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Lists, Field Guides, and the Descriptive Organization of Seeing: Birdwatching as an Exemplary Observational Activity

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**Lists, field guides, and the descriptive organization of seeing:  
Birdwatching as an exemplary observational activity**

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Warblers so puzzled the Cherokees that they left many species without names, apparently because they could not tell one from the other – a touch of nature that makes them kin to modern bird watchers who, looking the birds up in their field guides, find them lumped together in the category “confusing” warblers. Joseph Kastner, *A World of Watchers* (1986:7)

**1. Aspect-blindness**

For most of us, most of the time, the activity of seeing and naming objects in the natural environment is relatively unproblematic. So “natural” does it seem that the contextual skills that we deploy are concealed from our scrutiny. It is only when we are novices – young children, apprentice scientists or radiographers, or aspirant birdwatchers – that the fact of those skills, and, more important, of their social construction, becomes visible to us. Consider these notes which are taken on a birdwatching trip:

\* We are grateful to Bob Anderson, Jeff Bowker, Michel Callon and Bruno Latour who read and commented on an earlier draft of this paper.

N is a complete novice, initially with indifferent interest in the activity of birdwatching, but lately taking some interest. She had not “studied” the field manuals, and has not accumulated a fund of previous experiences other than of the “usual” backyard varieties and a few of the more spectacular species seen alongside the highway or on nature walks.

Again and again I point to a specimen, reciting my judgment of its identity: a gadwall, a night heron, black tern, kestrel, etc. I indicate or describe the specimen’s locale, she trains her binoculars on it, and I make some remark about its features, habits, abundance, etc. A day, or even an hour later, she’ll ask me, “What’s that?” and I’ll note that it’s the same species I had described to her on a prior occasion.

She started keeping a list of her own. She kept asking me whether she should “count” species that I knew she had seen, but that she would be unlikely to recognize again should she see one. She acknowledged that she “didn’t know what she was seeing”. The question is: what does this “not knowing” consist of?

Assuming that over the course of the occasion we have just successfully collaborated on isolating the same bird (just this duck), the question then becomes, “just what has the name, e.g., ‘gadwall’ been attached to?” Clearly it’s attached to the duck. What else? We didn’t misfire and attach the name “gadwall” to a clump of reeds, a pattern of reflection on the water, the insect hovering overhead. It aimed at the duck, but somehow it didn’t “stick”. The next time N sees what I take to be the identical species she doesn’t see a gadwall.

If N is “failing”, then numerous possible explanations for her “failure” come to mind: she has failed to recognize that the second duck was also a gadwall because of variations in perspective or individual condition; she recognized that it was like the other one but she forgot what its name was; although she “saw” the duck she was momentarily distracted from the game of birdwatching and made no effort to identify it by species. None of these explanations are implausible. However, the explanation that we prefer is that, for her, “gadwall” is one name among many for “ducks”. What is happening is that, though she can see and name

generic ducks, she is unable to see the features of the gadwall as contrasting with other ducks of similar profile: the dull grey appearance and the male's black posterior are not juxtaposed against the green and ruddy heads, colourful wing and flank patches, distinct beak shapes and darting movements and seasonal and regional habitats of comparable species.

Let us say, then, following Wittgenstein, that she is experiencing "aspect blindness".<sup>1</sup> That is, she is "suffering" not from a defect of eyesight or an inability to see or optically resolve birds in the field, but rather from *an inability to collect and re-collect species identifications*. She has not, that is, worked through a *table of possibilities* in the light of a sighting of a duck to find how it differs from others in a taxonomic array.

Where would such a table of possibilities come from? The persistent birdwatcher might create it for herself. This would be unusual and we will consider the possibility no further. She might derive it from another more experienced birdwatcher. She might derive it from the discriminations that are made in a field guide. And/or, she might start creating her own list of the birds she had observed. Typically she would mix the last three. However, for the purposes of simplicity we will concentrate primarily on lists and field-guides and describe a particular "literary language game"<sup>2</sup> *in which a "novice" walks or drives through a particular habitat and consults a field manual as an aid to formulating a list of birds seen on the expedition.*

The notion of a literary language game brings into relief the way in which naturalistic observation and representation require an apprenticeship in a social organization of "reading" and "writing". When encountered through such an apprenticeship, "natural order" is discovered and organized through the basic texts in the language game. "Natural kinds" are not simply representations of what the eye (or the mind's eye) sees. In place of this perceptual model for observations we are substituting a model of *reading and writing*. We are suggesting that birdwatchers do not simply see birds. Rather: they (1) engage in a reflexive elaboration in which a text provides an iterable organization, a bulky object and a moment in a hermeneutic reading of the world; and (2) organize their gaze sequentially, in terms of the canonical order of a list. If these suggestions can be sustained for the accessible activity of

birdwatching, they may also be located in esoteric practices in the natural sciences.

## 2. The descriptive organization of seeing: Lists

He binds sight to crafted description and, further, places this activity in the context of the greater Baconian project. Svetlana Alpers, *The Art of Describing: Dutch Art in the Seventeenth Century* (1984:73)

Lists are central to birdwatching, and practitioners commonly keep several: “life lists” which record a cumulation of species identified by a particular person; lists which record species identified in a particular time interval; lists of species identified on a particular trip by an individual or group; and “Christmas counts” which record the species identified within a particular regional jurisdiction during an organizationally specified time period. Superficially, such lists are records of the species observed by members: they are representations of observations. However, they are also much more than that. How any observation is organized in the course of a field trip depends upon the lists being compiled in-and-through the observation. “Perception” is list-driven in the sense that the current state of the list provides motives for: searching the environment; regarding, disregarding and selecting among potential experiences; remarking upon or saying nothing about an observed event; and treating an announced sighting as a notable, doubtful or unremarkable claim. There is thus a reflexive relation between the literary phenomenon of the list and the embodied and interactional performance of observation and representation. The concrete configuration of observation is not reducible to generic structures of individual perception and cognition because it depends upon the textual formatting of a list and the source of social interaction through which that list is composed.

Although a solitary birdwatcher may keep a list for herself alone, list making and list reciting are organizationally accountable. Birdwatchers can be competitive about the length of their “life lists”, and listings of uncommon or rare species are subject

to rivalry and controversy (Kastner, 1986:211ff.). Organizations such as local chapters of the Audubon society, which collate sightings of rare and vagrant species in a region, often specify constraints on what is to count as a competent identification. As the following practical advice suggests, to identify a bird properly (i.e., to *list* it in a socially acceptable way) is to build a canonically ordered description:

Notes should be made and kept in logical and systematic sequence, if possible, for ease of later retrieval. Try to build a description each time in the same order. Do this by looking for different parts of the bird in the same order. This is, of course, not always possible and often you must scramble and take what you can get when you can get it but *trying* to follow the same sequence is a start at learning a good habit. What is more important is writing up the details. (Bernstein, 1984:1)

In this ideal world the bird watcher is supposed to start by noting her overall impression of the bird – its “feel”: “Study the bird in life to its gestalt, that is, the bird in its entirety.” (Bernstein, 1984:1) Then she is instructed to move through a list of parts in a specific order – starting with the dorsal and moving through the ventral and the “soft parts” (the eye, the mouth, the feet) to a description of its song, if any. In this particular article a schematic picture of a generic gull (the author notes this to be “admittedly oversimplified”) accompanies the text and points to the different types of feathers which cover the wing. This “logical and systematic” check list and the description that it shapes is contrasted with that which may be derived from the field manual:

