Example Handout with exercise:

Writing about Visuals in Statistics

Visual displays—figures and tables—are essential to working with data—both for understanding one's data and for communicating one's analyses of those data to others. To do these things well, you need to learn to design effective visuals.

Equally important, but often less appreciated, is the need to learn how to *write about* these visual displays. Some people say that figures should speak for themselves—but they can't. Your visuals need your help to make sure your readers understand them, and that they see in them what you want them to see.

When you communicate your ideas in writing rather than in person, you have to tell your readers all of that stuff *in writing*. Here is an example from the *Journal of Economic Perspectives*, a top economics journal.[1] The authors are investigating life span and mortality across countries and groups. First, here is a figure from the paper. Take a moment to examine it before you move on. What does it show? What do the authors want you to take from it?

Figure 2
Expected Age at Death, England and Wales
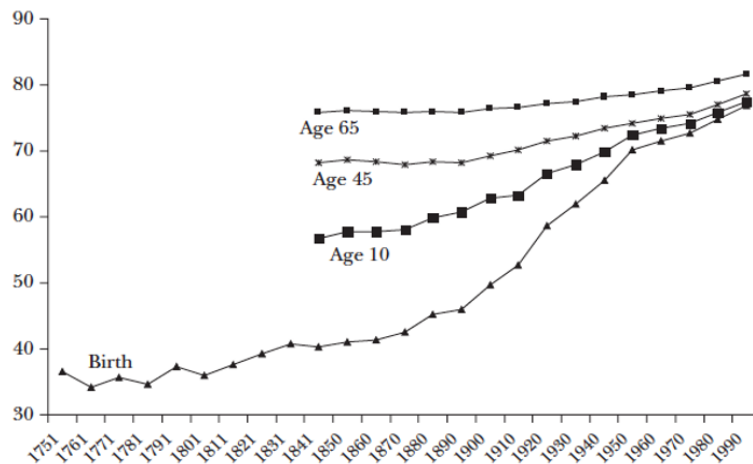
Source: Data for 1751–1841 are from Wrigley and Schofield (1981, Table 7.15, p. 230); data from 1841 are from the Human Mortality Database.

Now, here is what the authors said about this visual:

> Figure 2 shows trends in life expectancy by age in England since 1840. Between 1841 and 1950, life expectancy at birth increased by 30 years, while life expectancy at age ten increased by only half that amount. The decline in infectious disease explains this disparate age pattern. In 1848, 60 percent of deaths in England were from infectious disease. Between then and 1971, infectious

---

1 David Cutler, Angus Deaton and Adriana Lleras-Muney. The Determinants of Mortality. Journal of Economic Perspectives—Volume 20, Number 3—Summer 2006 (97–120).

disease mortality declined by 95 percent. Since infants and children are the most vulnerable to infections, their mortality rates were most affected by the decline in infections.

As you can see, these experts do this well. But what—precisely—are they doing here? Because there are so many different kinds of visuals and they are used in so many different contexts, it can be difficult for students to see patterns in the ways that experts write about visuals.

To help you learn to write about visuals like the experts, this document presents a set of "moves" that scientists regularly use when writing about visuals. The acronym PAV (Passage About Visuals) will be used to name the passages that contains these moves.

The Moves

Here are the four moves you will learn:

Announce When should readers look at the visual?

Orient What are readers looking at?

Observe What are the important features or trends you want readers to see?

Explain Why are those observations important?

We will use this color-coding scheme to help you see the moves and learn how to apply them in your own writing.

Let's look at the economics example above again—through the lens of these moves. It begins like this:

Figure 2 shows trends in life expectancy…

This is the *announcement*. It's simple but important. It says, "Hey, look at Figure 2 now." Following the *announcement*, the first sentence does an *orient* move, describing the figure's general content.

Figure 2 shows trends in life expectancy by age in England since 1840.

The next sentence makes an *observation*, directing readers to locate the years 1841 and 1950 on the horizontal axis and then notice that the gains in age at death (vertical axis) during that period is greater for the lowest curve (birth) than for the other three curves.

Between 1841 and 1950, life expectancy at birth increased by 30 years, while life expectancy at age ten increased by only half that amount.

The remaining sentences *explain* the trends, suggesting why have the patterns they do:

The decline in infectious disease explains this disparate age pattern. In 1848, 60 percent of deaths in England were from infectious disease. Between then and 1971, infectious disease mortality declined by 95 percent. Since infants and children are the most vulnerable to infections, their mortality rates were most affected by the decline in infections.

More about the four moves

Now that you have a sense of what these moves are, here is a bit more information to help you understand them and how to use them:

Announce
If you've included a figure or table, you need to tell your readers when to look at it (e.g. "See Figure 1"). Most of the time, you would make a single announcement for each visual. But sometimes you'll want multiple announcements for the same visual. For instance, you might want readers to look at a diagram in the introduction to get a sense of what your study does—and then again in the methods section when you want to point out specific details of how things were done. For figures that have multiple panels, you'll likely want to announce each panel as you discuss it (e.g., Figure 3, Panel B).

Orient
Orientations help readers understand what kind of thing the visual is and what they need to know to make sense of it. You'll want to decide what to include in the orientation based on the type of visual and how familiar you expect your readers to be with it. Also, some orientation information is useful to give readers in the PAV—before they turn their attention to the visual. Other info might be better in the caption—where readers can easily look back and forth between the visual and that material.

