Man and World 16:177–205 (1983)

OBJECTS' OPTIMAL APPEARANCES AND THE IMMEDIATE AWARENESS OF SPACE IN VISION

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It is tempting to suggest that the immediate awareness of space is simply our ordinary, everyday experience of the spatiality of things in the world. But this is a temptation to which we must not yield, for our ordinary experience of material things in space and of their spatiality is filled with meanings first known in various intellectual experiences, e.g., in geometry, and these meanings associatively inform our perceptions of objects and their spatial properties. So, for example, to report on the basis of ordinary perceptions that a table top is rectangular or that a basketball is spherical is to presuppose – at least implicitly – precise geometrical definitions of ideal figures and to apply these definitions in the empirical order. We need no long survey examples of attributive and relational judgments about the spatiality of things in order to recognize that our ordinary experience of things and our reports based thereon frequently appeal more or less explicitly and more or less distinctly to a knowledge of ideal objectivities. Usually this means that, in our reports of ordinary experience, we utilize Euclidean names for the shapes of the objects we encounter and that we describe as having Euclidean properties the spatiality of the world in which we live and act. At the same time, however, we recognize that in our ordinary awareness there are no Euclidean objects as such and that spatial relations actually encountered only approximate the Euclidean. But within ordinary experience itself, the presence of the mathematical ideal and the relation between it and the physical are never of concern to us. However, in a philosophical reflection upon the experiences of space, including the ordinary, both the distinction and the relation must be granted, and together the facts of the distinction and the relation show clearly that the ordinary experience of space cannot be the immediate experience with which this philosophical reflection must begin.

Given this conclusion, the immediate experience of space can be only either a direct encounter of ideal space itself, an encounter prior to and informing our ordinary encounter with physical things, or an experience of the spatiality of individual physical realities which is both prior to and independent of any knowledge of ideal objects and relations. In the latter case, the subsequent coming to know ideal objectivities would then inform even later experiences of physical things. For purposes of the present paper, I shall simply assume that the first alternative has been shown incorrect, i.e., that we have no explicit or implicit innate knowledge of geometric objectivities prior to any encounter of actual material objects in space. I shall also assume that the second alternative is likewise incorrect if it makes of our immediate experience of space simply the psychological organization of sensuous data and makes of the mathematical experience of space merely the empirical generalization of the patterns in the psychological organization of sensuous data. Such a theory renders unintelligible both the objectivity of space and the ideality of geometry. Finally, I shall assume that the Kantian view of space as an a priori form of sensuous intuition is also incorrect, for while it seeks to preserve the ideality of space by making the organizing patterns of sensibility necessary – and thereby ideal – it fails to preserve the objectivity of these idealities. Although Kant claims they are objective both because they must be universally applied in all representing of physical objectivities and because they can become the object of a reflective regard, the idealities are at best only transsubjective. They are not fully objective since they govern in fact the activity of representing objects rather than the relations existing among the objects themselves.

Consequently, the view that the immediate experience of space is both prior to and independent of our ordinary encounter with things and their spatial properties must be explicated in such a way that it (1) preserves the *objectivity* of immediately experienced space; (2) permits the abstraction of *objective idealities* while preserving the sense of *necessity* inherent in the sense of these idealities; and (3) permits the subsequent application of these idealities in our experience. I shall furnish in this paper a description of the immediate experience of space which satisfies these three conditions, but I shall attend specifically only to the first, and I shall show how our awareness of objective space arises in the acquisition of an optimal appearance of an object. To demonstrate that the second and third conditions are satisfied and how they are is possible, however, only through detailed descriptions, e.g., of the mathematical experiences of space,

which go far beyond the scope of a single paper. I shall, finally, limit my discussions throughout to vision.

I

The concrete ordinary experience of the world is first of all perceptual, but we ought not understand the word "perception" and its cognates in too narrow a sense. In the first place, we ought not understand perception as a merely sensory experience. Secondly, we ought not understand it as directed to things merely qua material and, finally, we ought not understand it as an exclusively cognitive experience. Our ordinary experience of the world is in fact directed to a sensible, material, and cultural world. So, for example, the things present in the world are experienced as possessing cultural properties, properties related to human desires, interests, and purposes. Most significant among these cultural properties are two classes, functional properties and value-properties. Functional properties, say, of a tool or machine are grounded in the causal or material properties of things. The same is sometimes true of value-properties, although these can be founded directly on sensible properties, e.g., something might have a pleasant shape. To the extent that functional and value-properties are grounded in causal properties, we must consider the fact that we ordinarily experience the things of the world as having causal properties. These properties can first be apprehended *as causal* only in specific acts of judgment which assert a causal relation between things or events. The original determination of a property *as causal* can never occur in and of itself in perception. While I can certainly perceive an event, say, a stone breaking a window, and therein can perceive a real qualitative change as an effect either in an object acted upon by the perceived object or in the perceived object itself, and while I can perceive the stone's hardness and weight, I *perceive* these qualities *as causal* only when my perception is associatively informed by a judgment that these qualities produce or are an effect. In our example, I perceive the weight and hardness of the stone as causal properties only after explicit judgments have been made that this stone or similar stones have in fact broken windows. Subsequent to such explicit judgments, any perceptual encounter of stones is transformed and informed by this meaning, and I apprehend the stone's hardness and weight not merely as sensible qualities but as causal. Similarly, I can perceive the deformation of bread dough when I push against it to see if it has risen fully, but I recognize this deformation as

an effect only after I have explicitly judged that my fingers can and do cause such deformation. The making of these explicit causal judgments presupposes, however, that I *sense* in the object some sort of change – change with regard to shape, motion and position, or quality. The making of such judgments presupposes, in other words, that I encounter the thing simply as a *sensible* thing.

The same is true for our ordinary experience of what we might call the "ideal" properties of the thing. The apprehension of the rectangularity of the table top and that of the sphericality of the basketball presuppose a reference to a prior experience in which the theoretically exact definitions of the geometric figures are acquired. The experience of sensible shape associatively recalls this theoretical background, and we attribute a mathematical property to a physical object even while we recognize that the mathematical does not exist as such in the physical order. We do so because the mathematical definitions of figure are exact in a way that empirical generalizations about shape are not and cannot be, and because the theoretical description of our world and its attendant – and valued – canons of objectivity and exactness have become a part of our cultural heritage. But all such attributions presuppose the fundamental and immediate experience of the sensible object and its spatiality.

Hence, the ordinary experience of the world, to the extent that it includes the experience of the causal, cultural, and ideal properties of things, is mediated by a variety of cognitive, volitional, and evaluative activities, all of which presuppose an immediate encounter with something to which we attribute these properties; that something is the *purely sensible object* or, as Husserl calls it, the "phantom."[1] The immediate experience of a material thing, then, is the experience of its phantom and the immediate experience of space is the experience of the spatiality of the phantom.

