card's black-white edge in the prism. What colors appear along the edge? Draw and identify.
- **Experiment 2.** Invert card **A** so that the black area is now at the top and white at the bottom. What colors now appear along the edge? Draw and identify.
- **Experiments 3a & 3b.** Repeat situations 1 and 2, but this time assure that the image of the card's edge is displaced in the opposite way (if down before, now up and vice versa).
- **Experiment 4.** Look at card **B** so that the long axis of the white rectangle is parallel to the prism axis. Observe and describe the colors that appear on the upper and lower edges of the white rectangle. Slowly move card **B** away until it is at an arm's length. As you move the card, observe and describe any color changes. What *new* color appears?
- **Experiment 5.** Using card **C**, carry through the same procedure as with card B. What *new* color appears?

Table 3. Five prism experiments from *Theory of Color* (Goethe 1970).



Figures 5 and 6, illustrating card experiments 1 and 2 (results of experiments 3a and 3b not shown).

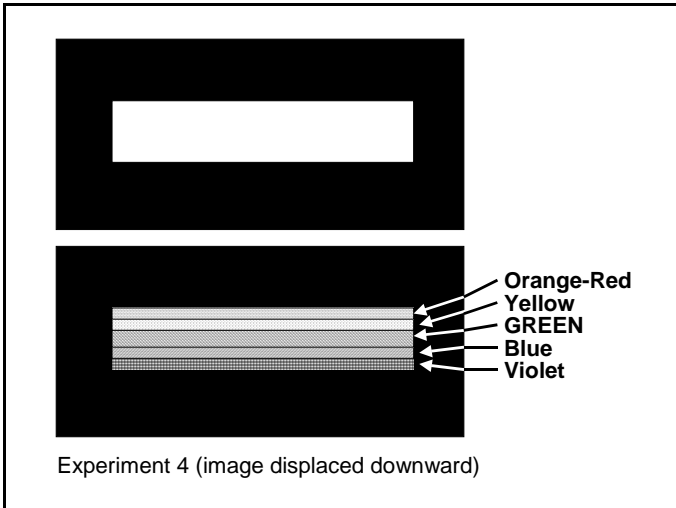


Figure 7 illustrating card experiment 4.

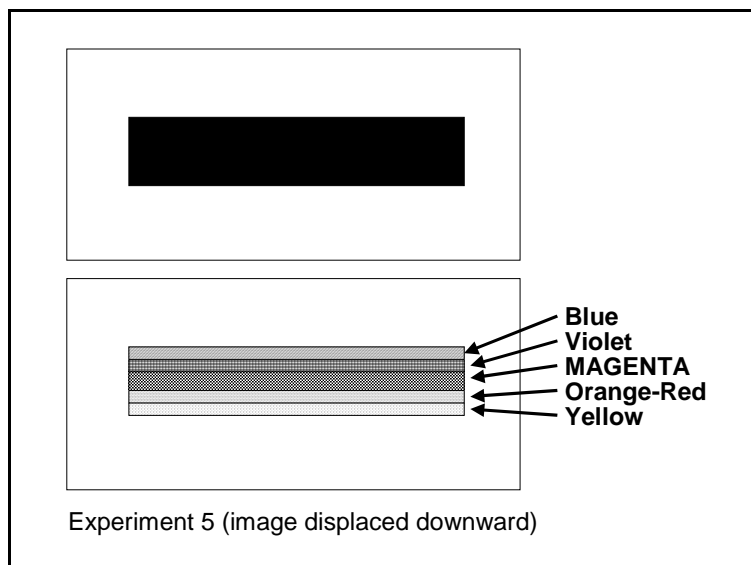


Figure 8 illustrating card experiment 5.

As figures 7 and 8 indicate, the experiments with cards B and C are perhaps the most intriguing because they generate two colors not as regularly seen as in the dominant spectra of yellow-orange-red and blue-indigo-violet. As one moves card B farther away toward arm's length, there is a point at which the yellow and blue edges merge, and a vivid green appears horizontally so that the original white rectangle is now a band of rainbow (figure 7). For card C, a similar point is reached where the red and violet edges merge to create a brilliant magenta (figure 8).