Observe
Observations focus readers' attention on specific aspects of the visual, such as relationships, trends or key features. Imagine you were giving a talk, the visual was on a slide, and you had a laser pointer. What would you want to make sure they noticed? Since you're not there with them, tell the in writing what to notice.[2]

Explain
Explanations tell readers how to think about observations that have been made. Some *explain* moves suggest reasons for a feature or observed trend. Others are inferences, in which authors generalize from observations—answering the question, "What do these observations mean?"

---

[2] And if it isn't easy to describe this—consider adding something to the visual (like an arrow) that you can refer to.

See which PAV moves you can identify in this example. It's from an environmental science article published in *Water Research* presenting empirical data on water quality for the Odzi River in Zimbabwe.[3]
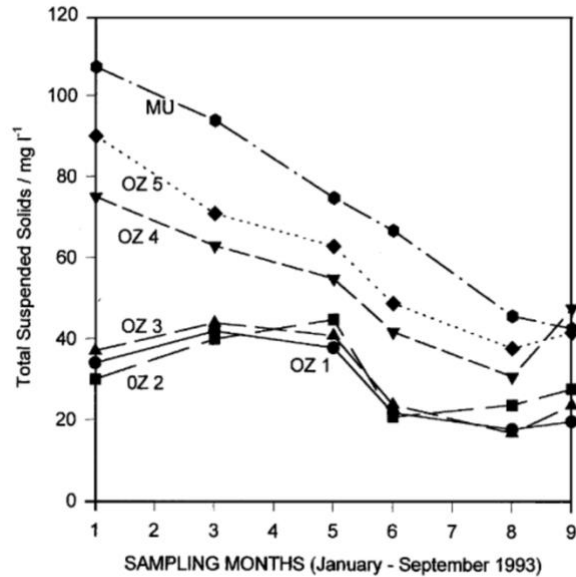

Fig. 3. Seasonal variations in the levels of total suspended solids at six sampling sites.

Here's the PAV for this figure:

> Figure 3 illustrates the seasonal variation in the TSS values. At the three sites in the upper reaches of the river (OZ 1-3), levels of TSS were in the same range and low. Again, total suspended solids recorded highest at MU in the rainy season (107 mg l^{-1}) and decreased to as low as 40mg l^{-1} in the dry season. Higher levels of TSS that were observed at OZ 4 compared to the upper reaches could be due to runoff waters from the farms in the upper reaches. The TSS levels at OZ 5 increased further due to incoming water from the Mutare River.

Take a moment to think about which moves you think the authors made here. When you're done, check your thinking against the text box below.

Announce: "Figure 3"; *orient:* "Illustrates the seasonal variation in the TSS values."; *observe:* "At the three sites in the upper reaches of the river (OZ 1-3), levels of TSS were in the same range and low. Again, total suspended solids recorded highest at MU in the rainy season (107 mg l^{-1}) and decreased to as low as 40mg l^{-1} in the dry season."; *explain:* "Higher levels of TSS that were observed at OZ 4 compared to the upper reaches could be due to runoff waters from the farms in the upper reaches. The TSS levels at OZ 5 increased further due to incoming water from the Mutare River."

---

[3] Jonnalagadda, S. B., & Mhere, G. (2001). Water quality of the Odzi River in the eastern highlands of Zimbabwe. *Water Research*, 35(10), 2371-2376.

PAV PEER FEEDBACK ASSIGNMENT

For this task, you are asked to give feedback to your classmates on their use of the four PAV moves in their writing.

> **Announce** When should readers look at the visual?
>
> **Orient** What are readers looking at?
>
> **Observe** What are the important features or trends you want readers to see?
>
> **Explain** Why are those observations important?

Notes

- Remember: a PAV is a passage that discusses a visual element (graph, table, diagram, photograph, chart, etc.).
- For your feedback, answer only for <u>yourself</u> as a reader. Do not try to imagine how others might respond.

Instructions

1. Get a clean digital copy of your peers' paper(s).

2. Locate the PAV(S) that address each figure and table in the paper. If there are more than three figures or three tables, do this only for <u>three of each</u>. (Try to choose visuals from different sections of the paper when possible.) Highlight each of those PAVs in light grey.

3. For <u>each</u> PAV, answer the following questions. (You may use the feedback table on the next page if you'd like.)

    a. Is there an ANNOUNCEMENT for the PAV?

    b. Is there an ORIENT move? If yes, how effective is it for <u>you</u> as a reader in helping you <u>understand</u> the visual? If not, would it be helpful for you? What questions do you have for the author(s)?

    c. Is there an OBSERVE move? If yes, how effective is it for <u>you</u> as a reader in telling you <u>what to notice</u>? If not, would it be helpful for you? What questions do you have for the author(s)?

    d. Is there an EXPLAIN move? If yes, how effective is it for <u>you</u> as a reader in telling you what the visual <u>means</u>? If not, would it be helpful for you? What questions do you have for the author(s)?

Feedback Table

* Use a separate copy of this table for each visual *

VISUAL Label	Figure/Table # (e.g., Table 2):
Is there an ANNOUNCEMENT? **Yes ___ No___**	If yes, is the placement of the announcement within the PAV effective?
Is there an ORIENT move? **Yes ___ No___**	If yes, how effective is it for <u>you</u> as a reader in helping you <u>understand</u> the visual? If no, would it be helpful for you? What questions do you have for the author(s)?
Is there an OBSERVE move? **Yes ___ No___**	If yes, how effective is it for <u>you</u> as a reader in knowing <u>what to notice</u>? If no, would it be helpful for you? What questions do you have for the author(s)?
Is there an EXPLAIN move? **Yes ___ No___**	Comments: If yes, how effective is it for <u>you</u> as a reader for understanding what the visual <u>means</u>? If no, would it be helpful for you? What questions do you have for the author(s)?