Compare your sighting with books only after the notes are made. Having the book at hand during the note-taking will only interfere with the process. Many possibly good and valid records have been tarnished because the observer consulted a book before finishing the notes. As a result, the description often is that of the picture in the book, *not* of the actual live bird seen. (Bernstein, 1984:2)

Such an attempt to impose a standardized form by those collating bird lists is not surprising. Thus it is only when descriptions are normalized in this way that it becomes easy to compare descriptions in the search for authoritative similarities and differences between species.<sup>3</sup> While Garrett argues that an “accurate and detailed description” is always necessary, he also notes that the:

documentation of a rarity must convince reviewing bodies or editors that similar species were considered and reasonably eliminated. Having in mind the species one needs to eliminate, one becomes selective about the aspects of the bird under scrutiny which are emphasised in the description. (Garrett, 1986b:3)

He goes on to note that recording committees have to “juggle multiple descriptions” with different or conflicting interpretations.

Lists, we suggest, answer to the problems of imposing durability upon bird sightings. Inserting such sightings from a local context into a network which monitors, selects and compiles lists on a collaborative basis depends upon their translation into a canonical and normalized form in which one set of textually expressed similarities and differences is emphasized at the expense of others.

### 3. The descriptive organization of seeing: Field guides

In North America or Europe the birdwatcher may choose from a range of field guides covering national, geographical and local regions. Popular field guides have been used for at least two centuries, but the “classic” guide currently in use in North America is Peterson’s *A Field Guide to the Birds of the Eastern United States* (1934; 1939; 1947; 1980). Peterson’s Western Edition (1941; 1961) is similar in format to the original Eastern Edition, and is the main source for our analysis of Peterson’s illustrations and descriptions. Original and revised editions of Peterson’s work remain in widespread use, although several other popular field guides have appeared in recent years. Two of these, which we shall compare to Peterson’s, are the Audubon Society guide (Udvardy,

1977) which uses photographs rather than drawings of birds, and the National Geographic Society (1983) guide which, according to Kastner (1986:208), is aimed at more “sophisticated” bird-watchers.

Though these guides display important differences, they also have a number of points in common:

1. *Naturalistic accountability*: all three field guides are realist in some sense, though each exhibits a different accent. Each manual, and its novice user, operates on a set of commitments: that bird species exist in nature; that they can be identified and indexed on the basis of sensory (mainly visual, but also audible) evidences; that separate species can be identified and named; and that species can be represented in paradigmatic illustrations and described in texts. The entire literary language game relies upon and testifies to these naturalistic assumptions.
2. *Authority*: when playing the literary language game, the novice relies upon the text as a “state of the art” compendium – as an authority and a “disciplinary matrix” in Kuhn’s (1977a:307ff.) sense which lists each of a region’s available species. Such authority may not be entirely justified. Classification systems have changed historically, and continue to change, as witnessed by recent changes in the “lumping” together of the Bullock’s and Baltimore orioles into the category of Northern oriole, the imperialistic absorption of the Florida gallinule by the common moorhen, and the annexation of four species of juncos into one species (Kastner, 1986:213–214). Many manuals are notably incomplete in their listings of species, and no field guide lists every species or variant that might *possibly* be seen. Nevertheless, however unjustified this may be, the text remains authoritative in the hands of the novice unless strong external grounds are found for denigrating its completeness or adequacy. Efforts are made to “locate” a bird sighted in the field in the text’s listings of pictures and descriptions.<sup>4</sup>
3. *A picture theory of representation*: each of the three field guides is lavishly illustrated. A non-illustrated field guide would be almost impossible to use in the field. Each guide thus employs a tacit “picture theory” of representation: an idealiza-

tion of the potential correspondence that can be achieved between a representation in the text and the “bird in the field”. The illustrative conventions, however much they may differ in the schematic or photographic form, are taken (within the language game) as realistic in *some* sense. The question is: what is that sense? Their realism is conveyed by “illusionist” (Gombrich, 1960) use of the pictorial surface to provide a realistic sense of what can be seen in the field. While they may also count as aesthetically appreciated commodities in themselves, within the novice’s literary language game the pictures act as mundane referential devices.

4. *A strategic use of texts*: each manual makes strategic use of captions and descriptions. A wordless picture book for birds – where pictures were presented without identifying names, captions, pointers, range maps, phonetic spellings of birds-calls etc. – would be useless in practice. The interplay of pictures and other expressions in each manual furnishes its readable relation to birds in the field. In addition, various forms of index are used in the field guides to facilitate the sometimes hopeless task of finding the appropriate pictures under the severe time-constraints of identifying a bird before it flies away.

### 3.1 *Schematic, photographic and dioramic birds*

Despite these important similarities, the three manuals nevertheless take very different representational paths. Peterson’s early and revised editions are the most schematic, the Audubon guide opts for photographic realism, and the National Geographic guide uses somewhat more naturalistic paintings than does Peterson.<sup>5</sup>

#### 3.1.1 *Peterson’s schematic representations*

In Peterson’s various editions colour and black and white plates (see Figures 1 and 2) juxtapose representative drawings of several different species on a single page. Each species depiction is arrayed as a decontextualized specimen (usually juxtaposing male, female and/or immature instances in a cluster), drawn in para-

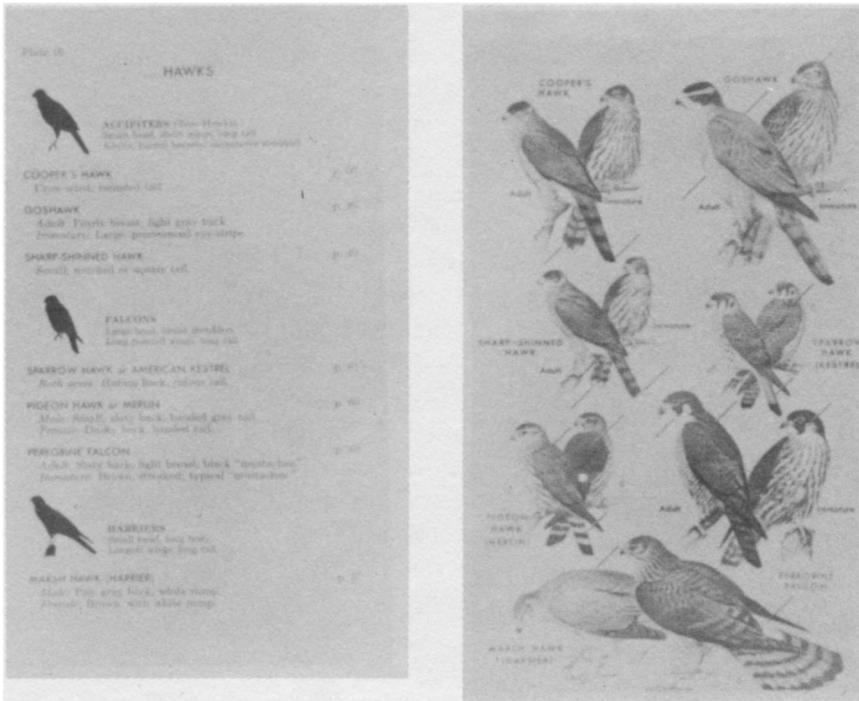
digmatic fashion and with a minimum or absent reference to naturalistic surroundings. Each drawing is labelled, and a small line indicates the feature or features of the bird in question that are held to be particularly relevant in assisting identification. On any single page each representative bird is drawn in parallel orientation to others on the same page so that the various specimens make up a loosely tabular arrangement. For some specimens – for instance the hawks – separate arrays are used to depict flying profiles as seen from underneath. In the earlier Peterson editions (Figure 1) the perching plate is faced by a sparse page of text which lists the pictured birds within their genera, and comments on the features indicated by the lines on the drawings. A fuller description is provided elsewhere in the texts. In the most recent edition (Peterson, 1980) the description is placed opposite the plate, and a distribution map is separately printed toward the end of the guide.

