Commentary

A Quick Fix for Figure Legends and Table Headings

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In our research papers, we rely heavily on figures and tables. As authors, we prepare the figures and tables to tell our story, and then write the text around them. As readers, we turn quickly to these "pictures," hoping to find the distilled take-home messages of an author's labor; if we are hooked by these data pictures or fascinated by the overall topic, we then proceed to read the details of the text.

Why is it, then, that in our figure legends and table headings we make it so hard on each other? In these crucial paragraphs, it is as if we do our best to conceal the punch lines of our hard-earned stories. Authors typically tell only what is in the picture, such as a relationship between two or more items, histograms of something or other, or eigenvalues for this or that; rarely do authors tell why the figure or table is important, how to read the story depicted therein, or provide guidance as to how to explore the data (see Table 1). It is as if the author is saying to the reader "I don't want to bias you about the data," or "see if you can figure it out," or "I challenge you to find the explanation in the text." Because so few of us take the time to read those text details, however, the value of figures and tables is greatly diminished.

In each legend or heading, I would think that an author would want to proclaim his or her findings with a paragraph of unmatched perfection. At the very top of each such paragraph, where readers most expect it, would be the illustration's explicitly stated point, or take-home message (e.g. see Williams 1990). A reader would immediately know the significance of the data and how to read and explore them. Next, supporting details would provide additional information about this "point," as expected in a good paragraph. No guesswork would be needed as the reader ponders the "why" of a figure or table.

How difficult can this objective be? Not very, I contend. As we put together the stories for our papers, think of the take-home message for each figure and table. State the message explicitly, and put it first in the legend or heading. Then provide the supporting details. Fine-tune the contents, shape, orientation,

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and other aspects of the figure or table to guide the reader's eye to the intended point. Improving figure legends and table headings is simple, both in theory and in practice.

To illustrate this practice, I suggest ways to improve a few legends and headings from a recent issue of my favorite journal (Table 2). The transformations are usually accomplished with ease. For example, instead of simply telling that a figure shows a relationship between X and Y, why not tell what the relationship is, so that the reader is guided to your main message? Instead of saying that a table contains the results of some statistical test, why not tell what the biological take-home message is, and then provide the supporting details of what kind of test was used. As you compare the published and revised paragraphs in Table 2, ask yourself which of the two informs you more about the accompanying data. Which of the two makes you more eager to explore the picture? Which of the two imparts a better understanding of the author's findings? Which will you remember better? Always, I believe, it is the revised version.

These ideas are not new. We are repeatedly encouraged to make figures and tables "comprehensible without immediate reference to the text" (CBE 1994:698). They should be "understandable on their own" (McMillan 1997:35). Graduate students are urged "to make tables and figures fully informative in themselves . . . .[Because] figures and tables are often examined before the text, they should not be dependent on the text for comprehensibility . . . .[Each figure and table] is *a complete unit of communication*" (italics mine; Woodford 1986:19,128).

Why don't we already follow this simple strategy to promote our findings? Frankly, I'm puzzled. Perhaps authors feel they must present a figure or table objectively, so as not to bias a reader? That doesn't wash, however, because the author has already carefully chosen the subset of material for the picture, thus purposely (and acceptably) biasing the reader's conclusion. Are we trained to conceal our findings? I hope not. Are we worried about being redundant, by making our point in both the text and illustration? Perhaps, but why would one choose to make the point once in the text and be opaque in the illustra-

TABLE 1. Most table headings and figure legends in *The Auk* tell only what is in the illustration, not its take-home message, thus making it difficult for readers to readily grasp the author's point. Data tabulated here are from the October 1999 issue of *The Auk* (from 67 tables and 75 figures in 28 papers by 80 authors).

Message conveyed	Table headings	Figure legends
"What" only	66	73.5
Take-home message	1[a]	1.5[b]

[a] See table 3 on page 960.

[b] See figure 1 on page 883 (also the first entry in Table 2, below) and figure 5 on page 919.

tion when one can make the point twice? Is space an issue? I don't think so, because revised headings aren't necessarily longer than published ones (Table 2; remember, too, that supporting information provided in the legend or heading need not be repeated in the text). Perhaps it's tradition? I think so. That's

the way we've always done it before, and, if we follow *The Auk* guidelines to authors (which encourage us to "See recent issues for examples"), that's the way we'll always do it. I can't think of a single good reason why authors would resist promoting their findings with more effective figure legends and table headings. As a respondent to an informal survey said, "I can't imagine that anyone would prefer the interpretation-free versions."

Writing legends and headings that clarify the purpose of the accompanying figure or table has a number of benefits. These benefits begin in the construction stage, because authors who are reminded to focus on their main points and to state them explicitly will produce figures and tables designed to communicate those points more effectively. It will also be harder to justify figures and tables that are simply "data-dumps," i.e. dumping grounds for data the author can't make sense of but hopes someone else can. Authors benefit, too, because the benefits to the reader are enormous. The take-home messages of a research article now accompany the data pictures,

TABLE 2. Figure legends or table headings that reveal the take-home message of the figure or table make it easier for readers to grasp the author's point, as illustrated by suggested revisions of 10 published legends or headings from the October 1999 issue of *The Auk*. (My apologies to authors if I get their point wrong.)

Page	Published legend or heading	Revised legend or heading
883	"Head of *Grallaria ridgelyi* showing black and white pattern. Inset is magnification of cheek feather."	Two distinctive features of *Grallaria ridgelyi*. (A) Black and white pattern on head. (B) Rigid, loose-barbed feather of cheek (magnified).
941	"Relationship between territory size and distance from roads for 21 Ovenbird territories. . . . "	Territory size of 21 Ovenbirds decreases with distance from roads . . .
951	"Percent of positive plates and nestling day. . . . "	As nestlings grew older, they became infested with more microbes . . .
970	"Genetic distance among individuals within the three island endemic vireos . . . and the continental *Vireo griseus*. . . ."	Genetic distance is lower among individuals within the three island endemic vireos than it is within the continental *Vireo griseus*. . . .
982	"Probability of lake use by breeding Madagascar Fish-Eagles as a function of number of suitable perch trees within a shoreline section. . . . "	Madagascar Fish-Eagles favor shoreline sections of lakes with more suitable perch trees.
987	"Fates of California Gnatcatcher nests. . . ."	"California Gnatcatchers had low nesting success, mostly due to predation."[a]
987	"Results of two-factor ANOVA comparing California Gnatcatcher nests . . . and random locations. . . . "	"Nest placement of California Gnatcatchers was not random,"[a] as revealed by two-factor ANOVA. . . .
1029	"Kimura 2-parameter distance matrix between thrasher species."	Relatedness among thrashers varies considerably, as revealed by the Kimura 2-parameter distance matrix.
1143	"Incidence of mate guarding by male House Sparrows in early and late morning observation periods during laying and incubation."	Male House Sparrows guard their mates especially during early morning of the laying phase.
1149	"Relationship between actual productivity for Kirtland's Warblers . . . [and] . . . an index of productivity. . . . "	Actual productivity and an index of productivity are positively correlated for Kirtland's Warblers. . . .

[a] Quote is from text.

and the author's ideas and findings are far more quickly appreciated by readers. By improving legends and headings, authors will entice readers to learn more of their story; ultimately, more, not less, text will be read. Authors and readers clearly benefit when figure legends and table headings begin with the take-home message.

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