Celia's FAQ on Tenses

1. What tense should be used for scientific writing?

I think the past tense is preferable for the methods, results, and discussion sections, to make it crystal clear what you ***did*** (built, tested, assembled, measured, recorded, cooled, heated) and what you ***found*** (determined, calculated, observed). The discussion section should show what assumptions you ***made***, what treatment of data you ***performed***, and what you ***analyzed***. A "future work" section obviously should be written in the future tense. I think the conclusions section should probably be written in the present tense (here's what all this ***means***). The background and introduction section will probably be a mix of past and present tenses: here's what has been done previously, and here's the question we aim to answer.

2. Does that mean I can mix up tenses in the same section? paragraph? sentence?

Yes, the tense can change within a paragraph, or even a sentence, as long as it's clear what happened when. Here's a trivial example:

> Mousetraps were baited with 0.5-cm cubes of cheddar cheese, because mice are known to prefer cheese to broccoli, and cheddar cheese was the cheapest kind available to the researchers.

In this example, we've got past-present-past. You bought the cheapest cheese and baited the mousetraps. Those actions both happened in the past and did not continue into the future, so they should be written in past tense. However, mouse preferences are time-independent (same today as yesterday and expected to be the same tomorrow), so that phrase should be written in the present tense.

To recap, put anything you did (methods) or discovered (results) in the past tense, and enduring truths (time-independent facts) in the present tense.

3. But I thought we weren't supposed to flip tenses.

Well, you're not supposed to flop all over the place randomly. Here's an example of proscribed "tense flipping":

> Mousetraps were baited with chunks of cheddar cheese. The chunks are approximately 0.5-cm cubes. Forty traps were baited and are placed in basement areas that were known to be inhabited by mice. The mice will encounter the traps on their nocturnal strolls. We will check the traps in the morning. Upon inspection, 35 traps are sprung and denuded of their cheese chunks, but only 33 mice were caught. We therefore conclude that some form of cheese-eating animals in addition to mice inhabited the basement.

Here's another example, stripped of physics so you can really see the action of the verbs:

Objective: to determine if certain songbird species prefer one type of wooden birdhouse over another

Methods:
Four medium-growth deciduous and coniferous trees were identified in virgin timber in Funks Grove, Illinois—a white oak, a sugar maple, a Douglas fir, and a black walnut. The trees were cut down 6 in above the ground using Stihl chainsaws and shipped to a lumber mill in Alton, Illinois, where they were processed into 6-ft, 1x4-in planks. The lumber was then kiln-dried at 400 K for 10 hr.

The 1x4s were sorted by species of tree, and 10 identical birdhouses were constructed from each type of lumber. A blueprint of the birdhouse plan is shown in Figure 1. Each birdhouse was assigned a two-digit number, which was painted on the sides of the birdhouses with both black latex paint and super-reflective paint.

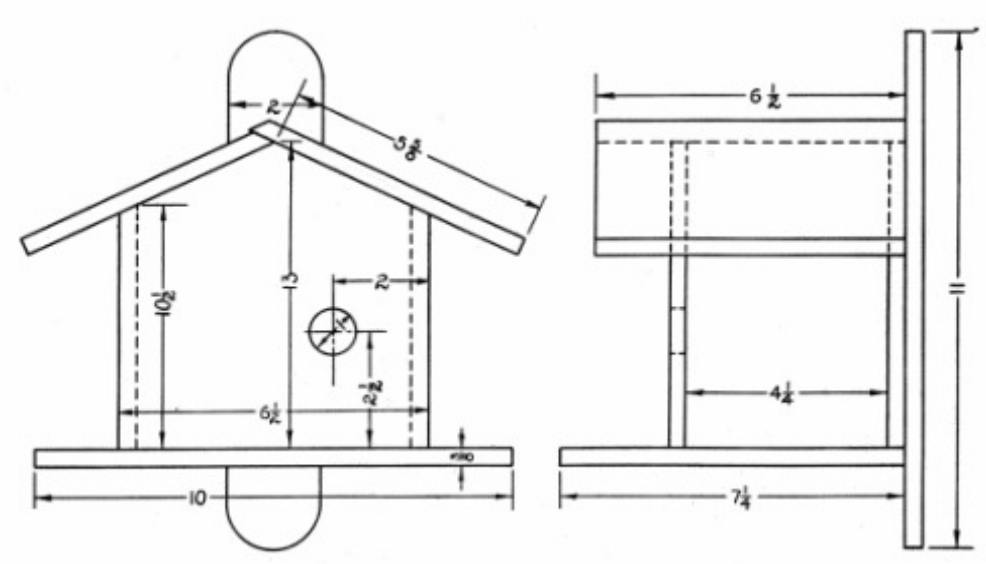

Figure 1. Plans for the birdhouses. Notice the overhanging eaves and solid fronts for perching. Measurements shown are in inches.

After construction, all 40 birdhouses were placed in native trees at the Champaign County Forest Preserve (40°11'33"N 88°24'8"W). The birdhouses were mounted at a height of 8 ft above ground level on February 23 and 24, 2011. All birdhouses were located randomly within 100 m of the Sangamon River.

Video cameras were mounted such that the identifying numbers on the birdhouses and any nesting birds would be recorded during the hours of 4:30 a.m. EST and 6:30 p.m. EST. The birdhouses were observed from March 1, 2011, through May 1, 2011.

Results:
Analysis of the videotapes revealed that 38 of the 40 birdhouses were occupied by native Illinois songbirds. Six species of songbirds were identified as having nested in the birdhouses. Table I shows the distribution of birds among the different types of birdhouses.

Table I. Distribution of songbirds among deciduous and coniferous birdhouses

Species	White Oak	Sugar Maple	Douglas Fir	Black Walnut
American Robin	3	3	0	3
Cardinal	0	0	6	0
Carolina Wren	5	0	0	0
Goldfinch	2	1	0	2
English Sparrow	3	2	1	1
House Finch	3	3	0	0

Discussion:

Cardinals showed a clear preference for coniferous birdhouses, while American robins clearly preferred non-coniferous, although they did not appear to differentiate among the three deciduous species. Carolina wrens nested exclusively in white oak birdhouses, perhaps because of their much smoother interior surfaces. English sparrows appeared to be willing to nest anywhere.

Conclusions:

Cardinals prefer birdhouses made out of coniferous wood. To attract cardinals, birdhouses should be made of Douglas fir.