Peterson is very clear that the drawings in both guides are stylized. It is worth quoting him on this subject at some length:

The plates and cuts throughout the text are intended as diagrams, arranged so that quick, easy comparison can be made of the species that most resemble one another. As they are not intended to be pictures and portraits, modelling of form and feathering is often subordinated to simple contour and pattern. Some birds are better adapted than others to this simplified handling, hence the variation in treatment. Even color is sometimes unnecessary, if not, indeed, confusing. (Peterson, 1947: xviii)

In the most recent edition he writes that:

Because of the increasing sophistication of birders I have leaned more toward detailed portraiture in the new illustrations while trying not to lose the patternistic effect developed in the previous editions. A drawing can do much more than a photograph to emphasize the field marks. A photograph is a record of a fleeting instant; a drawing is a composite of the artist's experience. The artist can edit out, show field marks to best advantage, and delete unnecessary clutter. He can choose posi-



*Figure 1. Peterson's schematic hawks*

Illustrations and captions from the book, *A Field Guide to Western Birds*, written and illustrated by Roger Tory Peterson, published by Houghton Mifflin Company, Boston. Copyright 1941, 1961 Roger Tory Peterson. Reprinted with permission.

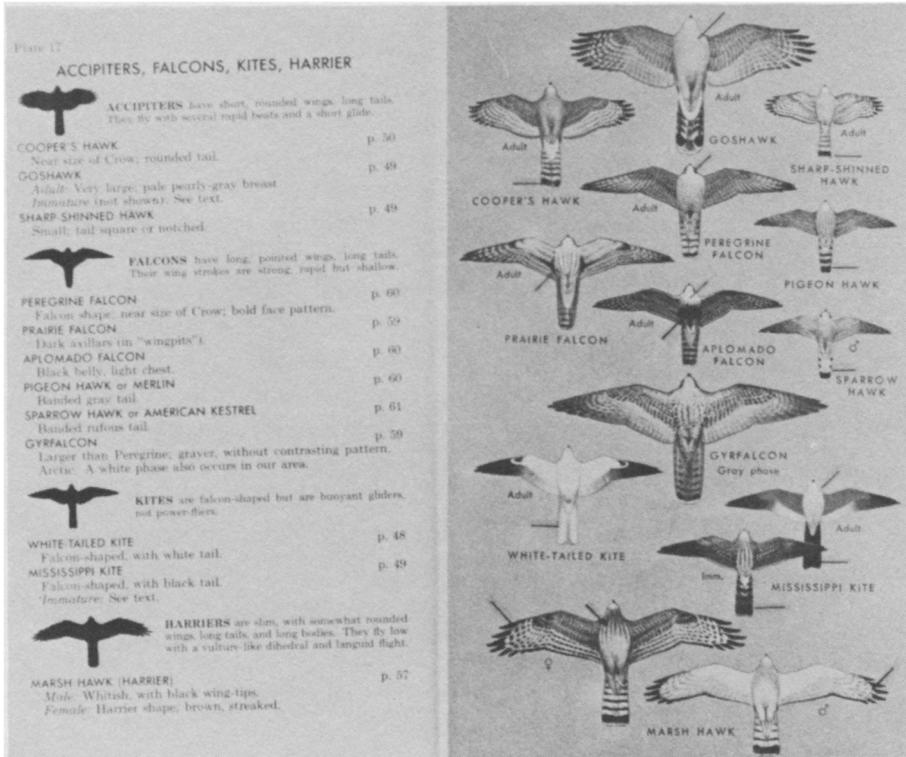


Figure 2. Peterson's schematic hawks, flying

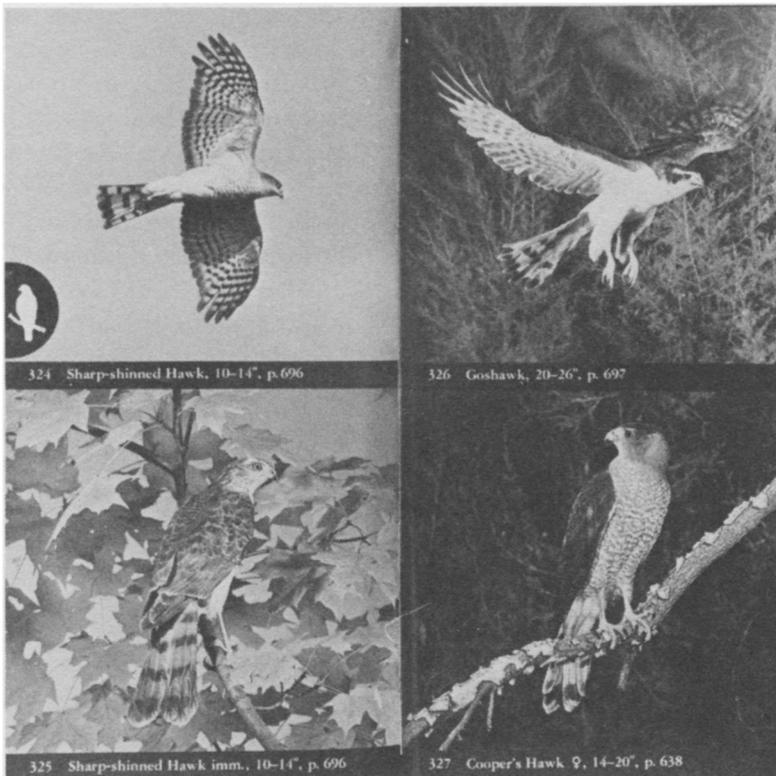
Illustrations and captions from the book, *A Field Guide to Western Birds*, written and illustrated by Roger Tory Peterson, published by Houghton Mifflin Company, Boston. Copyright 1941, 1961 Roger Tory Peterson. Reprinted with permission.

tion and stress basic color and pattern unmodified by transitory light and shade. ... The artist has more options and far more control .... Whereas a photograph can have a living immediacy a good drawing is really more instructive. (Peterson, 1980: 9–10)

Peterson's view that we should treat the illustrations as instructive diagrams to bring out authoritatively recognizable similarities and differences, rather than as full representations – can be exemplified in his treatment of two similar species – the Sharp-Shinned Hawk and the Cooper's Hawk (see Figures 1 and 2). Figure 1 shows two and three drawings of each species in equivalent postures and may be thought of as a table designed to contrast what might otherwise be thought of as indistinguishable species. Thus the profiles are placed along a vertical dimension, a column. Or perhaps, since there is no heading separate from the arrangement of the profiles, it would be better to say that the fact that there is a vertical dimension is made apparent in the way in which the illustrations are arrayed. This tabularization is assisted by the almost complete deletion of what Peterson describes as "clutter".