Allowing the Parts to Belong

I have discussed a portion of the procedure that Goethe used to introduce participants to colors' prismatic appearance, and now I want to highlight the style of looking and seeing more precisely. In working in the way that Goethe required, it is important to emphasize that participants must be active in their seeing. They must not merely observe what they see as passive spectators but plunge into the looking—they must, literally, “pay attention” so that they see *with intention* rather than just have a visual impression.

For Goethe, however, these efforts of active looking and seeing are not enough. Once the participant gains familiarity with the particular patterns seen (for example, black above white generating red-orange-yellow), then the next step is what Goethe called “exact sensorial imagination”—in other words, visualizing and thinking the phenomenon concretely in imagination. For example, I picture myself holding the black-above-white card, picture the displacement of the prism, picture the red-yellow-edge, then picture myself turning the card upside down and seeing the new edge of blue-indigo-violet.

Notice here that there is now an action that is simultaneously outer and inner as well as perceptual and cognitive—I re-experience my perceptual seeing but do it in my mind's eye. As Bortoft explains, “I am giving thinking more the quality of perception and sensory observation more the quality of thinking” (Bortoft 1996, 42). What I have just encountered in perception is transcribed into an intellectual picture, but that intellectual picture is held to accurate transcription by the original reality of my perceptual looking and seeing.

An important result in Goethe’s color experiments is that we begin to realize various necessary connections among the colors—for example, we recognize that blue, indigo, and violet always appear together, as do yellow, orange, and red. In this sense, says Bortoft, we see colors “belonging” in a non-contingent “togetherness” that is not determinable from just looking alone. The perception here of necessary connection “is the perception of a relationship as a *real* factor in the phenomenon, instead of being only a mental abstraction added on to what is experienced with the senses” (Bortoft, 1996, 99).

Moving out into Nature

In regard to his prism experiments, Goethe realized that light and darkness were integral to the appearance of the colors. He saw the prism, however, as a complicating factor in that it was required for the colors to appear. If, instead, he could find some situation in nature where colors arose *all by themselves*, then he would be able to locate the source of color in nature itself. He called such a foundational situation the “ur-phenomenon” (*Urphänomen*)—the deep-down or primal phenomenon that marks out a necessary pattern of relationship.

In time, Goethe concluded that the ur-phenomenon of color is the reciprocity of darkness and light or, more precisely, that color is the resolution of the tension between darkness and light. Thus, darkness lightened by light leads to the darker colors of blue, indigo, and violet, while light dimmed by darkness creates the lighter colors of yellow, orange, and red. As Goethe poetically summarized the situation, colors are the “deeds and sufferings of light.”

As figure 9 indicates, Goethe believed that he had discovered color’s ur-phenomenon in his observations of the sun, sky, and landscape. On clear days he noticed that the sun directly overhead at midday is a yellow-white, whereas the same sun setting is often orange or red. He also saw that the sky overhead is a brilliant, darker blue, whereas toward the horizon its blue shade grows lighter. In a similar way, he noticed that, when looking at a series of receding mountain ridges, the nearer mountains are shades of indigo and violet, while the ridges farther in the distance are blue.