It must be stressed at the outset that the phantom, while an individual sensible object and experienceable as such, is essentially an abstract component of a material thing. Rarely is it the case that our experience is of only the phantom, although that is possible. Husserl's own examples of phantoms are such things as rainbow, the blue sky, stars and planets in the night sky, and the sun, for even though we might know in the science of physics their causal properties, both the manner in which they affect and are affected by other objects, we do not *perceive* these properties.[2] Phantoms have no *perceptible* causal properties; they have only sensible properties and, perhaps, ideal properties and immediately grounded value-properties (such as the pleasantness

of shape). In many cases, the perception of a phantom is the consequence of an experience being deficient in some respect. The child's experience, for example, might be of this sort: not knowing the causal and functional properties of a hammer, the child does not truly perceive a hammer. He or she does, however, experience the hammer-phantom, a sensible object of a certain size and shape which endures through time and occupies a certain position in space, and which is of a certain color and texture, which makes a certain sound when dropped, etc. The child's failure to see the hammer as such rests upon a lack of knowledge, specifically of its causal properties and function, a knowledge which is ordinarily and implicitly brought to bear in the perception of a hammer. These deficiencies are corrected as the child assumes his or her cultural inheritance through education and training and as the child's own experience grows.[3]

The phantom – like the material object itself – is an identical object given in a manifold of momentary appearances. Most obvious is that the phantom is given in a manifold of perspectival views. We see first the back of the house, then its side, finally its front; we inspect the features of the façade by directing our glance now to this part, then to that corner, etc. But this is not the only manifold in which the identical phantom appears. The phantom is also an identical object through its temporal extension, as well as the identity given in the multiplicity of sensible qualities, each of which is the direct object of one or some combination of senses. So, for example, my house today is the same house I saw yesterday; it has its visual qualities (shape and color), its tactile qualities (shape again, hardness, texture), and perhaps even olfactory and auditory qualities. Moreover, for each of these senses, the phantom presents itself in a manifold of aspects. The identically qualified phantom will, for example, change its appearance as the conditions of the perceptual medium are varied. The apparent color of a necktie might vary as we move from artificial, especially fluorescent, lighting to daylight, and the straight stick appears bent in water. Furthermore, an identical object might vary its appearance if the sense organs are diseased or deficient in some respect (e.g., color blindness). Indeed, even subjective moods could affect the manner in which an identical object, e.g., a flower, momentarily appears. Finally, the differences in the interests guiding our experience at the moment can affect the manner of an object's appearance, and we shall consider this circumstance more carefully.

Our perceptual life is in a state of nearly constant flux. We continually redirect our gaze among and within objects; we change our focus

from one object to another, and we investigate various views and details of the same object. Even in those cases where our perceptual attention is limited to a single object, our investigation of it can never be complete. As we change our view of its, we retain in our experience past views, and these together with our present view condition our sense of what to expect in the object as our experience continues, but we never exhaustively know the object. So, as we move from the rear of a white house along its white side toward the front of the house, we implicitly and automatically expect the front to be white, and we are surprised if it is not. And in our examination of the house, we come to know it more and more completely and more and more precisely. But while our perceptual activity works toward a goal of complete and precise determination of the object, we never do attain this goal, nor can we, since a perception can never grasp at once, or successively, the object from all sides or under all aspects and conditions.

Hence, the tendency toward complete and precise determination must be limited in some way if our perceptual expectations are ever genuinely to be satisfied. The limiting factor is the practical interest governing our perceptual life at the moment (*DR*, 134). This practical interest limits the goal of precise determination to those features relevant to our interest in the object, and at the same time, indicates the degree of precision necessary in order for those interests to be served. Such practical interests can be of varied sorts: the taxonomic, theoretical interest of the botanist in a flower (where theorizing is understood as a special case of praxis because the subject's *particularity* is no longer relevant to the interest governing it), the aesthetic interest of a passerby in the same flower, etc. (*DR*, 129). Thus, a carpenter in his workshop would settle for nothing less than a "true" hammer of the proper hardness, length, weight, and balance in order to complete his or her construction of a cabinet. That same carpenter, however, when hiking in the woods and suffering from both a loose heel on one shoe and a shortage of hammers, might settle for the other shoe or a suitably shaped rock as a useful substitute for a hammer. In a sense, he or she would perceive the shoe or rock as having roughly the shape of a hammer (i.e., as having a part which could serve as a handle and another part which could serve as the head) and as having approximately the proper hardness and weight. In this way, the carpenter's "looking for a hammer" or "looking for something to hammer with" is satisfied in the perception of the shoe or rock and the implicit realization that it could be used as a substitute hammer. This is an exaggerated case and it does not, of course, make the shoe or rock a hammer, but such

an experience could never occur within the confines of a workshop where the practical concern is professional craftsmanship.

Our practical interests, then, call forth certain qualities for attention and demand that the object be given such that we can best experience those qualities. The teleology of perception, therefore, is directed not to complete givenness but to "maximal" or "optimal" givenness relative to the practical interest governing the perception (*DR*, 128).[4] To approach optimal givenness through the temporal extent of a perception is to experience an increase in the richness of the qualitative determination relevant and relative to that interest.

The possibility of such perceptual determination of an object depends on two further conditions. The failure to satisfy either condition will render an appearance indistinct. The first condition is the suitability of the physical circumstances in which the perception occurs (*DR*, 132, 138).[5] These circumstances can be either subjective (e.g., the health of the sense organ) or objective (e.g., the state of the perceptual medium). If the physical circumstances are not suitable, the object's qualities cannot be truly manifested; the appearance, in other words, will be anomalous rather than normal and will be subject to correction by other perceptions of the same percipient or other subjects.

Secondly, an optimal appearance requires that the object be (a) given in the center of the visual field rather than at its margins, (b) presented at a suitable distance from the perceiver, and (c) susceptible to careful and comprehensive scrutiny by the perceiver. This general requirement refers only to the positioning of the object relative to the percipient and the sense organs; it does not refer to the presence and normalcy of apparent qualities. The presence of the appearance in a suitable position in the field and at a suitable distance from the perceiver makes possible the distinctness of each phase. A momentary appearance not so positioned could not be precisely determined because the eye, say, would not be properly focused on the appearance. The accessibility to careful and comprehensive scrutiny is necessary because a truly optimal appearance requires more than one view of the object and, consequently, usually more than one position relative to the subject. It is this second general requirement for optimal givenness that leads directly to an account of the role played by optimal appearances in our immediate awareness of the spatiality of the phantom (and the material thing whose phantom it is) in perception.

II

The key to understanding the satisfaction of each part of the second general requirement is what Husserl somewhat idiosyncratically calls "kinaesthesis."[6] By this he means the capability of the perceiving subject to move his or her body or body parts such that the position of the sense organs relative to the object changes. Consequently, our exposition of the relationship between optimal appearances and the awareness of space must be ordered in such a way as to discuss the kinaesthetic activities appropriate to the satisfaction of each part of the second requirement for optimal appearances. Although this requirement consists of three parts, there is a more general distinction under which the parts can be subsumed. The first part of the requirement deals with an appearance's position within the visual field, whereas the second and third parts deal with an object's position in space relative to the percipient. In this section of the paper, I shall use this more general distinction as my organizing principle. I shall deal first, therefore, with the visual field and the kinaesthetic activities appropriate to it. I shall then treat those kinaesthetic activities involved in the awareness not only of the complete spatiality of the phantom but of space itself. The second part of this section will be subdivided to reflect the differences between the second and third parts of the general requirement.[7]

A. The visual fields

1. The visual field simpliciter

Consider an artificially and arbitrarily limited perceptual situation. Let us stipulate (1) that the percipient is making *no* bodily movements of any kind, (2) that the percipient's head is in its normal, vertical position with the eyes looking straight ahead, and (3) that the objects thus appearing to the percipient are unchanging and at rest. In this situation, the perceiver would encounter a visual field consisting entirely of a flat expanse of areas of contrasting apparent qualities filling delimited parts of the field. This is not to deny perspective in the visual field; however, the perspective which does exist is a function of changes in the direction of the lines which outline an object and of relief produced by shadings, shadows, and the overlapping of appearances, rather than a function of depth as such or the perception of depth.[8] The demarcations existing between areas of contrasting qualities indicate qualitative

differentiations within objects or the numerical differentiation of objects. So, for example, the black of the window shutters stands out against the white of the house which, in turn, stands out against the green of the grass and the blue of the sky. More exactly, small expanses of black stand out against a large expanse of white standing out against an expanse of green and one of blue.