Let us consider some of these deletions. The first of these concerns distance. Thus, although none of the illustrations use the conventions of linear perspective (*chiaroscuro*, vanishing points, etc.), it is clear that Peterson makes use of depth in the quasi-tabular arrangement. We take it that the slight relative differences in size between the picture of the two types of hawk are not irrelevant but rather indicate the relative sizes of the birds. To see this, the reader must assume that each set of specimens is calibrated for "distance" from the reader and that the flattened depiction is not simply a non-perspectival rendering, but acts, rather, to "control the variable" of distance. This reading is partially warranted by reference to the text which (in the case of the more recent guide) indicates that the male Cooper's Hawk is "obviously larger" though it also indicates that there may be size overlap between a female Cooper's and a male Sharp Shinned Hawk.

Distance is not, however, the only visibly constructed *ceteris paribus* relation. Though there are substantial differences in the colouring of the two species *between* the two guides (the earlier is "richer" in tone), *within* each guide the colouring conventions adopted for each bird are identical. This similarity may be compared with the photographs in the Audubon Society guide (Udvardy, 1977) where the wings of the Cooper's Hawk appear to be darker and browner than the greyer Sharp Shinned specimen (Figure 3). Again, in the Audubon guide, in so far as it is possible



*Figure 3. Photographs of hawks*

Illustrations from *The Audubon Society Field Guide to North American Birds, Western Region*, edited by M.D.F. Udvardy, published by Chanticleer Press, Inc., New York. Plate 324 by Harry Darrow, Plate 325 by Karl Maslowski, Plates 326 & 327 by Ron Austing. Reprinted with permission.

to tell (the bird is facing away from the camera), the breast of the Sharp Shinned also seems to be lighter than that of the Cooper's. Colour, then, is a second area in which Peterson controls for what he takes to be irrelevant clutter. If the diagrams may be seen as instructions, then they are telling the reader who wishes to distinguish between the two species not to attend to the colouring of the birds.

A third visibly constructed *ceteris paribus* relation has to do with posture and orientation. As we have indicated, Peterson offers the reader identically posed depictions. These may be compared with the very different photographs offered of the two species in the Audubon guide – a Sharp-Shinned on the wing taken from underneath, an immature Sharp Shinned perched with its back to the camera, and a Cooper's, also perched, but half facing the camera. Though few birdwatchers would read the Audubon guide in this way, these differences could be used to legitimate the assumption, for instance, that mature Sharp Shinned Hawks are more likely to be in the air than mature Cooper's. Less fancifully, the Peterson drawings may also be contrasted with his pictures of Chickadees, Nuthatches and Brown Creepers.<sup>6</sup> There, where posture is a vital clue to the detection of difference, it is indeed represented in his drawings.

Peterson effects a final visual construction of *ceteris paribus* by adopting the already mentioned convention of pointing, by use of lines or arrows, to the visual differences between species that are authoritatively held to be crucial in difficult cases of identification. Thus, in the case of the two Hawks, it is the shape of the tail which is held to be particularly important for visual diagnosis. The instruction which may be read from the use of these lines once again, then, amounts to a *ceteris paribus* clause: if the birdwatcher has succeeded in narrowing down the identification of the bird in question to the point where it is either a Cooper's or a Sharp-Shinned, then all other visual differences may be ignored in favour of the shape of tail.

Overall, Peterson's drawings and their arrangement facilitate a number of inferences: first, the proximate and tabular arrangements of the two species eases their comparison. We are being asked to see these two species as close to one another, and their comparability is highlighted by their proximate and parallel illustration; second, visual control is imposed on all features save the "relevant" variables of size and tail shape. If these, rather than, say, colour and posture, are to stand as criteria for difference, then they do so in part because all other visible differences have been ruled out in the formal structure of the illustration. The comparative ambiguity of the Audubon book (discussed below) allows us to reflect on how Peterson provides clear criteria

by artfully rendering most possible differences irrelevant.<sup>7</sup>

The texts in Peterson reiterate many of the relations that are *shown* in the tabular depictions. The verbal accounts of the two Hawks follow one another. The lists of traits (size, colouring, shape of wings, tail, etc.) for each are similar, except for italicized differences: “generally the Cooper’s has a *rounded* tail (Sharp-shin *square-tipped* tail, slightly notched when folded)” (Peterson, 1961:50). These differences elaborate on the instructions which can be derived from the drawings, though they also, in the case of the two birds under discussion, tend to add complication:

It can be very tricky separating small male Cooper’s Hawks from large female Sharp-shins. They are not much different in size and the Sharp-shin’s square-tipped tail can even look slightly rounded when spread fanwise. The tail shape works best when the tail is folded.<sup>8</sup> (Peterson, 1947:42)

The recent edition frankly admits that “many cannot be safely identified in the field” (Peterson, 1980:152). Other differences which cannot be *shown* are described – for instance the call of the two species, and their range.

Note that the described similarities and differences do not simply criss-cross the various textual sites and formats but also make use of extrinsic bases of identity and comparison. The Cooper’s is described as “not quite as large as” a Crow (Peterson, 1961:50), and the Sharp-Shinned is differentiated from “other small Hawks” by its short rounded (rather than long pointed) wings. Thus, while the field guide is written to instruct the novice, a minimum degree of assimilation to the work of birdwatching is assumed. A number of “common or garden” species are used as reckoning points for the identification of others, and the network of similarities and differences depends upon and elaborates an increasingly esoteric knowledge of species as competence develops. Thus, while various orders of common sense are assumed on the part of readers (familiarity with language, maps, sounds and sights, habitat types), the use of indicator species posits the existence of a “core” of commonplace skills for recognizing and categorizing bird species. Robins, spar-

rows, and crows are assumed as “known” species by “anyone” who might use these guides.<sup>9</sup>

### 3.1.2 *The Audubon Society guide’s photographic realism*

As we indicated earlier, the Audubon guide opts for photographic realism (see Figure 3) and uses actual photographs of representative specimens in its colour plates. The author defends this decision by arguing that:

photographs add a new dimension in realism and natural beauty. Fine modern photographs are closer to the way the human eye usually sees a bird and, moreover, they are a pleasure to look at. (Udvardy, 1977:10)

Two photographs are placed on any single page. Typically, a single bird is shown in the frame of any photograph, and one specimen of an adult and one of an immature bird is used for each species. For some, for instance the Sharp-Shinned Hawk, a photograph of a flying as well as a perching specimen is shown. Each photograph is labelled, the size of the bird is indicated, and a page reference to a written description is given. Plates are indexed by generic profiles, sometimes colour-coded for the dominant hue of the bird (red, yellow, brown, etc.).