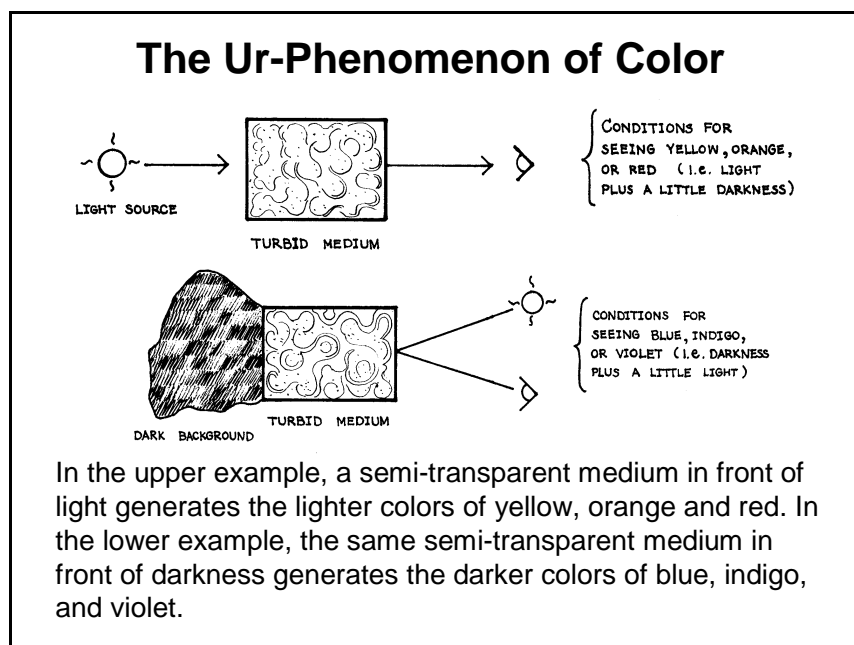


Figure 9. Goethe’s ur-phenomenon of color as evoked by a semi-transparent medium.

In all these instances, Goethe interpreted the layer of atmosphere between him and the thing seen as a semi-transparent medium that, depending on the situation, works as a layer of light or darkness and thereby generates lighter or darker colors. In front of the white brilliance of the sun, this atmosphere is turbid and thus darker. Depending on its thickness, this translucent medium makes the sun's color appear yellow at midday or red at dusk and dawn.

On the other hand, this same turbid atmosphere in front of the blackness of space or the dark green of distant mountain slopes works as a lightness, thus the sky at the horizon, with more atmosphere between me than the sky directly above, is a lighter shade of blue than the sky above. Similarly, the mountain ridges farther from me have more atmosphere in between than the ridges nearer, so the distant ridges appear blue while those nearer are indigo and violet.

Unlike Newton, who theorized that colors are entities that have merely arisen out of light (as, for example, through refraction in a prism), Goethe came to believe that colors are *new* formations that develop through the dialectical action between darkness and light. Darkness is not the passive absence of light as Newton suggested but, rather, an active presence opposing itself to light and interacting with it. Goethe's central aim in *Theory of Color* was to provide a way to demonstrate firsthand this dialectical relationship and color as its result.

Engendering Reverence for Nature

Whereas conventional analytical science emphasizes a knowledge of primary qualities—i.e., features of quantity like number, size, and position that can be measured and thereby transformed into a mathematical model—Goethe sought a science of *qualities*—a method whereby color becomes visible as intelligible *within itself*—i.e., without some external explanatory agency like “angle of refraction” or “wave length” that lies outside color as color appears.

Rather, in Goethe's way of science, colors in everyday experience—e.g., the color edges made by the prism or the changing colors of sun and sky—are now understood to have an intrinsic necessity and therefore are understandable *in themselves*.⁹ He sought to locate, through direct experience, the relationships and interconnections *among* the colors. His resulting theory, as Bortoft emphasizes (1996, p. 33) is a phenomenology of color rather than an explanatory model.

There is nothing wrong with a quantitative science that gives attention to the progressive appearance of the natural world in its mathematical aspect, but this analytical interpretation is only partial. The natural world may be capable of appearing in other ways if approached accordingly. This is Goethe's great contribution: he pointed the way toward a complementary way of study that allows our thinking to enter into the coming into being of the phenomenon instead of analyzing in secondhand fashion what has already become (Bortoft 1996).

For me personally, what is most inspiring about Goethe's *Theory of Color* is its facilitating a kind of “folding over” of natural phenomena so that things unjoined before in understanding now connect in relationship. Phenomenological geographer Edward Relph says that the best phenomenology is the “gathering together of what already belongs together even while apart” (Relph 1983, 201). *Theory of Color* offers such a gathering admirably, fostering an awareness and understanding of color that parties can see

and agree on once they have worked through Goethe's experiments. The result might be called a phenomenology of intersubjective corroboration and a science of qualities.

