UNIT 1

Writing Communities: Insider or Outsider?

"A good writer is like a well-mannered person; s/he is considerate of others. S/he must know who her/his readers or listeners are and aim, with this in mind, for the most rapid and comfortable communication possible."

—*Scientific Writing for Graduate Students*
(Council of Biology Editors, Inc.)

Writing in academic and professional settings positions you in a variety of communities with common features. First, you become a member of a broad U.S. academic community of writers in a range of fields. These writers generally share basic assumptions or beliefs about the qualities of effective writing that might be different from the assumptions in other countries. For example, in the United States, the responsibility for communicating clearly belongs to the writer, but in some countries it might rest with the reader. Second, you join smaller target communities—your academic program, research group, and university/professional organizations—that use varied features and conventions that you will need to understand. This unit will help you examine the **basic assumptions** of academic writers, how to **target your audience,** and the use of **academic language.** By analyzing these concepts and creating a brief research interest statement for two types of audiences, you will take your first step into the university writing community.

Basic Assumptions

You have probably already developed a set of assumptions and beliefs about effective writing. Some of these may be similar or different from the basic assumptions accepted across disciplines at an English-speaking university. Think about the assumptions you bring from your experience in three areas: audience (Who are your readers?), purpose (How should you make a claim or thesis?), and organization (How should you order your text?). Share them with a classmate (preferably someone in a different field of study), and list them.

Audience:

Purpose:

Organization:

Exercise 1A: Understanding Assumptions of Academic Writers

Complete this survey to compare your beliefs with a skilled academic writer's assumptions. Circle T for true or F for false according to your expectations about writing.

1. The main purpose of an academic writing is stated clearly and explicitly near the beginning of the text. T F
2. The reader should never have to guess the meaning of the writer. T F
3. It is important to tell the reader what is going to be written about, to write about it, and then to rephrase it at the end of the text. T F
4. The organization of the writing should be well mapped and organized so that the reader can visualize it easily. T F
5. A reader expects to find credible and relevant details to support general statements. T F
6. The main point of the writing should be reaffirmed and repeated frequently throughout the text. T F
7. A writer usually starts with a generalization and moves to specific details to support this generalization. T F
8. The main idea of a paragraph should be shown with topic sentences at the beginning of each paragraph. T F
9. Formal language should always be used in academic writing. T F

10. Good grammar is required. T F
11. "Ownership" of the written word is important. A writer must give credit to the owner in the form of footnotes and citations for words that are paraphrased or summarized. T F
12. Academic writing is usually persuasive, presenting a unique perspective and claim. T F

If you answered true to all the questions in this survey of assumptions, you share the general assumptions of English-speaking academic writers. Mark the ones that you answered as false, and ask your instructor to explain the assumptions.

Exercise 1B: Free Writing and Understanding Assumptions

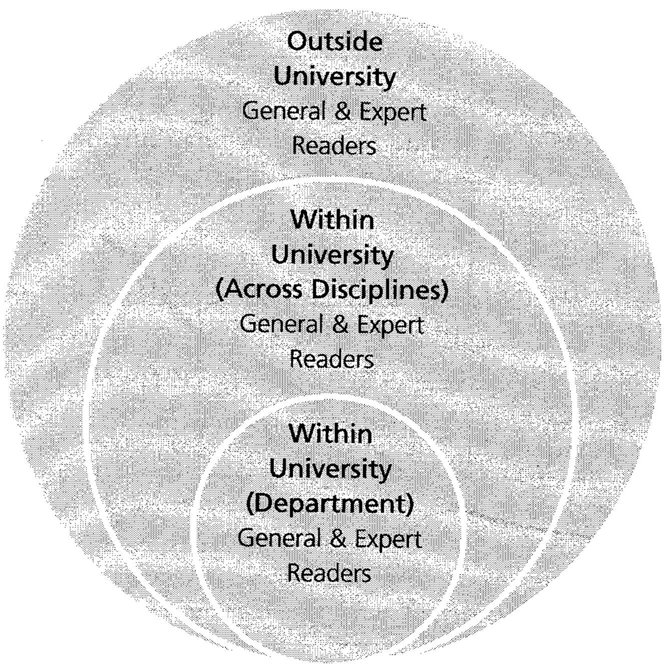
To organize your thoughts on assumptions and how you might need to adapt your views, try free writing for 10 minutes describing one of your assumptions that differs from one of the basic beliefs in Exercise 1A.

1. Put your thoughts on paper as quickly as possible. (This is free writing.)
2. Stop and read your thoughts.
3. Mark one or two ways that differ from the assumption you selected.
4. Write one sentence describing the assumption you want to acquire.