The photographs, though they juxtapose closely similar species, and appear, when taken in conjunction with the text, to be interpretable as instructions about what should be attended to when identification is attempted, are, for the reasons mentioned above, otherwise unlike the drawings in the Peterson guide. The version of photographic realism used in the Audubon guide less clearly highlights the similarities and differences between species. First, it is difficult if not impossible to read the photographs as tables. The birds appear in a variety of poses and orientations. Second, detail treated by Peterson as clutter is here not deleted. The birds appear against a background of branches, leaves or sky. Taken together, these factors lead to a third consequence: it is difficult if not impossible (a) to notice and (b) to interpret the significance of variations in the size of images: it is necessary to refer to the caption to discover whether there is a difference in size between two birds. In addition, the provision of a background offers rich detail whose salience is, however, not easily

interpretable. Thus, the possibility that the Sharp-Shinned Hawk frequents deciduous trees while the Cooper's prefers conifers, while a warrantable reading of the background of two of the photographs, is undermined by the discovery that the text about the Cooper's is located in the section on deciduous birds, while the Sharp-Shinned is to be found in the section on conifers! Fourth, the colouring of the birds, and complexities of feathering are not stylized, and the photographs thus do not, as Peterson prefers, "emphasize the field marks". Indeed, as we have already indicated, differences in colouring between the perching Sharp-shinned and Cooper's Hawks which are bleached out of Peterson's account, are quite noticeable in the Audubon guide. Since the text of the latter writes that the Cooper's male is "slate blue above, barred rusty below" (Udvardy, 1977:638) while the Sharp-Shinned is "Slate blue above, white below with rich rusty cross-barring" (Udvardy, 1977:697), it is, perhaps, pointing to differences in colouring as an important distinguishing feature. Whether or not this is the case is unclear, given the absence of stylization in the photographs. The multi-interpretability of the illustrations is aided by the fact that there are not, as in Peterson, lines or arrows on the photographs to indicate salient differences which particularly deserve attention.

### 3.1.3 *The National Geographic guide's naturalistic diorama*

The National Geographic guide which is the most recently published of the three, and is generally the preferred guide for the birdwatchers observed in this study, combines characteristics of the other two. The illustrations are hand-drawn by various artists (Figures 4 and 5), but are more "naturalistic" in the depiction of positions and surroundings than those in Peterson. On any given colour plate, typically two or three "related" species are depicted. Each species is represented by several individuals (adult male, female, one or more "immatures", and sometimes flying as well as perching specimens). The various individuals of a species are posed in "natural situations", and the background features are "filled in" with somewhat greater perspectival detail than in Peterson. On each page (such as Figure 4), two, three or more such "diorama"<sup>10</sup> are juxtaposed discontinuously with each other and various miniaturized profiles of flying or strategically positioned specimens.

The “diorama” suggest a natural situation by detailing the birds perched on branches in an appropriate habitat. The hawks in Figure 4, unlike Peterson’s, are shown in the midst of characteristic activity. One member of each pair of hawks on the page is shown with prey. Like a museum diorama, however, the arrangements are discretely framed synthetic schemes. They differ from the Audubon Society’s guide by showing, within each of the three frames shown on the page, perching adults of both sexes and a flying immature. The sharp-shinned hawk diorama includes the added bonus of a hawk, shown in the distance, pursuing an evening

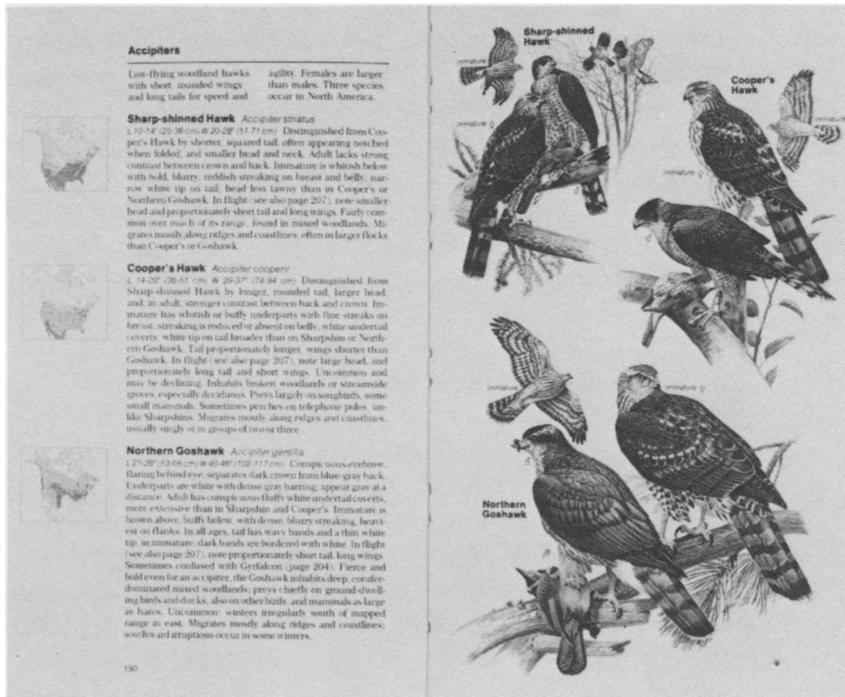


Figure 4. Hawks in diorama

Illustrations and captions from *Field Guide to the Birds of North America*, published by the National Geographic Society, Washington D.C. Drawings by Donald L. Mallick. Reprinted with permission.

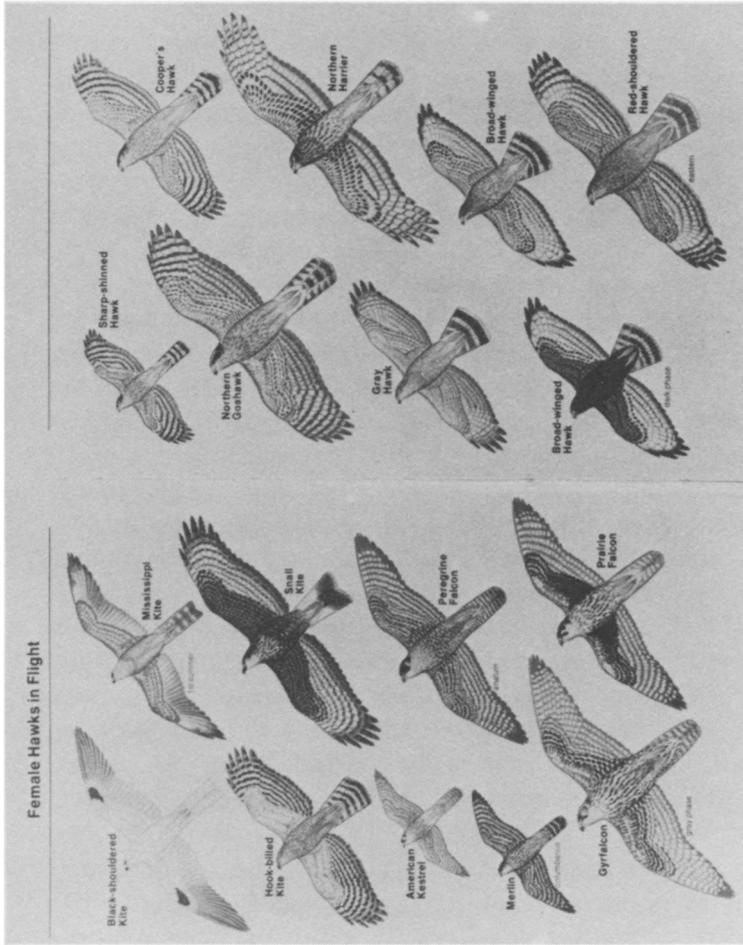


Figure 5. Flying hawks, National Geographic guide  
 Illustrations from *Field Guide to the Birds of North America*, published by the National Geographic Society, Washington D.C. Drawings by Kent Pendleton. Reprinted with permission.

grosbeak. Although individuals of each species are not represented in exactly the same pose as in Peterson, the specimens are arranged in such a way as to minimize overlap, while packing the various individuals into a compact space. Each adult specimen displays eye, beak, a portion of breast, tail, and feet. And, while each of the three frames is isolated from the others on the page, the specimens are shown in proportionate size. The “controls” in this case are far less obtrusive than in Peterson, but no less significant. While evoking the detail of a photograph, the frame includes an *organization* of such detail that would be extraordinary if found in any single photograph.