It is also important to emphasize that today Goethe's approach is being applied to many other topics in the natural world and leading to innovative practical results. One example is ecologist Mark Riegner's pioneering efforts to use plants and animals as a means to "read" the unique sense of place of particular ecological regions (Riegner 1993, 1998). Another example is the work of animal researchers Wolfgang Schad (1977) and Craig Holdrege (1998, 2003), who seek to render a Goethean phenomenology of animals through qualities of animal form, appearance, and behavior. I particularly admire sculptor John Wilkes' efforts at a Goethean study of water and the crafting of fountainlike vessels he calls *flowforms*, which allow water to move in a lemniscate rhythm that is not only attractive aesthetically but also provides important ecological functions, including oxygenating water more quickly and thus having important value for wastewater treatment (Riegner and Wilkes 1998, Wilkes 2003).

The Becoming of Parts Together

I now want to return to the original question of what interconnections, relationships, and wholes become phenomenologically. In the style of phenomenology I argue for here, the quest is "right parts all of a piece"—in other words, a mutual coming to presence of parts and whole through a sustained effort to look and resulting moments of insight in which one "sees."

This style of phenomenology is arduous in practice and uncertain in results. Bortoft (1985, p. 287) identifies the central dilemma as the "hazard of emergence"—on the one hand, a part is only a part if it contributes to the whole to which it belongs; on the other hand, the whole can only emerge if it allows the parts to appear. As Bortoft explains, "the whole depends on the parts to be able to come forth, and the parts depend on the coming forth of the whole to be significant instead of superficial. The recognition of a part is possible only through the 'coming to presence' of the whole" (ibid.).

What is the foundational "stuff" that grounds and allows for this coming to presence? For Bortoft, it is a situation in which all the parts have their proper place and can be together in a way that is real and non-arbitrary. In short, there is a *genuine belonging* that both sustains and reflects a whole all part and parcel.¹⁰

In both my phenomenology of lively urban places and in Goethe's phenomenology of color, there is an effort to locate and describe necessary relationships and interconnections that both contribute to and are shaped by a belonging together in which the parts are integral and have their place. The integral parts of place ballet are individual habitual bodies in synchrony with a supportive spatial configuration that generates animated streets and places. The integral parts of Goethe's color theory are the tension between darkness and light and the colors resulting from light overcoming darkness and vice versa.

Obviously, these two phenomena involve different aspects of the lifeworld: bodily routine and place ballet exist largely in the natural attitude outside of self-conscious awareness, while discoveries evoked by Goethean science involve a patient, deliberate attention whereby taken-for-granted aspects of the world emerge reflexively. I would phrase this difference in terms of two contrasting modes of daily life—what I called in *Geography of the Lifeworld* (Seamon 1979) the *triad of habituality* and the *triad of openness*. The former refers to the typical ordinariness and humdrum of everyday life, which much of the time involves unquestioned repetition and routine that most people, unless forced, are unwilling to change. One fruitful means by which to introduce useful shifts in the triad of habituality is through thoughtful design of

the physical environment as demonstrated, for example, by Hillier's space syntax work, which provides ways whereby spatial configuration might be used to generate animated urban places through place ballet.

In contrast to the triad of habituality is the *triad of openness*—those moments in everyday life when one is suddenly alert to the world in a more sensitive, intense way, and one experiences a heightened encounter with the world. As I hope the above explication of Goethe's color work indicates, his way of science can be an important tool for moving people into the triad of openness. By practicing a way of encountering the world in an empathetic, participatory way, Goethe believes that what is taken for granted and thus unseen can reveal new patterns in which parts that were before unrelated now belong in a non-contingent togetherness.

I realize that, in our time of poststructural relativity, any emphasis on necessary relationships and interconnections founded on a noncontingent "belonging" will strike some critics as an experiential essentialism associated with a conservative phenomenology that still believes in the "things themselves." On one hand, I do believe that the relationships of necessity that Goethe reveals in his color theory and the body-space structure of place ballet are real lifeworld structures that can be discovered through careful study and description of typical environmental and place experiences. On the other hand, one must also realize that place ballets and the significance of color are always expressed through particular cultural, social, and personal filters. In short, there is always a lived dialectic between the more general and the more specific, the foundational and the particular way the foundational is expressed in the real-world life of particular people in particular places at particular historical moments. My personal study preference lingers with the foundational.