Targeting Your Audience

Understanding and learning to direct your ideas to different English-speaking readers may well be one of your most difficult and critical challenges as a writer. Just as we adjust our speech when we talk to professors, friends, grandparents, or strangers to appear well-mannered and polite, we must also alter or modify our writing for different readers (even those within our field of study). For example, a chemist writing for the journal *Science* (a popular magazine for a general academic audience) will include background information, definitions, examples, and explanations for a **general (non-expert) reader** (GR) who is probably interested in the human aspect of the research. However, writing for a field-specific publication such as *The Journal of Mass Spectrometry*, a chemist will use specialized and technical vocabulary and will omit general definitions and explanations because a **field expert reader** (FER) understands the concepts and shares a background of information with the writer. You will write for both types of readers but primarily for professors inside or outside of your department and for general readers outside of the university when you apply for research grants or fellowships. Some of you might even publish your student research ideas in academic journals, alumni and student magazines, local newspapers, or on department web pages. The **audience or reader chart** (Figure 1) can help you visualize your current role as a writer among GRs and FERs.

Figure 1: Audience or Reader Chart



To target a GR or an FER you should:

1. Determine if the readers share or do not share your knowledge about the topic.
2. Select appropriate vocabulary and language for the type of reader.
3. Organize the text with the conventions expected by the type of readers.

Exercise 1C: Considering Readers

Evaluate the common academic types of texts listed by considering the possible readers. Indicate whether the text would primarily have Audience 1 or Audience 2. In some cases, the text may have both types of audiences.

Audience 1. General Readers (GRs)

Audience 2. Field Expert Readers (FERs)

Type	Reader
Abstract	_____
Biographic statement	_____
Cover letter	_____
Thesis	_____
Email	_____
Academic essay	_____
Grant	_____
Lab report	_____
Resume	_____
Proposal	
☐ conference	_____
☐ dissertation	_____
Published article	_____

Exercise 1D: Selecting an Area of Interest for General Readers

Select a developing research area related to your field of study (or one that interests you). Later you will write a paragraph about this developing area to share with GRs.

1. Write your area of interest here. ____________________
2. Why do you believe GRs will be interested in this area?

____

____

____

Language Choice

An obvious and important difference between texts written for GRs and FERs is the vocabulary. Compare the sample sentences from the articles in the same field: *In vivo cancer targeting and imaging with semiconductor quantum dots* written by Xiaohu Gao, Yuanyuan Cui, Richard M. Levenson, Leland W. K. Chung, and Shuming Nie for FERs and *Scientists target tumors with 'quantum' dots* written by Holly Korschun for GRs. Focus on the vocabulary used for the two different types of readers.

> **Article 1: FER**
>
> The structural design involves encapsulating <u>luminescent</u> QEs with an <u>ABC triblock copolymer</u> and linking this amphiphilic polymer to <u>tumor-targeting ligands</u> and drug-delivery functionalities.
>
> **Article 2: GR**
>
> Encapsulated in a <u>highly protective polymer coating</u> and attached to a monoclonal antibody that guides them to <u>prostate tumor sites</u> in living mice, the quantum dots are <u>visible</u> using a simple mercury lamp.

The text for the FERs includes the words *luminescent*, *ABC triblock copolymer,* and *tumor-targeting ligands.* The text for the GRs uses the more commonly known words *visible, highly protective polymer coating*, and *prostate tumor sites.*

Exercise 1E: Comparing Vocabulary for General and Field Expert Readers

Analyze these two sentences for FERs and GRs. Use a highlighter to mark the words in the second sentence (written for GRs) that have been substituted for the underlined words in the first sentence (written for FERs).

1. These results raise new possibilities for ultrasensitive and <u>multiplexed imaging</u> of molecular targets <u>in vivo</u>.
2. Emory scientists have for the first time used a new class of luminescent "quantum dot" nanoparticles in living animals to simultaneously target and image cancerous tumors.

Which vocabulary do you understand more easily? ___ Article 1 ___ Article 2

Analyzing Texts

Being able to identify a text's audience, its parts, and its vocabulary is an important skill that will help your own writing improve. In the sample text from the article *In vivo cancer targeting and imaging with semiconductor quantum dots* written for FERs, note how the writers target expert readers by using field-specific vocabulary and an organization specific to the community. Examples are noted.

In vivo cancer targeting and imaging with semiconductor quantum dots

Xiaohu Gao, Yuanyuan Cui, Richard M Levenson,
Leland W K Chung & Shuming Nie

Abstract (formal research style of organization):

We describe the development of multifunctional nano-particle probes (field-specific vocabulary) based on semiconductor quantum dots (QDs) for cancer targeting and imaging in living animals. The structural design involves encapsulating luminescent QDs with an ABC triblock copolymer and linking this amphiphilic polymer to tumor-targeting ligands (field-specific vocabulary) and drug-delivery functionalities. In vivo targeting studies of human prostate cancer growing in nude mice indicate that the QD probes accumulate at tumors both by the enhanced permeability and retention of tumor sites and by antibody binding to cancer-specific cell surface biomarkers. Using both subcutaneous injection of QD-tagged (field-specific vocabulary) cancer cells and systemic injection of multifunctional QD probes (field-specific vocabulary), we have achieved sensitive and multicolor fluorescence imaging of cancer cells under in vivo conditions. We have also integrated a whole-body macro-illumination system with wavelength-resolved spectral imaging for efficient background removal and precise delineation of weak spectral signatures. These results raise new possibilities for ultra sensitive and multiplexed imaging of molecular targets in vivo.