Like Peterson’s guide, the National Geographic uses a tabular array of flying hawks where the specimens are calibrated for apparent “distance” and are oriented in a parallel direction, with “cognate” specimens juxtaposed (Figure 5). There are several differences, however. The interior of each silhouette shows more profuse detail than in Peterson, with the outlines of the flight feathers and their barred patterns more distinctly painted. The National Geographic’s hawks look less like cardboard cutouts than Peterson’s, since their partial side view, showing of eye and facial features, gives more of an illusion of dimensionality. Although this does not show up in our black and white reproductions of the figures, Peterson’s array of flying hawks (Figure 2) is done in black and white, while the National Geographic’s is in color. Whether this makes them more “realistic” is questionable, since if “realism” refers to what a viewer sees when inspecting a flying hawk with binoculars, the highly detailed National Geographic hawks are not very realistic. From below, in a bright sky, a birdwatcher typically sees a back-lighted, obscurely marked, silhouette.

The National Geographic guide makes no use of Peterson’s famous lines to point out field marks, although in its descriptive caption for the Sharp-Shinned hawk (Figure 5) it does mention, among a number of other distinctive features, a “shortened, squared tail, often appearing notched when folded”. Generally, the National Geographic guide places less emphasis on single field marks, opting for a list of visible and behavioral features (e.g., “sometimes perches on telephone poles, unlike Sharpshins”).

A distinct advantage of the National Geographic guide is that

it presents picture, name, description and range map all on a single, two-page spread. This differs from Peterson's early editions where extended descriptions are placed on a separate page from the illustrations, and from Peterson's most recent edition (1980), where longer descriptions are placed alongside the illustrations while range maps are indexed to a separate page. It also differs from the Audubon Society Guide, which places its colour plates in a separate section from pictures and range maps. The National Geographic guide enables the reader to more quickly assemble the various resources the text supplies for identifying a given species.

#### 4. The circumstantial deconstruction of textual order

However well organized the field guide and however admirable the programmatic aims of its author, our experience with all three of the manuals discussed above convinces us that users of the guides will encounter innumerable frustrations, uncertainties and quandries. Such "troubles" are typically experienced by committed birders as temporary problems arising within a personal and situational relationship to "reality" – problems with perspective, acuity and luck. While we admit that a "positive" attitude may encourage noble efforts to overcome difficulties, we see such troubles as being deeply embedded in the organization of the novice's literary language game. As such, they have methodological significance as "pauses" in the midst of fluent practice which reflexively call forth taken-for-granted organizations of activity. We therefore embrace such negativity in order to gain leverage on the texts that we are analyzing, and to show how their "reading" is caught up in contingencies which cannot be found in even the most detailed inspection of their pages.<sup>11</sup>

We will start by considering troubles that are associated with the particular organization of each of the field guides discussed above. Our concern is not to evaluate the quality of the guides themselves but rather to show how the representational conventions which give each text its distinctive advantage as a field guide can also be sources of trouble. We will then move to those troubles that may arise in the use of any manual.

#### 4.1 *Troubles with particular field guide conventions*

##### 4.1.1 *Troubles with schematic representations: "Missing the mark"*

This arises most clearly in the case of Peterson's treatment, with its emphasis on one or a few particular "field marks" for each species, and its formalistic "bleached out" illustrations. The other two manuals are not immune to this trouble since the Audubon guide's photographs are selected to show birds in paradigmatic poses, and the descriptions emphasize key distinguishing features. Similarly, the naturalistic paintings in the National Geographic guide highlight certain features and the texts list particular distinguishing marks. The trouble is the following. Often the bird flies away even before a "good look" can be obtained. There are innumerable ways in which this occurs: the bird flies before it can be seen within the narrow field of vision of the binoculars; it fails to expose the parts of itself upon which the "field marks" are detectable; it moves rapidly; it remains too far away.

There is a related problem with all but the most recent Peterson edition. This is because more detailed descriptions are placed elsewhere in the book than the illustrations. As Figures 1 and 2 show, there pictures are paired with names and very brief accounts of key field marks on the facing pages. Often, when using Peterson in practice, we have found the illustrations and brief captions to be insufficient, and have turned to the more extensive descriptions. This takes extra time, assuring in many cases that the yet-to-be identified bird flies away or hides itself. In addition, the Western Edition does not include range maps, and this has proved frustrating at times since often the easiest way to distinguish between similar appearing species (such as the Eastern and Western meadowlark) is to consult the range map. This practice, which is sometimes frowned upon, is rendered most easy by the National Geographic guide.

##### 4.1.2 *Troubles with photographic realism*

As we have already noted, despite their "realism" photographs can be a source of innumerable "illusionary" uses. Perhaps unsurprisingly, in practice we have found the Audubon guide to be the most frustrating of the three in use. This has little to do with

the quality of the photographs but rather with the comparative lack of freedom for the photographer (or editor) to represent paradigmatic instances. Although the photographer no doubt selects a “good specimen” (such as an adult in healthy condition and in breeding plumage) and a shot which “captures” it in a “classic” pose, the artist has much greater licence to show a bird in just the pose necessary to reveal its distinctive colouration (using near cubist licence to free the specimen from particularistic perspective), and to highlight the field marks. In addition, the photographer has much less leeway to “control for” illumination and distance than Peterson, and specimens photographed in the field are rarely found grouped in tight tabular arrangements of individuals of distinct species.

As a result the user of the Audubon guide is faced with the problem of extracting the “essential” details that can aid identification while disregarding other details as “gratuitous”. In addition, some distinguishing features may not be shown. The plates in the guide show ducks in water without visible feet, or hawks without visible breast feathers, and because the photographs are large, the number of individuals representative of age classes and colour phases for each species is limited. The problem is compounded by the fact that the pictures are paired only with species names, and an index for the page elsewhere in the book where descriptions and range map are found.

By now it is perhaps clear, at least in part, why the Audubon guide is difficult to use, at least in terms of the conventions that have developed in North American birdwatching where almost every birdwatcher has been weaned on Peterson and his system of stylization and little lines. An authoritative reading of the salient differences between illustrations is difficult if not impossible without complete prior competence – it is, accordingly, difficult to treat the illustrations as unambiguous instructions,<sup>12</sup> though to say this is to say nothing about their aesthetic or technical qualities. (Note that a more recent edition of the Audubon Guide, published since this writing, uses photographs in, perhaps, a more convenient way.)