In a certain sense, however, there would be no spatial character to the field as such; it would manifest a qualitative organization and, as long as neither the percipient nor any object moved, there would be no reason to characterize this organization in the spatial terms of "above," "below," "in front of," "to the left of," and the like. The most that we could say is that within the continuum of sensed qualities which I shall call the "visual field *simpliciter*,"[9] the complex of apparent qualities presenting the object to which our attentive glance is directed is qualitatively distinguished from the remainder of the field which presents the background against which the object appears. This background comprises the appearances of other objects, and is distinguishable into those complexes of qualities presenting the objects immediately surrounding the object of attention and those complexes which are less well focused at the margins of the field. Thus, the complexes of apparent qualities are distinguished as figure/ground and the field is distinguished as having a center (the small area correlated to the percipient's looking straight ahead and occupied by the figure), a surrounding area, and a margin.

Although the field as such has no genuinely spatial character, it does present indications of the spatiality of the phantom. The contrasting and discontinuous complexes of qualities presenting objects are each spread out within the field and occupy within it a determined extent with a determinate shape and a determinate location. Thus, do these contrasting complexes possess apparent size, apparent figure, and apparent position relative to other complexes, and thus do they present the size, figure, and position of objects. Furthermore, the division of the field into contrasting figures establishes relationships of reciprocal limitation which, in turn, maintain the ordered and fixed unity of the field as a whole and provide the means for the presentation of relationships of distance. But the presentation of position and distance do not in and of themselves give to the field a spatial character, for we find only absolute position and absolute distance. Only when position and distance are fully variable and fully relativized do we truly have a spatial form of ordering – a system of places. The first step towards this goal is the variation in an object's orientation within the field, a varia-

tion which occurs either when we move our sense organs or when the object moves in the field. I shall – for reasons which will become clear below – limit my discussion for the most part to the case of kinaesthetic movement when the objects in the field remain unchanged and at rest.

2. The oculomotoric field

In order to account for the experience of space we must begin systematically to remove our artificial limitations on the perceptual situation, for so long as we maintain that the percipient can make no bodily movements, no true perception of objects, e.g., of their solid shape and their other sides, is possible, and enlarged visual fields and space itself cannot appear. In this light, let us suppose that we are sitting high on a bluff overlooking the Mississippi River and reading a book. Our visual field *simpliciter* in this circumstance would be composed of a central area consisting of a few words in focus, a surrounding area of the page with other words out of focus, and a marginal area presenting certain parts of the landscape. Let us further suppose that all of a sudden an indistinct bright spot in the margin of the field catches our attention and we seek to determine what it is. Without moving the head, we look in the direction of the bright spot and see that it is the reflection of sunlight off the window of a house situated on the opposite bluff. We then return our eyes to the spot in the book where we had interrupted our reading.

This example involves two important modifications in the visual field. The movement of the eyes toward the reflected sunlight not only varies the visual field so that it includes objects not seen in the original situation and excludes objects originally seen but also changes the orientation of all the objects within the field. Thus, when the bright spot moves to the center of the visual field as we move our eyes toward it, the book moves away from the center into the margin of the field and all the other objects in the field likewise change their orientation. Some of the objects previously in the margin of the field leave the field, while new objects enter in the opposite margin. It should be noted that in this case, since all the objects appearing to use are assumed to be at rest, they undergo a uniform change of orientation, i.e., they all move the same apparent distance in the same direction and maintain their fixed positions relative to one another for as long as they remain within the field.

A similar but not identical change of orientation occurs when the object of our new attention moves while we remain perfectly still.

So, for example, suppose the bright spot is the reflection of sunlight off an airplane; in this case, the spot would change its orientation within the field without any movement of the bodily organs, but the other objects in the field would not change their orientations. Furthermore, the plane would change its position relative to other objects whereas all the other objects would maintain their fixed positions relative to all objects save the moving plane. What is most important to note is that change of orientation within the field is possible only when there is subjective or objective movement and the widening of the field is possible only when there is subjective movement, for if I do not seek an optimal appearance of the plane by looking up at it or following its flight with my eyes, the visual field is not widened and no new objects enter the field although the plane will leave it.

It is the possible motivation of a series of appearances by a kinaesthetic process that grounds the "horizonal" structure of the field itself. The percipient implicitly recognizes that both the object and the space presented in the field have "horizons," i.e., indications of other dimensions and aspects cut off from view. A necessary constituent of such an experience is the further implicit awareness on the part of the perceiver of his or her own bodily position and attitude. If the percipient then actualizes any one or some combination of kinaesthetic capabilities, new views of the object appear against new backgrounds, i.e., new visual fields appear, as long as the kinaesthetic process continues. This horizonal structure of the visual field, therefore, is the objective correlate of a kinaesthetic system; as the capabilities of the system are actualized, the visual field is horizonally widened.[10] This fact permits the concept of the visual field to be expanded. The field is no longer conceived merely as that in which the appearances of objects are ordered in a single, momentary perceptual phase but as that in which all the possible appearances which can be motivated by the activity belonging to a particular kinaesthetic capability, e.g., that of the eyes, are ordered throughout the temporal extent of an act of perception. The reference point, the point of orientation, for this ordering is the body and its sense organs as kinaesthetically situated.[11] The body is the absolute here with respect to appearing objects. It is not movable vis-à-vis the point of orientation as are other things; when the body moves, the point of orientation changes.

The second level, therefore, in the presentation of the visual fields is the presentation of the oculomotoric field. The oculomotoric field is the objective correlate of the kinaesthetic system of eye movements, whether the system is monocular or binocular.[12] In the presentation

of this field, *only* the eyes are moved and movable. Thus appears a limited, two-dimensional field with two axes corresponding to the normal (because they involve the least muscular exertion and tension) movements of the eyes to the sides and up and down: the left/right axis and the above/below axis (*DR*, 309). The field is limited because the movement of the eyes along either axis is physiologically limited. The two axes themselves are coordinated to and intersect at the center of the field, i.e., that position within the field which is the correlate of the fixed kinaesthetic situation wherein the eyes look straight ahead. This, it should be noted, is the kinaesthetic situation of the visual field *simpliciter*. The oculomotoric field, then, is the quadridirectional widening of the visual field *simpliciter* generated by moving the eyes both left and right and up and down. The oculomotoric field is the second level in the constitution of the visual fields and space because the eye movement motivating it is the minimal kinaesthethic activity needed to widen the field and it produces the next most limited field.

3. The cephalomotoric field

Let us resume our reading along the Mississippi. Assume now that we are again distracted from our reading, this time by some sort of movement at the margins of the field. Our attention is now attracted by a spot of white in some way associated with this movement. We move our eyes in the direction of the white and see a bald eagle perched high atop a tree on the opposite bluff. Whereas the reflected sunlight previously did not hold our attention, the bald eagle does. Let us also suppose that in order to bring the eagle to the center of the oculomotoric field, we had to move the eyes up and left, and that we find this position uncomfortable. The appearance, then, would not be optimal because it is not easily held. Consequently, we also raise and turn our heads so that we can return the eyes to the more comfortable central position. In this case, we have introduced a new kinaesthetic system, the movements of the head (and upper body).

