**Writing Guidelines**

(J. Nowick)

The following are stylistic guidelines that I try to follow in my own writing. Although they are not carved in stone as the "right" way to write, they seem to work pretty well for me. To facilitate the writing of papers and theses, I encourage you to attempt to incorporate them into your own writing.

## TRANSITIONS

The logical flow of ideas is essential in conveying your thoughts clearly. I generally try to pick up on words from the preceding sentence to help create smooth transitions between sentences. The transitions are underlined in the following brief introductory paragraph.

> The mimicry of peptide and protein structures has emerged as a focal point of bioorganic and medicinal chemistry. This emergence has been marked by the appearance of at least fifteen review articles since 1990 on different aspects of peptidomimetic chemistry.[1] As a result of the recent activity in this field, there is now a growing appreciation that peptidomimetic chemistry can serve as a basis for drug development and that peptidomimetic model systems can provide fundamental insights into the folding and structure of proteins.

If these transitions are omitted, the paragraph is more choppy. Although it makes sense to me, my reader may not understand the relationship between the ideas.

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## VOICE, PERSON, AND TENSE

There are many ways to say the same thing. Usually, one is more appropriate than the others. Here are six ways to say the same thing, illustrating the use of different voices, persons, and tenses.

First person, active voice, present tense: We treat amine **1** with isocyanate **2** to generate urea **3**.

First person, active voice, past tense: We treated amine **1** with isocyanate **2** to generate urea **3**.

Third person, active voice, present tense: Treatment of amine **1** with isocyanate **2** generates urea **3**.

Third person, active voice, past tense: Treatment of amine **1** with isocyanate **2** generated urea **3**.

Passive voice, present tense: Amine **1** is treated with isocyanate **2** to generate urea **3**.

Passive voice, past tense: Amine **1** was treated with isocyanate **2** to generate urea **3**.

**When describing other's results, it is generally best to use the *third person, active voice*. The past or present tense may be used, as appropriate, and the researchers or the research may be the subject of the sentence. Such description is often used in the introduction or discussion of a paper.**

In 1950, Goldschmidt and Wick reported that amino acid ester hydrochlorides could readily be converted to the corresponding amino acid ester isocyanates by refluxing in toluene while sparging with gaseous phosgene.[2]

Kim and Berg measured the antiparallel β-sheet propensities using a zinc-finger peptide and obtained free energies favoring β-sheet formation by 0.53, 0.48, 0.35, and 0 kcal/mol for these four amino acids.[1]

The previous examples place more emphasis on the researchers. To place more emphasis on their results, change the subject to the research.

Amino acid ester hydrochlorides can readily be converted to the corresponding amino acid ester isocyanates by refluxing in toluene while sparging with gaseous phosgene.[2]

Previous studies established that the free energies favoring β-sheet formation are 0.53, 0.48, 0.35, and 0 kcal/mol for these four amino acids.[1]

**When describing one's own motivation or design of an experiment, it is generally best to use the *first person, active voice, past tense.* Such description is often used in the introduction of a paper.**

We prepared and studied several derivatives of the general structure **8**, with the anticipation that the alanine and glycine residues at the ends of the tripeptide strands would isolate the middle ($R_1$ and $R_2$) residues from the turn portion of the molecules and that chemical shift differences would better reflect the β-sheet forming propensities of these residues. We decided not to use this system, however, because of its greater potential for conformational heterogeneity, greater difficulty of synthesis, and greater complexity in the $^1$H NMR spectrum.

**When describing the results of your work, it is generally best to use the *third person, active voice.* The past or present tense may be used, as appropriate.**

$^1$H NMR studies reveal that **28** adopts a β-sheet conformation in $CDCl_3$ solution.

Treatment of **7** with isocyanates $R_2NCO$ and $R_1NCO$ yields diurea **8**. Removal of the Boc protective group, followed by reaction with acrylonitrile, affords aminonitrile **9**.

Aminolysis with methylamine converted the methyl ester group of **6** to a methylamide group, affording artificial β-sheet **2** in 81% overall yield.