Finally, despite its initial plausibility, the reader should not necessarily, in any case, accept Udvardy’s claim that “Fine modern photographs are closer to the way the human eye usually sees a bird”. This suggestion is at best questionable. First, photography

rests upon a set of technical conventions that may or may not – this depends on circumstances – parallel those that help to constitute the literary language game of the novice. Thus, since, as we have just noted, Peterson’s earlier guide helped to train the perception of generations of North American birdwatchers, one should at least entertain the possibility that perception seeks out and notices details – for instance, the round shape of the Cooper’s tail by comparison with that of the Sharp-Shinned – which are discernable only with difficulty in photographs.<sup>13</sup> Second, photography, with its technical apparatus of films, film speeds, and levels of light, which is both a constraint and a resource, may see things differently – not at all, or “better” – than the birdwatcher. Hosking’s justly famous sequence of photographs of a Barn Owl represents just such a case. Only photography with flash could have captured the owl in the act of bringing a vole to its nest in the dark (Hosking, 1979). And even in the less esoteric case of the photograph of the immature Sharp-Shinned Hawk, there is some evidence that the photographers’ art is at work because the lighting in that photograph appears to be artificial, at least in part. Third, the fact that the photographer freezes a moment in the life of a bird creates considerable potential distance between her vision and that of the birdwatcher. First, the moment which has been captured may or may not be consistent with the behaviour of that bird as this is accepted by convention. Second, many of the most characteristic visual features of species are movements, or sequences of movements, which are not captured either by photography or in drawings. And third, it is, in any case, a rare bird that sits still and allows itself to be studied in the way it is possible to study a photograph. Thus, though it would be a project in its own right, there are excellent grounds for questioning both the “realism”, and the correspondence theory of perception, which underlie the assumption that photographs are “more true to life” than drawings.

#### 4.1.3 *Troubles with naturalistic diorama*

Though the National Geographic guide has some advantages over the other two, it also generates troubles for the user. Consider the resemblance between the National Geographic guide’s diorama and John J. Audubon’s famous paintings in *Birds of America*. Both provide lavishly detailed colour portraits of groups

of birds in idealized “situations”. It is not incidental that Audubon, like most nineteenth-century naturalists, used a shotgun to collect his specimens so that he could then gain access to their detailed features and pose them more freely than the living specimens might pose themselves. The naturalistic diorama invites the reader to appreciate a “natural” scene, with little acknowledgement of the artifices of pose, position and highlighting. Consequently, readers may be led more easily to expect to see birds look “just like” those portrayed in the guide, and then to suffer a form of “disillusionment” when finding that birds are not quite so colourful, unruffled, clearly marked and boldly positioned.

## 4.2 *Ubiquitous troubles*

### 4.2.1 *Troubles with the actual bulk of the manual*

Often disregarded in academic treatments of texts is the fact that texts are weighty artifacts, that they require “manual handling”, and that pages must be turned in a time-consuming process to find “places” in the text. Birdwatchers become acutely aware of such properties. Typically a text is carried along with binoculars, and must either be held in the hand or stuffed in a pocket or a backpack where it can be instantly accessible. The larger (and thus more “complete”) the manual, the more trouble it thus presents to its bearer. In addition, sighting a bird with binoculars often requires both hands to steady the instrument. This makes it difficult or impossible to keep the field guide in the hand. Birdwatchers often wish they were endowed with three arms – two for the binoculars and one for the field guide – and those who wear glasses feel the need for four.

### 4.2.2 *Troubles with place-finding in the text*

In addition to the above-mentioned problems, the novice experiences complex difficulties once an interesting but unidentified bird is sighted. Consider a typical instance. A “hawk-like bird” spotted overhead with the naked eye is scrutinized with some difficulty through the binoculars under adverse lighting conditions in order to detect its markings.<sup>14</sup> The novice then turns to the field guide to find a possible identity for the bird, or to

confirm what she believes it to be. The necessity of holding the field guide, opening it, flipping through its pages, and reading it under such circumstances, provides a convincing lesson on how the manual is anything but a transparent medium of representation. Binoculars must be put aside, a pause in the action must be negotiated at a delicate time, occupying both hands and eyes. The specimen may fly away or land behind opaque foliage while the reader's gaze is directed to the text. In short, it may refuse to wait until the reader finds the section for "hawk-like birds", checks the pictures and descriptions for several species of hawks (and perhaps even an owl or two), and then finds the relevant "field marks".

The dexterity with which a birdwatcher negotiates the pages of the text has little to do with physiological co-ordination, but much more to do with taxonomy. One of the quickest routes to the appropriate picture is to look up the bird's name in the index, but, to take this route, the birder must already know or be able to guess the species name. Other less precise indexes are based, depending on the field guide, on the general silhouette, "family" resemblance of the bird, dominant colour, and type of habitat.

#### *4.2.3 Troubles with specimens "not in the book"*

Birdwatchers not uncommonly sight specimens which they cannot "find" in the field guide. Even after obtaining a "good look" at the bird in the field, repeated searching in the book reveals no description or illustration which appears to do the job. There are many possible reasons for this, but the beginning birdwatcher almost never concludes that she has discovered an uncommon species or that the book had omitted a common species. Rather, the novice typically accepts the authority of the text while attributing the trouble to her inexperience, problems in perspective, or to an atypical appearance of the particular individual or local variant of the species.

Although this list of "troubles" barely begins to specify the difficulties encountered while playing the literary language game, we do not mean to imply that all field identifications are beset by troubles. Some birds in the field are "seen at a glance". Specimen and species identity are appropriated within the same instant. How this is accomplished is complex and worthy of a more ex-

tended discussion than we can give it here. We will note only that “seeing at a glance” is circumstantial, dependent upon local expertise, and is not simply dependent on intrinsic “markings” which make some species very different from all others which share their range. We have focussed on instances of “troubled” identifications because they extend the “moment” of identification and reveal effortful attempts to bring naturalistic observation within the province of textual order.

## 5. Conclusion

In this paper we have considered the organization of textual materials – notably lists and field manuals – used in amateur birdwatching. We have focused on the place of these texts in a particular form of taxonomic application which we have called a “literary language game”, and we have argued that the texts provide a descriptive organization to the craft of *seeing* species in the field. Thus, instead of relying upon perceptual metaphors for elucidating the theoretic organization of observation, we have preferred the metaphor of “reading” and “writing” with the naturalistic gaze.

Birdwatcher’s lists, we have tried to show, are not just columns of names (although in further work it would be interesting to examine the concrete features of particular lists). They are accountable reports of observations. This is especially so when the lists are compiled as part of socially organized practice (and even the lists of the solitary birdwatcher are part of such a practice, though perhaps freed from some constraints that cover collaborative field surveys). The accountability of the lists pervades the methodical “look”. “Getting a good look” is clearly a list-organized phenomenon.

The activity of birdwatching is also an exemplar for studying the place of an instructional text in order of practice. This is an established topic in ethnomethodology, which has been applied in analyses of work in scientific and other fields (Garfinkel, 1967; Lynch et al., 1983; Suchman, 1987, Amerine and Bilmes, 1988). Here we have described some of the similarities and differences between field guides, and some of the troubles that arise from

using three texts in the field. This has allowed us to identify some of the contingencies arising within the hermeneutic circle comprised of perceptive “readings” in a wordly field in reference to an authoritative text.