I have emphasized lively urban places and colors here because I have a particular interest in phenomenological insights as they might reach into the world of praxis. Phenomenological research on place ballet might not only sensitize individuals and groups to particular places that have important significance in their own lives but might also offer practical means for strengthening those places through policy and design. Goethe's way of science I find particularly significant practically because it offers a comprehensive, intuitive means for encountering the lifeworld and finding unsuspected interconnections among parts that suddenly merge together in wider patterns of relationship and meaning. One feels satisfaction intellectually but is also surprised and touched emotionally.

The African-British novelist Doris Lessing (1969, p. 10) writes that love is "the delicate but total acknowledgement of what is," and her idea crystallizes the heart of Goethean seeing: that the mundane, little things of our world can house a miraculous wholeness that we can encounter, understand, and come to care for. I believe the greatest contribution that phenomenology can offer is to provide a systematic means for discerning this miraculous wholeness in all portions of the natural and humanmade worlds.

Notes

1. In this book, Worster emphasizes that the central concern of ecology is "the interdependence of living things," though he also demonstrates that ecology as a science often understands these interrelationships in a much different way from the "ecological point of view," which he defines as "a search for holistic or integrated perception, an emphasis on interdependence and relatedness in nature, and an intense desire to restore man to a place of intimate intercourse with the vast organism that constitutes the earth" (Worster 1994, p. 82). A useful discussion of the many different conceptual strands of the ecological point of view is Hay 2002. Besides Worster's book, valuable discussions of the nature of ecology as a science include Keller and Golley 2000; and Pickett, Kolasa, and Jones 1994.

2. Important works that relate phenomenology and the ecological point of view include Abram 1996; Brown and Toadvine 2003; Fisher 2002; Foltz 1995; Hay 2002, chap. 5; Ihde 2002, chap. 8; Langer 1990; McWhorter 1992; Relph 1981, esp. chaps. 7-12; Seamon 1979, 1993; Seamon and Mugerauer 1985; Seamon and Zajonc 1998; von Eckartsberg 1971a & b; Zimmerman 1990. Also central are phenomenological efforts to understand place and place experience—see Casey 1993, 1997; Hay 2002, chap. 6; Malpas 1999; Mugerauer 1994; Relph 1976; Seamon 2000; Stefanovic 2000.

3. As far as I know, ecologist Mark Riegner (1993) first used the term “phenomenological ecology,” which he defined as “a descriptive approach that strives to interpret patterns of relationships both within and among landscapes” (ibid., p. 211). He emphasized that the approach also applies to human landscapes. Drawing on Riegner, I incorporated the term in the subtitle of my *Dwelling, Seeing, and Designing: Toward a Phenomenological Ecology* (Seamon 1993), the volume in which Riegner’s article appears.

Other related labels for this field of study include “eco-phenomenology” (Brown and Toadvine 2003), “ecopsychology” (e.g., Fisher 2004; Roberts 1998), “experiential ecological psychology” (von Eckartsberg 1971a, p. 73), and “existential ecology” (von Eckartsberg 1971b, p. 377). In my own work, I have more often used the label “environmental and architectural phenomenology” because the expression offers one way to hold natural and humanmade worlds together—a union that is crucial if we are to understand the full range of ways by which people and world commingle. For updates on research in this multidisciplinary field, see the *Environmental and Architectural Phenomenology Newsletter*, published three times a year since 1990 (www.arch.ksu.edu/seamon/EAP.html).

4. It is unclear why Merleau-Ponty and later phenomenological researchers have largely ignored extended body-subject actions and the particular manner in which qualities of the world might contribute to their unfolding (but see Allen 2004; Hill 1985; Toombs 1995). In *Phenomenology of Perception*, chapter 3, “The Spatiality of One’s Own Body and Motility,” Merleau-Ponty provides a number of examples—a lady’s accommodating a hat with a feather, a motorist’s driving his automobile, a blind man’s using his walking stick, a typist’s striking typewriter keys, an organist’s playing the organ—to describe how body-subject automatically adjusts actions through movement space so there are no disruptions or accidents (ibid., pp. 143-46).