This example immediately shows that up to a point certain kinaesthetic systems can substitute for and are continuous with one another (*DR*, 170–71, 315). So, I could have immediately looked up to the eagle by moving the head instead of first the eyes and then the head. Or, if the eagle were to fly away, I could begin to follow its flight with only the eyes, but I would not be able to follow it very far (unless it were merely circling). But having followed the flight of the eagle to the margin of the oculomotoric field, I could continue to follow its flight by moving the head in the same direction I had moved the eyes.

The example also shows that variations in one kinaesthetic system can make possible new variations in another. So, when I move the head to see the eagle, I can return the eyes to their original position or can continue to widen the field by maintaining them at an extreme position (although I would then no longer have the eagle in focus). Consequently, we can see that movement of the head presents a manifold of visual fields in each of which all the eye movements are again possible, i.e., the movement of the head presents a manifold of oculomotoric fields.

The third level in the presentation of the visual fields and objective visual space, is, therefore, the presentation of the cephalomotoric field. The cephalomotoric field is the objective correlate of the kinaesthetic system of movements of the head and upper body and the eye movements made possible thereby. This field, according to Husserl, insofar as there are no limits to the left and right of center but are limits above and below, is a two-dimensional field closed in one dimension and open but limited in the other. Thus, Husserl claims that in turning the head to the left or the right in a continuous motion (much like a cartoon character who has just received a devastating left hook), the head will cyclically return to its original position and the oculomotoric field originally presented will reappear. And continuing the same motion, the manifold of oculomotoric fields previously experienced will repeat itself in the same determined order. This cyclical repetition of fields in one continuous kinaesthetic movement closes the field because the manifold of possible oculomotoric fields along the left/right axis is completely given; there are no further indications of other spaces existing along this axis. This argument, of course, presupposes that the head can rotate freely on the neck and shoulders. But given this assumption, the line of left/right coordinates is closed. The line of above/below coordinates, on the other hand, is not closed (*DR*, 310).

Husserl's argument here is obviously forced. He, on the one hand, ignores physiological limitations on the left/right movement of the head and, on the other hand, invokes them with respect to the up/down movement of the head. However, the point of the descriptions of the cephalomotoric field is that the movements of the head enable the left/right dimension of the manifold of oculomotoric fields to form a cyclical unity whereas they do not enable the above/below dimension to form such a unity. And this point is well taken. Let the starting position of the system of head movements be the normal, vertical position of the head with the eyes looking straight ahead; if we then turn the head as far as possible to the right and move the eyes as far as possible to the right along the same axis, a particular visual

field appears. This field overlaps and is continuous with the visual field given in the diametrically opposed kinaesthetic situation, i.e., where the head and the eyes are moved to the left as far as possible. None of this is true in the case of the physiologically possible movements of the head along the up/down axis.

Hence, the actualizable movements of the eyes and head are insufficient to present three-dimensional space. Even if the movements of the head were fully idealized so that the above/below dimension in the field also appeared as a closed, cyclical manifold, i.e., of the physiological restraints on the movement of the head were completely removed so that it could rotate freely on the up/down axis, there would still appear only a two-dimensional field rather than three-dimensional space. This field would be fully closed and unified, and in it all objects would be presented on a curved plane at a fixed distance from the subject, much as if the head were the projection point of a fully spherical (rather than hemispherical) planetarium.[13] The interval in the interior of the sphere would not constitute depth; for all objects appear in the field which is the interior surface of the sphere, and all dimensionality and distance are confined to that curved, two-dimensional surface.

B. Objective visual space

The second major level in the immediate experience of space is the presentation of a unified, three-dimensional space which is open and infinite and in which cyclical manifolds of two-dimensional appearances present spatially enclosed, three-dimensional objects in a wider space. A new (front/back) dimension must be introduced in order to account for the appearance of three-dimensional space as we actually experience it. The kinaesthetic activities necessary for this belong to the body as a whole; they are locomotive and ambulatory in character, moving the entire body relative to the object, and they are two in number: (1) distancing (*Entfernung*), i.e., the movement of the body toward or away from the object such that its apparent size expands or contracts as does the apparent size of the other appearances composing the background against which the object is presented, and (2) orbiting, i.e., the movement of the body around the object such that there results an apparent turning motion of the object, specifically an axial rotation of its appearance and of the field presenting the thing in space.[14]

1. Distancing

Both Husserl and Heidegger use the word "*Entfernung*" in their descriptions of our immediate experience of the spatiality of things. But the German prefix "*ent-*" has a double sense; it can be used in composition with other words to denote either the establishment or abandonment of a particular state. Hence, "*Entfernung*" can denote the establishment of a state of new and greater distance, specifically between myself and an object, and Husserl uses the word in this restrictive sense to denote the activity of moving away from an object in opposition to the activity of approaching (*Annäherung*) (*DR*, 206). Or "*Entfernung*" can be used (although it is seldom so used) to denote the overcoming of a state of distance by bringing close what was formerly remote, and Heidegger uses the word in this restrictive sense.[15] *Entfernung* or de-severance, then, is discovering remote objects which are severed from our practical concern and bringing them close, making them ready-to-hand.[16] Heidegger here emphasizes the relationship between practical interest and the givenness of things. But we must be careful not to discount too much – as perhaps Heidegger does – the relationship between closeness and remoteness relative to practical concerns and objective distance (*Abstand*). We must not, in other words, while stressing the practical component of our ordinary experience, forget that the immediate experience of the phantom and its spatiality is also fundamentally cognitive and objective, and governed more by the determinations of the object than by our interest.

Husserl also suggests that "*Entfernung*" can be used in a way that includes both the positive and negative senses.[17] And I shall throughout use the term in this broad sense to denote the activity of establishing the *correct* distance – whatever it might be – for optimal givenness. This activity might involve either moving away from an object that is too close to be well focused or moving toward an object too distant to be scrutinized with sufficient detail.

Let us return once again to the Mississippi. Say our eagle now flies toward the bluff on which we sit and alights upon a tree. We again move our eyes and head so as to maintain the eagle in the center of the visual field, but the eagle is still too far away for us to see it well. We wish to take a "closer look," and we consequently rise and walk towards the eagle, all the while adjusting the position of our eyes and head so as to keep the eagle in the center of the visual field. If the eagle – as is likely – is high atop the tree, this will produce an unavoidably uncomfortable position, but our interest in examining the eagle demands it. Finally, we are close enough; the appearance of the

eagle has expanded enough in size so that we can examine it in some detail.

The significant fact about our approaching the eagle is that its appearance expands, providing thereby an opportunity for more careful examination and more precise determination of its features. And while our attention is explicitly focused on the eagle, our implicit awareness of the spatiality of the eagle and of space is significantly augmented and altered. In order to see this more clearly, let us consider the significance of the expansion or contraction of an appearance which occurs along with our own activity of distancing.

The apparent expansion and contraction of the phantom are modifications which occur as we seek to establish the optimal distance from the object under inspection (*DR*, 206). The rate of expansion for different appearances within the field will always be non-uniform, i.e., the various appearances in the field will invariably expand at different rates, for the percipient's approach toward one particular object placed in the center of the visual field and the differentiation between its central orientation and the orientations of other appearances motivate the expansion of the central appearance at a rate greater than that of those other appearances. This is true even when objects of the same apparent size and shape are at the same distance from the perceiver. So, for example, if a semicircle of trees of similar size and shape fills the visual field of a perceiver standing at what would be the center of the full circle and if the perceiver then approaches one of the trees, it will expand at a rate greater than the other trees in the field. The phenomenon of non-uniform expansion is even more pronounced when the objects whose appearances are in question are not at the same original distance from the perceiver. So, for example, as we approach the eagle, the trees in the background on the opposite bluff expand at a rate significantly less than that of the appearance of the eagle.