For reasons of space, and because we have restricted our focus to the place of texts in field observation, we have not dealt with a number of other themes. In further work we intend to develop the issue of “getting a good look” beyond the brief mentions that we have made of it here, and we will devote more explicit attention to several other topics on the embodied and social interactional accomplishment of field observation. These include the location of birdwatching sites and “species places”, the various forms of intervention in the field for exposing or eliciting birds, the use of optical technology and its associated problems, and the interactional and institutional organization of group birdwatching.

It is also important to explore the applicability of our exemplar to scientific practice. Although we find birdwatching interesting and enjoyable, we do not aim to pursue a “sociology of birdwatching” for its own sake. The question then is, what does our account of birdwatching have to do with practices in science? Our answer is tentative. Arguably the apprenticeship of a novice to the “normal science” of birdwatching reflects more general processes of apprenticeship in which textually ordered “knowledge” is elaborated in the course of practical investigation.<sup>15</sup> If this is the case, then the study of birdwatching (and other “trouble-prone” lay observational activities) speaks directly to a burgeoning interest in the social studies of science about the relationship between textual order and scientific practice.<sup>16</sup> Writing and documentation are seen as pervading laboratory practice, as lending organization, packaging and stabilizing sense, and as constitutive to the process of building and circulating claims. Literary artifacts (O’Neill, 1980) absorb and articulate orders of things within orders of discourse. So it is with texts in birdwatching. The strategies of list-building and field-guide design and the constitutive troubles that these bring in their wake – strategies that are relatively transparent to the outsider – may find their analogues deep within esoteric scientific practice where they are correspondingly more difficult to detect.

Whether the analogy that we have drawn between birdwatching

and science is defensible is in part a function of the uses to which it is put and of the assumptions one makes about the nature of science – its unity or heterogeneity, and its relationship to the “ordinary” institutions of language and practice. If, however, the analogy is permissible (and we note that Kuhn, 1977a:390ff., for one, has made use of birdwatching metaphors in his writing), then our argument does three things. First, it supports those who claim that the “scientific mind” may be treated as a social construction rather than something which is located within the hardware of the brain.<sup>17</sup> Second, it suggests that there is much to be learned by considering the way in which rather mundane “ecological” practices are managed in scientific work – such as matters of the spatial and sequential distribution of instruments, texts and social relations. And third, and more modestly, it points to the methodological utility of using “homely” examples in order to obtain purchase on esoteric and technical practices.

## Notes

1. While we will not follow up many of the nuances of this term, we find Wittgenstein’s (1953:214) discussion very much to the point:

Aspect-blindness will be *akin* to the lack of a “musical ear”.

The importance of this concept lies in the connexion between the concepts of ‘seeing an aspect’ and ‘experiencing the meaning of a word’. For we want to ask ‘What would you be missing if you did not *experience* the meaning of a word?’

2. Here we are borrowing and no doubt misusing Wittgenstein’s (1953: § 7) terminology to speak of a practical use of words in an apprenticeship to a language:

... one party calls out the words and the other acts on them. In instruction in the language the following process will occur: the learner *names* the objects; that is, he utters a word when the teacher points to the stone.

In the *literary* language game, one of the “parties” to the game is a field guide, and a list acts as a textual expression within the socially organized competency of birdwatching. The literary language game is, of course, an ideal-typical construction; although one based upon our own practical experience and our observations of other novices.

3. See Kastner (1986) for a history of competing classificatory schemes in birdwatching, and Farber (1982) for an analogous account in ornithology.

4. This point was driven home to one of the authors, an American, while travelling in Britain. He purchased an inexpensive field guide to British birds and used it as a reference while travelling through parts to Britain. The field guide proved to be quite easy to use, and he accumulated a short list of species seen in backyards and along highways and pathways. Later, when shown another field guide with a much more extensive catalogue, he was disappointed to find that many of the species he had "counted" while using the simple manual could no longer be distinguished from cognate species included in the more complete manual.
5. Using Myers' (1988) scheme, we can arrange the conventions used in each field guide along a continuum from "abstract" (Peterson's schematic paintings) through "realistic" (the Audubon guide's photographs), with the "naturalistic" diorama (National Geographic guide) being intermediate. Placement of an illustration along the continuum is demonstrated by its inclusion or exclusion of what Myers calls "gratuitous" detail (aspects of the picture having no direct bearing on its analytic use in the text). Like Myers, we are concerned with the way in which such conventions provide a text's claims with variable analytic and realistic authority. However, the illustrative conventions used in field guides, unlike those in the text Myers analyzes, are primarily relevant as identification instruments. The pictures are operated as "ways of seeing" within the literary language game of birdwatching, and not as polemical moments in a text's argument.
6. Plate 44 in Peterson (1947) and pages 210–213 in Peterson (1980).
7. See Barnes' (1977:7–9) discussion of pictorial representation. He writes of a figure depicting the muscles of the arm from an anatomy textbook that

It is designed to facilitate recognition and naming of an esoteric activity. *Therefore*, it is not a rendering of a particular arm. Despite being apparently realistic it is intentionally a schemata. (Barnes, 1977:7, his italics)

8. Compare the tail shapes in the photographs in the Audubon guide.
9. This point is discussed in Law and Lodge, 1984:94.
10. Myers' (1988) uses the analogy of museum diorama to describe a typical style of drawing where realist depiction, using some conventions of photography, is combined with non-photographic synthesis of paradigmatic views, surroundings, and apparent "activities".
11. The following troubles are described in typified fashion, sometimes exemplified by recollected incidents. By describing these in typified form we are claiming that they recur, that they have been and will be experienced as regular features of the novice's language game. We are not, of course, wanting to suggest that our account represents a full description of that language game.
12. In addition, the Audubon guide suffers a further disadvantage which it shares with the earlier though not the more recent Peterson edition — that its illustrations and text are located on different pages. Since it is

difficult to tell what features of similarity and difference should be attended to by consulting the photographs alone, in practice this means that the birdwatcher has to move rapidly between two parts of the guide and the binoculars in order to achieve many identifications – a task of needless complexity, given the availability of simpler field manuals.

13. Compare the photographs of the tails in the Audubon guide!
14. The detection of markings through binoculars is itself a rich topic which we will consider in another paper.
15. There is, of course, no single analogy. There are numerous kinds of birdwatching, just as there are innumerable forms of observational activity in science. There is also an open variety of themes: intervention, use of equipment, social interaction and authoritative description. In the present paper we have considered only a very limited part of the practice of birdwatching.
16. See, *inter alia*, Latour and Woolgar (1979); Woolgar (1980); Knorr-Cetina (1981); Bazerman (1981); Law and Williams (1982); Callon (1986); Callon, Law and Rip (1986); Griesemer and Star (1986); Callon and Law (1987); Morrison (1988); Yearley (1988); Gilbert and Mulkay (1984); Lynch (1985a; 1985b; 1988); Latour (1986); Law (1986a); Myers (1988); and Amann and Knorr-Cetina (1988).
17. See Star (1987) for details of the social construction of localisation theories.

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