**However, when the actor is wholly unimportant, e.g., in synthetic procedures, the passive voice may be more appropriate.**

Artificial β-sheet **2** was synthesized efficiently and in high yield from diamine **3** (eq 1).

The reaction mixture was extracted two times with 300 mL of cold 0.5 M aqueous HCl and ca. 200 mL of crushed ice. Each aqueous layer was re-extracted with 100 mL of $CH_2Cl_2$. The combined organic phases were extracted with a mixture of 300 mL cold saturated aqueous NaCl solution and ca. 200 mL of crushed ice, dried over $MgSO_4$, filtered, and concentrated by rotary evaporation to afford the crude isocyanate as a light brown oil.

**When describing the interpretation of data or the conclusions from experiments, it is generally best to use the *third person, active voice.***

Comparison of the chemical shifts of the NH groups of **28** to those of controls **29**-**32** indicates that the valine NH, leucine NH, and alanine methylamide NH groups are hydrogen bonded.

These studies suggest that artificial β-sheets **38** are more robust than artificial β-sheet **28**.

**In some unusual cases, the interpretation of results is sufficiently tentative, that you may wish to use the *first person, active voice.***

Because the procedure is so convenient and sodium bicarbonate nontoxic and environmentally benign, we now consider it preferable to our earlier method of preparing amino acid ester isocyanates using pyridine.

Although this difference may reflect differing properties of parallel and antiparallel β-sheets, we believe that it does not.

## SENTENCE LENGTH AND COMPLEXITY

Clarity is essential to good writing. While it is possible to write clear sentences that are very long, shorter sentences are often easier to read. I generally find it best to keep my longest sentences to three full lines or fewer when using 12 point Times font. My typical sentences run about one and one-half or two lines, and this seems to work pretty well. In general, I try to keep the number of commas required per sentence to one or two.

## PROOFREAD, PROOFREAD, PROOFREAD

Repeated proofreading is essential to good writing. After writing your document, read and edit it. Check and recheck all of your data, figures, charts, etc. Check all of your footnotes for errors in what you are citing, spelling of names, page number, years, etc. Then, use the spelling checker to check for spelling errors you might have missed. You will have to closely look over the technical terms it does not know. Use the grammar checker to help you go over your document sentence by sentence. Although its ability to "understand" technical writing is not good and it flags a lot of things that are not incorrect, I always find that it catches a few errors and is worth doing. Finally, read you document out loud to see how it sounds.

## INTRODUCTIONS

Your introduction should be *about something*. Sometimes there are many different contexts that you can put your work into. (This is more often the case with the design and synthesis of new molecules with interesting or unusual structures and is less an issue in the development of reagents or synthetic methods.) You don't have to address them all. Choose the one that is most relevant and interesting and expound upon it. Keep in mind, that you may wish to return to this topic in the paper's conclusion.

I like to define what the paper is about in the first sentence, sometimes even in the first word of the paper. Consider the following introductions.

Recognition between exposed edges of β-sheets is an important mode of protein-protein interaction.

Peptide isocyanates are a hitherto unreported class of compounds that we required as building blocks for the synthesis of artificial β-sheets.

The 9-fluorenylmethoxycarbonyl (Fmoc) group has enjoyed tremendous popularity as a protecting group for amines in the synthesis of peptides and related compounds because of its stability to acid and lability to base.

> Hydrogen bonding contributes only modestly to the free energy of association of small uncharged solute molecules in aqueous solution.

In each, I have picked a something important about which to expand and presented it in a straightforward manner. In the first, it's recognition between proteins; in the second, peptide isocyanates; the third, the Fmoc group; the fourth, hydrogen bonding. I have tried to write each sentence in a fashion that makes the reader want to read on, if the subject of the paper is of interest to him or her. (If the paper is not about something, the reader won't want to read it.)

Now that you've got the reader's attention and told what the paper is about, you need to expand on the introductory sentence and put the work into context.

A good introduction, for example, should address: (1) the relevance of the current research subject to a larger body of research, (2) other methods of achieving a given chemical transformation or type of structure, molecule, etc., (3) the current state-of-art and any possible limitations therein, (4) the relevance of the current research subject to your research program, and (5) outline the purpose and scope of the current study.