The non-uniformity of expansion further results in the phenomenon of concealment or disclosure (*DR*, 235). This concealment occurs because as we approach the object its appearance so expands that it covers part of the same or another appearance which is also in the visual field, i.e., one set of apparent qualities encroaches upon another set, the latter disappearing from the field. The reverse process of the disclosure of apparent qualities occurs as we retreat from the object.

The expansions and contractions of appearances and the concealments and revelations of apparent qualities make possible the transformation of our awareness of the visual fields into an awareness of three-dimensional, objective space (*DR*, 236, 238; *APS*, 298). The

phenomenon of expansion indicates the object's fixed position in a third dimension (after the two belonging to the field), viz. that dimension in which the percipient approaches the object. Likewise, together the phenomena of non-uniform expansion and concealment or disclosure indicate the different distances of different objects from the percipient. Such relationships of distance are essentially different from the relationships of distance between two objects presented simultaneously in the visual field (*DR*, 228). This last relationship of distance is constituted in terms of the two-dimensional field alone without reference to distancing and distance from the perceiver.

The uncovering of this third dimension is not its addition to the two-dimensional field. Rather, it is the disclosure of depth first of all between the percipient and the objects in the field and, secondarily, between near and distant objects in space. The appearance in the visual fields always has an absolute depth with respect to the permanently positioned perceiver – even in the fully idealized cephalomotoric "planetarium," the perceiver is "here," the appearance "there." Distancing reveals that the relationship of depth is *relative* to the position of the perceiver, thereby introducing the relationships of "nearer to" and "farther than." Thus, distancing uncovers a new dimension not within the cephalomotoric field but within the perceptual experience of an object, a dimension which indicates that the position of the object relative to the perceiver is not reducible to the position of its appearance in the perceiver's visual field. Thus does *objective* space appear in perception, for the object has its own position in space relative to the percipient. Furthermore, the fact that I am aware of my locomotive or ambulatory abilities entails an awareness that I who am here can be there where another percipient viewing the object now is, and that I shall then see the object as he or she now does. The object, therefore, has its own position in space relative to *any* percipient and this shows as well the intersubjectivity of objective space.[18]

2. Orbiting

Distancing, however, is not yet sufficient for a complete understanding of the notion of objective space, for that notion includes not only the sense of three-dimensionality and of objectivity (subject-independence and intersubjectivity) but also the sense of the space of an object (its volume or enclosedness) and of the larger space in which the object takes its place. All of these aspects of space, conjoined with the sense of space as ordering in three dimensions relationships of distance between things, will fully account for the sense of space as immediately experienced.

Let us suppose that we have finished our book and are now walking the streets of Chicago heading for the Art Institute. As we walk, our attention is directed to a newly installed modern sculpture which appears to be a turquoise set of dice with rust-colored spots. But our present perspective is such that it appears to be a single, continuous piece. As we approach the dice – not directly, but obliquely along the sidewalk – our normal perceptual expectation is that we shall arrive at a point where we shall be able to see between the dice and recognize their individuality. But this never occurs! As we draw even with the sculpture, we do not yet see space between the dice. Somewhat bemused, we wonder whether the sculpture has other surprises; so we walk around it in order to examine it more fully. Finding no more surprises, and no longer bemused and not much amused, we continue on toward the Art Institute.

To the extent that an optimal appearance of a sculpture demands a good view of its solid shape, the kind of activity described here is necessary for an optimal appearance of the sculpture. Our oblique approach to the sculpture and the walking around it motivate a manifold of appearances in which the object manifests an apparent turning motion. This apparent turning motion can occur in arbitrary ways, but we need to consider especially the axial rotation motivated by an orbital movement around the object. Such rotation motivates in the appearances the replacement of one part of the apparent qualities presenting the object by other (although perhaps similar) apparent qualities presenting the same object, i.e., parts of the sensible appearance presenting the object are replaced – but not in the same place – by other, newly uncovered parts of the same concrete appearance (*DR*, 249). The part of the appearance replaced disappears from the field because its place is taken by previously neighboring qualities while new qualities enter the field at the other side of the object (*DR*, 251). Thus, we have a new view of the object.

The fact that our movement around the object is orbital entails that the modifications of the appearance will be cyclical (*DR*, 249). During the temporal extent of a perception, the flow of replacements and disclosures proceeds in such a way that there is presented a continuous manifold of two-dimensional appearances wherein the first appearance returns without any reversal in either the kinaesthetic activity or the flow of appearances. The manifold of appearances in orbiting leads cyclically back into itself, and, thus, we have again moved beyond the cephalomotoric field (*DR*, 250). In the cephalomotoric field, and before any locomotive activity, there was a cyclical

repetition of oculomotoric fields only along the left/right axis of the field. However, given the introduction of an orbital movement of the entire body, there is a cyclical rotation of the sensible appearance of the object within a manifold of cephalomotoric fields. Since this rotation can theoretically occur along the left/right axis or along the above/below axis or along any combination of the two, it is the case that to each determined line of orbital movement around the object belong a determined and closed or cyclical manifold of appearances. The actualization of the infinitude of such manifolds would result in the awareness of the complete bodily enclosedness of the object (*DR*, 250). This is so because, unlike the case of the cephalomotoric planetarium, the cyclical rotation is of the apparent object and the cyclical manifold of appearances encloses the object, whereas in the planetarium the rotation is of the head and the appearances enclose a space around the head. But the entire cephalomotoric field is movable and moved as the body moves, and hence the rotation of the head, while closing the field, does not close space. The orbiting activity, which can occur in any direction, and the distancing activity, which can theoretically produce a straight-line movement to an infinite distance from an object, together indicate that space is infinitely open in all directions; the orbiting activity, which necessarily involves some distancing of background objects and the consequent opening of a three-dimensional infinite space, thus encloses objects and their individual spaces while leaving intact the larger space in which these objects with their individualized spaces take their place. Hence, the awareness of the spatially enclosed object and that of an infinite, three-dimensional space are not separate. We are aware that the object takes its place in this larger space. Indeed, the awareness of the bodily enclosedness of the object entails the simultaneous awareness of the "empty" space between objects (*DR*, 257, 261), for we become aware of the object's "outside" in becoming aware of its enclosing an "inside." The mixture of the ambulatory activities of distancing and orbiting accounts, therefore, for the presentation of singular, spatially individualized, three-dimensional objects with their own shape, volume, and fixed position in space, and, at the same time, the awareness of the full sense of an infinite, three-dimensional, objective space as the form which orders objects in terms of relative position and distance.

Again, we must point out that Husserl, while not quite ignoring physiological limitations, is neglecting certain physical realities in his descriptions of orbiting: in our normal perceiving, bodily movements are made on a plane (the earth, a floor, and the like); the movements

Husserl suggests as theoretically possible seem possible only in underwater swimming and walking in outer space. But again – as he did in removing the left/right limits on head movements – Husserl points to an approximable activity; we can approximate these orbitings by a combination of movements of the whole body (walking, bending over in various directions, turning at the waist, turning and craning the neck, squatting, etc.) and thereby gain a good sense of the bodily enclosedness of the object. It is, it must be emphasized, only through the manifold of rotating, two-dimensional appearances that the object is *actually* seen as having other sides, and it is only through the completion (at least in part and intentionally) of this modification along with the expansion or contraction appertinent to distancing that an infinitely open, three-dimensional space comprising the bodily enclosedness of things and the "empty" space between objects is presented (*DR*, 250, 253–55).