The most significant (but brief) example that Merleau-Ponty provides of larger-scale actions of body-subject is his own bodily mastery of his apartment: “My flat is, for me, not a set of closely associated images. It remains a familiar domain round about me only as long as I still have ‘in my hands’ or ‘in my legs’ the main distances and directions involved, and as long as from my body intentional threads run out towards it” (ibid., p. 130). It is this same unselfconscious awareness “in the hands” and “in the legs,” extended over wider spatial and temporal scales, which is the lived foundation of body and time-space routines.

In his *The Sense of Space*, philosopher David Morris (2004) seeks a language to make Merleau-Ponty’s language of body-subject more dynamic by demonstrating “how the moving body is inherently open to the world” (ibid., p. viii). He identifies what he calls “the crossing of body and world,” by which he means “a flowing threshold that overlaps body and world” (p. 5). Oddly, though this language would easily accommodate wider-scale “crossings” suggested by body and time-space routines, Morris does not

identify such a possibility, even though he emphasizes that “the sense of space is rooted in that crossing” (ibid., p. 5). Perhaps the most useful notion he develops is what he calls *sens*—“meaning as arising within directed movement that crosses body and world” (ibid., p. 24). He writes: “There is *sens* within the body’s moving directedness toward the world. *Sens*... is neither a meaning in the head nor is it interior to subjectivity, it is a meaning within a movement that crosses body and world” (ibid.). In the time-space extensions of body-subject referred to here as body and time-space routines, one might speak of an environmental and place *sens*.

5. The reader at this point may well wonder whether place ballets actually exist. As far as I know, there have been no definitive empirical studies of real-world place ballets. In describing her neighborhood stretch of New York City’s Hudson Street as a street ballet, Jacobs (1961, pp. 50-54) offers an impressionistic account of the many different people present for different personal ends: her putting out the garbage, neighboring proprietors opening their storefronts, children walking by on their way to school. Jacobs also described how the nature and tenor of this street ballet changes over the course of the day and evening.

In a participant-observation study, geographer Christina Nordin and I (Seamon and Nordin 1980) used place ballet to examine the outdoor market of Varberg, Sweden, a coastal town of about 20,000 people south of Gothenberg. Located in the center of town in an open cobblestone square about the size of a football field, the market is open all year on Wednesdays and Saturdays from 8 a.m. to 1 p.m. From interviews and observations, we determined that approximately two-thirds of all buyers at the market are regulars, whereas the great majority of sellers are regulars.

The great difficulty in demonstrating place ballet is the considerable number of participants whose actions and experiences must somehow be observed and registered. Urban researcher William Whyte used time-lapse photography to record place use, and one of the most convincing accounts of a freewheeling regularity is his time-lapse record of sitting-ledge behavior at New York City’s Seagram Plaza (Whyte 1980, pp. 69-73; appendix B).

Another important contribution to exploring place ballet is sociologist Ray Oldenburg’s *The Great Good Place* (Oldenburg 1989), which studies informal meeting places outside home and work where people gather for good company—cafes, pubs, coffee shops, and the like. Oldenburg emphasizes that a key ingredient in these places is the “regulars, whatever their number on any given occasion, who feel at home in a place and set the tone of conviviality” (ibid., p 34).

Political scientist Douglas Rae (2003) gives indirect confirmation of 19th-century urban place ballet in his study of traditional urban place founded in animated street life and vibrant city districts. His real-world focus is the shifting social and economic geography of the streets, neighborhoods, and districts of New Haven, Connecticut, the city he draws on to typify traditional urbanism in America. Largely through archival evidence, he demonstrates the crucial importance of a locally-grounded network of human relationships founded in and sustaining urban businesses, civic organizations, and municipal government.