III

I shall conclude with three remarks relevant to the issues discussed above.

1. Heidegger, who sharply distinguishes the immediate experience of spatiality from the cognitive and formal intuition of an objective and homogeneous space,[19] simply refers the reader to Oskar Becker's classic study for an analysis of this formal intuition.[20] Likewise, Merleau-Ponty, who is primarily concerned with an account of how space comes to presence in a bodily relation to the world, simply refers the reader to Becker for detailed analyses of the bodily activity involved in our awareness of space.[21] Husserl's and Becker's, then, are the major phenomenological studies of space. I have already indicated some of my differences from Husserl,[22] and while only a small portion of Becker's study is devoted to the immediate experience of space, I should note the differences between Becker and myself. Becker (pp. 446–59) distinguishes three levels in the constitution of space: (1) the pre-spatial or quasi-spatial fields [further distinguished into the sense-field, i.e., the field in which are spread out visual and tactual sensuous data (my visual field *simpliciter*, but cp. above, n. 9), and the kinaesthetic field, i.e., the field motivated by movements of the eyes or of the tactual organs (cp. my oculomotoric field, as Becker himself sometimes calls it)]; (2) oriented space; and (3) homogeneous space, which is essentially characterized by the relativization of the "Here" and

intersubjectivity. Becker, however, obscures the fact that head movements do not merely continue eye movement but close the field along the left/right axis. Secondly, Becker's description of oriented space is grounded in a modification of the appearance of the object, viz. its rotation, which can be kinaesthetically compensated in the ambulatory activity of orbiting. But he is not consistent in appealing to an apparent modification of the object and the notion of kinaesthetic *compensation*, for the modifications in the kinaesthetic field and those which constitute homogeneous space are said to be kinaesthetically *motivated*. While all objective motion changes the appearance and/or orientation of the object in ways that can be kinaesthetically compensated, we are aware of the spatiality even of resting things; and any account of the immediate awareness of the spatiality of things and of space ought not, therefore, rely on objective motion.

It is likely that Becker's desire to identify the body as the center of orientation and to establish the absoluteness of the "Here" in a three-dimensional space as the distinguishing character of oriented space had led him to an explanation of this level in which he tries to avoid an appeal to the movement of the entire body. However, this blurs the fact that both oriented space and homogeneous space are motivated by essentially the same kind of kinaesthetic activity, i.e., by activity belonging to one kinaesthetic system, that of the whole body. A consistent description of the constitution of space in terms of merely apparent motion and its kinaesthetic motivation does not blur this fact.

Thirdly, rotation does not genuinely present a space since it does not genuinely introduce a third dimension, unless we – unlike Becker – take into account the appertinent distancing of background objects while orbiting the object of attention. Hence, distance between the perceiver and objects is not necessarily relativized in Becker's account, but this is required for a three-dimensional, objective space, as oriented space is supposed to be. Becker accounts for the three-dimensionality of enclosed objects without accounting for the co-presentation of the three-dimensionality of the space in which they are present. Furthermore, since any movement of the entire body with respect to the object necessarily entails the possibility of distancing, the relativization of the "Here," and the intersubjectivity of space, we again see the need to discuss orbiting (and the rotation it motivates) and distancing on the same level as two different aspects of the activity belonging to the single kinaesthetic system of locomotive movements.

Finally, the distinction between oriented space and homogeneous

space is overdrawn, for oriented space is homogeneous space considered from the point of view of only one percipient. But once the ambulatory activities have been introduced and the consequent relativization of the "Here" has been introduced, this limitation is possible only as a consequence of attending to the practical concerns of individual subjects, and this does not involve the introduction of an essentially different kind of space. It merely views infinite, objective space from the point of view of a single subject whose ordinary experience includes practical concerns; homogeneous space, on the other hand, involves no such abstractive consideration of individual subjects. The space in which we attend to our practical concerns is oriented around us, but it is also intersubjective and continuous or homogeneous in three dimensions, for our concerns frequently require movements of the entire body, movements which (1) preserve qualitative distinctions, e.g., of preferred places, (2) dislocate all orientations and oriented space itself, and (3) bring to presence a homogeneous space without qualitative distinctions *in itself*. A single experience can hold the two poles of individually oriented and intersubjectively homogeneous space together; we should not suggest that space is first individually oriented and qualitatively distinguished, then not (cp. *Ideen* II, 83).

2. Touch – as suggested in my remark on Becker – also presents three-dimensional space in its full sense, and it is the only sense besides vision to do so. While directionality is present in hearing and perhaps smell, they do not fully present all the dimensional and positional determinations of space as immediately experienced. Vision and touch both present space because the qualities which are their direct objects are what Husserl calls "space-filling" properties, i.e., qualities which are immediately and reciprocally involved with extension in the field or in space.[23] Color and texture, for example, are spread out in the visual or tactual field and in the object's expanse.

There are, however, two important differences between the kinaesthetic activities involved in touch and vision. The first is that a single tactual system, that of the hand with its fingers, is sufficient for the constitution of tactual space. The systems of the lower arm, upper arm, and whole body are merely extensions of this basic system (*DR*, 306) and are brought into play because of the size of the object or for convenience and comfort.

The second difference is that in tactile perception distancing does not present a continuous third dimension. Although it does still indicate the object's own position in space relative to the moving body parts, distancing in touch is a simple binary system; the object is

distant and not touched or it is near and in contact with the tactual organs.[24]

Finally, we must remember vision and touch do not constitute two different objective spaces. The constitution of the two spaces is, of course, different in account, but to give a full account of objective tactual space is beyond the scope of this paper.

3. A view held by many is that the geometry of visual space (the visual fields as I have described them) is a Lobachevskian hyperbolic geometry of constant negative Gaussian curvature while that of physical space (objective visual space, the space in which the subject lives and acts and in which objects are found) is Euclidean.[25] The problem then presumably arises of explaining how subjects who see things in a space ordered by hyperbolic geometry manage to get around so well in a world ordered by Euclidean geometry.[26] This issue can be addressed in a variety of ways, but the line I have taken in this paper undercuts most of them, for I have tried to show in both the regressive inquiry of section I and the descriptions of section II that the visual fields and objective space as immediately experienced are neither Euclidean nor Lobachevskian nor Riemannian nor any other idealized space. The spatiality of the visual fields and that of objective space are in themselves pre-geometrical. The issue then is to explain how we abstract from this lived, objective space the geometric figures and axioms, but this must be the topic of another paper.

It is certainly true that we often use terms which are properly defined only in idealized Euclidean geometry to describe our world and the objects within it, and it is also true that the movements of objects and our own actions can be more than adequately described by applying Euclidean principles to the space in which these movements and actions occur. There are, I suggest, two major reasons for this. The first: since (a) Euclidean geometry was the "first" geometry and for long the only and traditional geometry, and since (b) our ordinary perceptual concern is with objects and their properties including shape, and since (c) the idealized figures of Euclidean geometry are somehow grounded in our perception of shape, the idealizations of shape can be, have long been, and are reapplied to objects in predications describing those objects, even though we implicitly recognize that the empirical shapes themselves are only imperfect copies of an ideally and exactly defined figure. Thus, we call things "rectangular" and "spherical" rather than "box-shaped" and "ball-shaped." But our ordinary experience of empirical "Euclidean" figures is mediated by theoretical judgments operating in our perceptual associations; it is not the immediate experience of figure.

The second reason stems specifically from the fact that the interest operating in our ordinary experience of the spatiality of objects is directed primarily to their shapes and positions. Consequently, since Euclidean geometry gives names to different shapes rather than describe them functionally (as does even a coordinate plane or solid geometry identical with Euclidean geometry in its axioms), it is simply more convenient in dealing with shapes to use a Euclidean description in our everyday affairs.[27] When our concern is, on the other hand, with position, such as in treasure maps and our system of latitude and longitude, we very easily fall into a language of coordinates because this is more convenient to identify position in space; however, ease, convenience, and simple consistency dictate only a coordinate interpretation of Euclidean geometry.

There is, then, no true problem in reconciling the spatiality of the visual fields and objective space. They are both pre-geometrical and the latter is grounded in the former in the manner I have described herein. Nor is there a problem in reconciling our *experience* of the spatiality of the visual fields and our *experience* of objective space, for the latter is again grounded in the former as I have indicated. The problem – if there is one – is of reconciling the presumably exact psychological explanations of the spatiality of the binocular field and that of objective space. This must be accomplished – and presumably can be accomplished[28] – by appeals to factors influencing our perception of and behavior in space other than the spatiality of the visual field, and by appealing to the Euclidean character of local non-Euclidean spaces of constant Gaussian curvature. But all this occurs only as a problem in the explanations found in psychology. There is no problem of this sort for the perceiver as perceiver, and there is no problem for the mathematician. The problem might arise simply as a consequence of the wrong-headed desire of some psychologists to model their discipline after mathematical physics, but that too is the subject of another paper.

Indeed, if there is any problem for the perceiver as perceiver, it is to get around in an objective space in which objects do not change size and position while their appearances in the visual field do or, conversely, to get around in an objective space where objects do change size and position even though they do not appear to do so. But the key to this problem – again indicated in our description – is the percipient's kinaesthetic awareness. We recognize that some apparent changes are kinaesthetically motivated and kinaesthetically reversible, and therefore are *only* apparent changes. We recognize too that some apparent

changes are not kinaesthetically motivated but can be kinaesthetically compensated, and these changes are recognized as real. Finally, some apparent changes occur during kinaesthetic activity, but the reversal of the kinaesthetic activity does not fully reverse the apparent change, and here we have a combination of real and apparent change. However, to delve more fully into the issues of kinaesthesis and the awareness of objective change and motion would require yet another paper.

NOTES

1. Edmund Husserl, *Ding und Raum: Vorlesungen 1907* (hereafter *DR*), ed. U. Claesges, Husserliana 16 (The Hague: Martinus Nijhoff, 1973). Husserl first developed in detail the distinction between the phantom and the physical object in a sketch written probably in 1910 and printed as Appendix II, pp. 341–46. The main lectures are, however, anticipatorily devoted to an analysis of the experience of the phantom and its spatiality.
2. Edmund Husserl, *Ideen zu einer reinen Phänomenologie und phänomenologische Philosophie. Zweites Buch: Phänomenologische Untersuchungen zur Konstitution* (hereafter *Ideen* II), ed. M. Biemel, Husserliana 4 (The Hague: Martinus Nijhoff, 1952), p. 37. Robert Sokolowski points out [*Husserlian Meditations: How Words Present Things* (Evanston: Northwestern University Press, 1974), p. 95, n. 12] that Husserl himself had in Ms. D 13 XVIII expressed a reservation about the example of the sun because its workings in the world are perceivable, e.g., in its making things warm. The same, it might be said, is true of the sky whose being made blue by the light of the sun is perceptibly obvious in the contrast with the night sky. Rainbows, however, and the heavenly bodies of the night sky seem to be good examples of phantoms.
3. This sketchy account of the experience of the phantom by no means exhausts all its aspects. And I do not mean to suggest that the child or even the infant does not experience value-properties immediately grounded in the sensible properties of things, e.g., the pleasantness of a color, shape, facial expression, or the like. I am saying only that the encounter with physical and functional properties is not part of the child's experience until he or she formulates judgments concerning these properties or assumes the judgments of others through some sort of training and education. This might help account for the fact that the child, without any explicit training in art or mathematics or science, can be attracted to certain works of art; they are simply visually attractive.
4. Cf. also Edmund Husserl, *Analysen zur passiven Synthesis: Aus Vorlesungs- und Forschungsmanuskripten 1918–1926* (hereafter *APS*), ed. by N. Fleischer, Husserliana 11 (The Hague: Martinus Nijhoff, 1966), p. 23.
5. Cp. also the more extended discussion of *Ideen* II, pp. 41–42, 48, 55–58. I have discussed the relations between perceptual appearances and psychophysical conditions in "On the Nature of Perceptual Appearances or Is Husserl an Aristotelian?", *The New Scholasticism* 52 (1978): 1–22.

6. Cf., e.g., *DR*, 159–61; *Ideen* II, 20, 56–58; *APS*, 13, 229; *Cartesianische Meditationen* (hereafter *CM*), ed. S. Strasser, Husserliana 1 (The Hague: Martinus Nijhoff, 1963), pp. 145–46; and *Erfahrung und Urteil* (hereafter *EU*), ed. L. Landgrebe (Hamburg: Felix Meiner Verlag, 1972), p. 82. Husserl usually discusses kinaesthesis in the context of discussing our awareness of the *identity* of the material thing in space as it is presented in a continuing flow of varying appearances. To perceive – at least implicitly – an object as identical is an essential component of optimal givenness, and I have here changed the focus of the discussion to the connection between kinaesthesis and optimal appearances in order to highlight certain features of the awareness of space. Husserl, too, makes this connection, but does not work it out systematically. As we shall see during the course of the paper, the acquisition of an optimal appearance, the perception of the spatial and numerical identity of the thing, and the awareness of space are essentially connected, and the account of the relationship between kinaesthesis and the flow of appearances remains constant in the change of focus from that on the constitution of the identity of the thing to that on the constitution of space. In addition to the detailed accounts of *DR*, Husserl gives numerous brief accounts of this functional and motivational connection between kinaesthetic processes and appearances. Some of the most important are *Ideen* II, 20, 56–58, 128–29, 216–21; *APS*, 13–15, 107; and *EU*, 88–91, 113. For an analysis of Husserl's views on the identity of the material thing in space, see my "On Seeing *a* Material Thing *in* Space: The Role of Kinaesthesis in Visual Perception," *Philosophy and Phenomenological Research* 40 (1978–79): 19–32, and for an analysis of the nature of the functional connections between kinaesthetic activity and a flow of appearances, see Sec. 3 of that paper. I should point out that both there and here I modify Husserl's position. The continuous kinaesthetic process – as well as the synthesizing structure of consciousness itself – motivates a series of appearances which manifests itself as a continuous series, for the appearances *continuously motivated* show phenomenal signs (overlapping and concealment) not merely of discrete similarity but of continuity. Husserl, however, asserts the existence of a motivational connection between two series of sensations; the kinaesthetic sensations which reveal the freely undertaken kinaesthetic process and the motivated series of presenting sensations. The kinaesthetic process is continuous; so too is the series of kinaesthetic sensations. The continuity of the kinaesthetic series motivates an awareness of the continuity of presenting sensations thereby allowing for the presentation of objective continuity and identity. I have elsewhere ("On the Nature of Perceptual Appearances. . . .") argued against the existence of sensations which present the qualities of things, and while I recognize kinaesthetic and somatic awareness, it is not alterations in that awareness which generate and motivate new appearances. It is alteration in the kinaesthetic *situation* which motivates them; it is, in other words, the kinaesthetic *process*, the bodily activity itself, which generates these new appearances, and the continuity of that process motivates a continuous series of appearances, and certain kinaesthetic processes motivate the constitution of the objectivity of space and, when certain phenomenal conditions are satisfied, the identity of the object.