Especially relevant for the possibility of place ballet is Rae’s description of the intimate connectedness between residents and their urban world—so much so, Rae suggests, that most residents could not imagine themselves in any way separate or distinct from that world. One can readily imagine that the

world of these urban citizens would involve routine and repetition grounded in the places of the city that made up their urban lifeworld:

A fully grounded city citizen would work full time within her city, would live her nights and evenings there, would educate her children there, would routinely shop in stores there, would worship there if anywhere, would live in a social network pinned down on the city. Its streets, saloons, restaurants, corner stores, plant gates, ballparks, and many more very particular and localized features would organize her life. It would be hard to say who she is without reference to her city (ibid., p. 113-14).

From the vantage point of humanistic geographer Yi-Fu Tuan, place ballet would exemplify a *field of care* — i.e., any place that comes to be known through prolonged experience and that fosters a sense of comfort and attachment. One striking example of the significance of a field of care is provided in psychiatrist Mindy Thompson Fullilove's *Root Shock*—a study of the traumatic impact that urban renewal has had on African-American neighborhoods (Fullilove 2004). The enforced segregation of the black ghetto was racist and ethically wrong, but Fullilove demonstrates that one of its strengths was as a place “where people shared with one another... People had in common the pressures of daily life. People had in common the struggle to survive in the face of racism. And though such pressures might turn people against one another, in those places it made for a great deal of kindness” (ibid., pp. 121-22).

Fullilove demonstrates that this “field of kindness” arose from a strong sense of place solidarity generated in part by an outside-imposed spatial boundedness: “In the compact space of the ghetto, a tight field of activity was created, through which acts and words might pass quickly. It was possible to know of someone’s pain or glory, and to respond when needed. Actions toward others were permitted and expected. They were extended with the consent of the community, and received in the same vein. This passage through the field of the community, with the consent of the community, meant that the sense of kindness was everywhere, at least within the community” (ibid., p. 123).

One of the most destructive aspects of urban renewal was the dismantling of these fields of kindness: “The shattering of the field... had an enormous effect on kindness because kindness was passed through the field. In the aftermath of urban renewal, individuals were preoccupied with making a new life, and perhaps they could not be as kind as they had been previously. At the same time, given the loss of the field, the kindness did not extend as far as it had before. The buffering effect of kindness was lost, and the negative behaviors and attitudes that had always been present were given greater scope. Given the other difficulties that were to come, the decline in kindness, however small, triggered a downward trend in kindness over the ensuing decades” (ibid.).

Fullilove emphasizes that the ghetto’s field of care was rooted in an animated street life, including street ballet (ibid., pp. 18-19). In short, place regularity sustained responsibility for and love of place, which in turn helped make sure that place regularity continued—until derailed by urban renewal, which “replaced people-friendly blocks and structures with megablocks and megabuildings surrounded by parking lots” (ibid., p. 92).

6. Hillier’s derivation of statistical and graphic indices is a significant achievement and represents, from a phenomenological perspective, a powerful example of quantitative measures that serve to allow the phenomenon to appear (rather than reduce and distort the phenomenon as so much quantitative analysis

typically does). Hillier attributes the forthrightness of his measures to “trying to describe an order that is already present in the system” (Hillier and Hanson 1984, p. 45).

On the other hand, it must also be said that Hillier’s mathematical measures derive from configurational properties only, thus other important aspects of urban place—e.g., land uses, functional activities, building types, and user density—are not considered. In his most recent work, Hillier claims to demonstrate that “movement in the urban grid is, other things being equal, generated by the configuration of the grid itself” (Hillier 1996, p. 5). He argues that “the structuring of movement by the grid leads, through multiplier effects, to dense patterns of mixed-use encounter that characterize the spatially successful city” (ibid., p. 6; also see pp. 167-70). One helpful effort to integrate spatial configuration with these other aspects of urban place is Bentley et al. 1985.

7. Eventually, one must ask if, in the real place, the pathways of highest integration are actually the most used and the liveliest in terms of pedestrian activity. To answer this question, Hillier and his researchers have gone to the actual pathways and counted pedestrians. Overall, results indicate a high correlation between high integration values and animated streets. See Hillier 1996, p. 161; Read 1999, pp. 251-64.

8. The most complete set of Goethe’s scientific writings in English is Goethe 1988. For examples of recent Goethean phenomenology, see Seamon and Zajonc 1998. The best single overview of Goethean science, including its phenomenological significance, is Bortoft 1996; also important is Lehrs 1958. For a helpful overview of academic evaluations of Goethean science, see Amrine et al. 1987.

9. I am not qualified to evaluate the scientific validity of Goethe’s color theory. Until recently, the preponderance of scientific opinion concluded that Goethe’s theory is subjectivist and without the foundations of the “wave length” theory of light that dominates color research today. On the other hand, there has been some experimental work, especially the color experiments of Edwin Land (inventor of instant photography), which cannot adequately be explained by “wave length” and, in fact, makes more sense in terms of Goethe’s theory, particularly the importance of a light-dark edge for generating colors and the active role of the eye in contributing to the color experience (Land 1959, Zajonc 1993).

In his central experiment using two light projectors, Land (Land 1959, Zajonc 1993, pp. 190-99) projected on a screen a synchronized image produced by two colored lights—one yellow, the other orange—passing through two black-and-white transparencies shot of a still life. One black-and-white transparency was taken through a red filter, the other through a green filter (the fact that the filters were red and green is immaterial to the experiment as are the projected colors of yellow and orange).

One would expect that the resulting still life on the screen would appear in gradations of yellow-orange but, amazingly, what one really sees is a full-colored reproduction of the original still life, and this done with two colored lights and black-and-white images! Land writes that “we are forced to the astonishing conclusion that the rays are not in themselves color-making. Rather they are bearers of information that the eye uses to assign appropriate colors to various objects in the image” (Land, 1959, p. 2).

From Goethe’s perspective, the first provocative component of Land’s experiment is the black-and-white transparencies, which could be understood to provide a great number of varying darkness-light “edges” that the two separate projector lights then pass along and through. One could infer a great number of black-white edges, each accommodating a particular color edge.

Though I haven't emphasized the point here, Goethe also believed strongly in the eye's *active* role in seeing. Goethe spoke of "the law of required change"—the idea that "the eye is compelled to a form of opposition... quickly merging opposites and striving to achieve a whole" (Zajonc 1993, p. 196). Part I of *Theory of Color*, dealing with physiological colors—i.e., colors in the eye—describes colored after images and color shadows as everyday examples of this law.

Colored shadows arise when there are two light sources (one that is white) casting shadows thrown by an object. If the colored light is green, for example, the object's shadow cast by the green light and illuminated by the white light will be *red*, even though there is no red light anywhere. This appearance of red, says Goethe, is the instantaneous tendency of the eye to supplement the dominant green lightness of the scene with a red in the darker shadow.

Colored shadows are especially relevant in regard to Land's experiments because all colored shadows, like Land's complete color rendition of the still life, occur instantaneously and must require an immediate response of the eye, which in this case is an immediate rendition of all the colors of the still life, perhaps because of the "infinite" number of gradations of black-white edges offered by the two superimposed black-and-white transparencies.

10. In part, Bortoft's understanding here derives from Martin Heidegger's distinction between "belonging together" vs. "*belonging* together" (Heidegger 1969, p. 29). In the former situation, parts not necessarily of a piece are brought arbitrarily together. In other words, the parts are together but they may not really *belong* together. The latter situation is much more real because the parts all necessarily belong together, and this belonging founds the possibility of really seeing how all the parts are together and the whole they make. One of the most effective aspects of Goethe's color theory is its discovery of how particular colors "*belong* together" because of the light-darkness dialectic. Goethean science attempts to find this *belonging* together in regard to the particular phenomenon studied.

11. One remarkable aspect of place ballet is that, though it is grounded in the natural attitude and routine, it can also evoke novelty, excitement, and surprise. The serendipity of encounters, the possibility of newcomers and outsiders, the sense of place ambience—these qualities may give a taken-for-granted place a sense of exhilaration and allure, all housed in the triad of habituality.

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