7. This treatment of kinaesthesis and the awareness of space is broadly but not exclusively based on *DR*, 154–255.
8. The reason for this is that our artificially limited perceptual situation precludes the possibility of both the binocular activity required for some depth-perception and the more fundamental ocular activity of moving the eyes along the ground on the axis constituted by distancing (cp. below, Sec. II.B.1). For the role this ocular activity plays in perception of distance and depth, cf. James Gibson, *The Perception of the Visual World* (Boston: Houghton Mifflin Co., 1950), esp. Chaps. 5–7. Cp. also below, n. 12.
9. Cf. *DR*, 82–83, although when Husserl speaks of the visual field, he speaks of a continuum of sensuous contents rather than a continuum of visual (apparent) objective qualities as I do. Cp. my "On the Nature of Perceptual Appearances. . . ."
10. For this discussion of fields as correlates of kinaesthetic systems, cp. Ulrich Claesges, *Edmund Husserls Theorie der Raumkonstitution*, Phaenomenologica 19 (The Hague: Martinus Nijhoff, 1964), pp. 23, 72–73.
11. Cf. *DR*, 308 and *Ideen* II, 56, 158–59. Although kinaesthetic sensations, i.e., the implicit awareness by the percipient of his or her own bodily position, attitude, and activities, have no presenting function with respect to the qualitative determination of the object, they do present the body of the perceiving subject but "in a manner which essentially distinguishes the body (*Leib*) from all outer things" (*DR*, 161). On the one hand, the body, like external physical objects, is a thing in space. On the other hand, the body, as kinaesthetically situated, is the organ of the perceptual intentionality (*DR*, 161–62). Cf. Merleau-Ponty's notion of bodily intentionalities [*Phenomenology of Perception*, trans. C. Smith (New York: Humanities Press, 1962), pp. 203ff.], although we must remember that intentionality is not a physical relationship nor even a relationship between exclusively material things.
12. Cf. *DR*, 234. The restriction to one eye is possible on the basis of Husserl's claim that monocular vision is sufficient to constitute visual space (*DR*, 351). He argues that binocular systems are necessary in order to account for the *perception* of depth (*DR*, 173), but this is probably true only in part (Cf. Gibson, Chaps. 5–7). However, Husserl also argues that the perception of depth is not necessary to account for the emergence of three-dimensional objective space. Three-dimensional space is not constituted by introducing a third dimension into the two-dimensional field. Rather, it is constituted by the activity of distancing (cp. below, Sec. II.B.1) which occurs along the straight line or axis between the percipient and the object. Depth perception occurs by virtue of the eyes moving along the ground into the distance on the line constituted by distancing. In general, by changing the focal point along the ground-line constituted by distancing, we bring our vision more into the foreground or extend it into the background and, in certain cases, increase or decrease noticeably the tension in the optic muscles and the divergence of images. But this activity both approximates and presupposes distancing. Only thus can be presented new visual fields which are "nearer to" or "farther from" the percipient.
13. Husserl (*DR*, 311 ff.) refers to this fully closed cephalomotoric field as the Riemannian visual space or field, while he refers to objects in the field as

having Euclidean properties and to three-dimensional space as Euclidean. It is not fully clear to me what he might mean by these references, but throughout his lectures and writings on space and the consciousness of space, including his lectures in *DR*, he warns us to remember that the attribution in ordinary experience of mathematically and scientifically discoverable or definable properties to things is a mediated act. If this is true, the philosophical descriptions of ordinary experience should reflect this fact by not attributing mathematical properties or a mathematical character as such to *immediately* experienced sensory fields and *immediately* experienced space. I take it, therefore, that we can best understand Husserl's references to the cephalomotoric "planetarium" as meant to emphasize both the sphericality and two-dimensionality of this field, whereas objects' appearances and objective space are characterized as Euclidean to capture respectively the sense of the "flat" two-dimensionality of the appearances and the sense of the three-dimensionality of space. Such mathematical ascriptions in the philosophy and psychology of the immediate and ordinary experiences of space easily raise, I think, false issues; cp. below, Sec. III.3.

14. It is with the locomotive activities of distancing and orbiting that the two foci on the identity of the thing and the objectivity of space in perception come most closely together. Consequently, the following two subsections are expansions and modifications of secs. 4 and 5 of my "On Seeing *a* Material Thing *in* Space." Where they overlap significantly in content with the earlier paper, I wish to thank the editors of *Philosophy and Phenomenological Research* for permission to reuse that material.
15. Martin Heidegger, *Sein und Zeit* (hereafter *SZ*), 11th ed. (Tübingen: Max Niemeyer Verlag, 1967), p. 105: "Entfernen besagt ein Verschwindenmachen der Ferne, das heisst der Entfernheit von etwas, Näherung." Cp. the English translation by J. Macquarrie and E. Robinson, *Being and Time* (hereafter *BT*) (New York: Harper and Row, 1962), p. 139.
16. *SZ*, 107; *BT* 142.
17. Cp., e.g., *DR*, 232 where Husserl speaks of the connection between the expansion of appearances and changes of distancing, but these changes could only be movements *toward* the object; thus, the broad sense of "distancing."
18. Cf. *CM*, med. V, esp. Secs. 51–55 for a discussion of the "pairing" association in which is constituted the intersubjectivity of nature.
19. *SZ*, 112; *BT*, 146–47.
20. *SZ*, 112; *BT*, 147. The reference is to Oskar Becker, "Beiträge zur phänomenologischen Begründung der Geometrie und ihrer physikalischen Anwendungen," *Jahrbuch für Philosophie und phänomenologische Forschung* 6 (1923): 385–560.
21. *Phenomenology of Perception*, p. 101; cp. also pt. II, Chap. 2.
22. Cp. above, esp. pp. 18–19, 27 and nn. 6 and 9.
23. Cf. *DR*, 68–69, 156. Husserl also calls these space-filling qualities "materializing determinations" (*DR*, 67). However, he is later dissatisfied with this expression because it implies that he is discussing the level of the material and causal properties of the object rather than the object as a merely sensible being (*DR*, 339, critical remark to p. 70, 11. 2 ff.). The space-filling qualities are contrasted with the merely adhering (anhängende) determinations (*DR*, 67).

These adhering qualities fill space only mediately by virtue of their connection with space-filling qualities and the spatial objects to which they adhere (*DR*, 72).

24. Cp. Claesges, pp. 92–93.
25. For an early, systematic statement of such a view, see R.K. Luneburg, *Mathematical Analysis of Binocular Vision* (Princeton: Princeton University Press, 1947).
26. Cf. Adolf Grünbaum, *Philosophical Problems of Space and Time*, 2nd ed. (Dordrecht: R. Reidel Publishing Co., 1973), Chap. 5: "Empiricism and the Geometry of Visual Space," p. 155.
27. This recalls Henry Veatch's distinction between Aristotelian logic and contemporary mathematical logic in his *Two Logics* (Evanston: Northwestern University Press, 1969).
28. Grünbaum, pp. 155–57 refers to the answers proposed by A.A. Blank; cp. p. 154, n. 8.