Exercise 1F: *Analysis of Text for General Readers*

Analyze an excerpt from the article *Scientists Target Tumors with 'Quantum Dots'* noting how a text for general readers features the implications and importance of the research findings in the field-specific article. Use a highlighter to mark the **vocabulary** that is easier to understand than in the field-specific sample on page 8 and the **definitions and explanations** given for general readers.

Scientists Target Tumors with 'Quantum Dots'

Holly Korschun

Emory scientists have for the first time used a new class of luminescent "quantum dot" nanoparticles in living animals to simultaneously target and image cancerous tumors. Encapsulated in a highly protective polymer coating and attached to a monoclonal antibody that guides them to prostate tumor sites in living mice, the quantum dots are visible using a simple mercury lamp. The scientists believe the ability to both target and image cells in vivo represents a significant step in the quest to use nanotechnology to target, image and treat cancer, cardiovascular plaques and neurodegenerative disease in humans. The findings appeared in the Aug. 1 edition of *Nature Biotechnology*. The research team was led by Shuming Nie, a nanotechnology expert and professor in the joint Emory/Georgia Tech Coulter Department of Biomedical Engineering and the Winship Cancer Institute, and by Lelund Chung, professor of urology in the School of Medicine and Winship.

Quantum dots are nanometer-sized luminescent semiconductor crystals that have unique chemical and physical properties due to their size and highly compact structure. Quantum dots can be chemically linked (conjugated) to molecules such as antibodies, peptides, proteins or DNA and engineered to detect other molecules, such as those present on the surface of cancer cells.

From Korshun, H. (2004, August 23). *Emory Report*, Vol. 57, No. 1, Emory University, Atlanta, Georgia.

Telling Your Story

You will have the opportunity to write about your developing research—"to tell your story" to both general and field expert readers in your academic career as you apply for travel and research grants through your university and outside funding organizations. Successful students find that targeting a particular audience increases their chances of being awarded a grant. To develop your skills in writing for different readers, you can begin by analyzing award-winning student texts and faculty publications.

Examine the two models by Julianne Chung, a PhD student in math, who wrote about her research area for different readers—a general public and a field-specific audience. She won the Computational Science Graduate Fellowship Annual Essay Contest sponsored by the U.S. Department of Energy and a fellowship to fund her research during her graduate doctoral study. By engaging a general public audience successfully by "telling her research story" effectively, she gained support.

Student Model 1: Engages Field Expert Readers

Julianne presents her research "story"—her ideas and claim—for field expert readers in the introductory section of her honors thesis *Filtering Methods for Image Restoration* (unpublished manuscript). She focuses on a field-specific audience: professors reading her honors thesis. In this text, she primarily shares her knowledge about her research focus. Note how she **situates her research with past and current research** and **uses field-specific vocabulary.**

Filtering Methods for Image Restoration

(uses field-specific vocabulary)

Image restoration is the process of removing blur and noise from degraded images to recover an approximation of the original image. This field of imaging technology is becoming increasingly significant in many scientific applications such as astronomy (1, 2,17), medical imaging (1,8,14,16), military, surveillance (1,16), iris scanning (13), microscopy (9,13), and video communication technologies (1,13) **(situates research)**. For example, scientists use long-range telescopes to obtain pictures of distant stars and planets. However, due to the distortion caused by the earth's atmosphere and the random interfering light rays coming from various sources, astronomers receive blurred images.

Similarly, doctors and medical technologist obtain images of human anatomy and physiology from radiological machines such as X-ray, Magnetic Resonance Imaging (MRI) and Single Photon Emission Computed Tomography (SPECT). Because the imaging device is located outside of the patient, the body serves as a distorting medium along with random radiation and can corrupt images. In addition, motion of the patient may cause further blurring in the image. With enhancement techniques, though, noise and blur can be filtered from these images, making them easier for doctors to decipher and analyze. Another emerging application of image restoration in the field of medicine is 3D volumetric tuned-aperture computed tomography (TACT) reconstruction **(field-specific vocabulary)**, in which 2D image restoration is introduced and implemented to reconstruct a 3D object (8).

Surveillance is yet another field heavily influenced by image restoration technologies, one that has severe national security implications. For example, law enforcement and forensic scientists use digital restoration techniques to recover faces and license plates from poor-quality security videotapes. More recently, techniques such as the cubic phase mask **(field-specific vocabulary)** are being used to bring all faces in a crowd into focus, no matter their proximity to the camera (3).

In each of these applications, obtaining clearer images can be accomplished by using computer programs to perform image enhancement techniques. This computational process can be complicated, requiring algorithms to solve tens of thousands and, possibly, millions of mathematical equations. However, an accurate and efficient re-construction can be extremely advantageous to the field.

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Exercise 1G: Identifying Strategies to Engage General Readers

In Student Model 2, Julianne uses a variety of strategies to interest the general public in her fellowship text published in *COMPOSE, The Department of Energy's Computational Science Graduate Fellowship (DOE CSGF) Annual Essay Contest Journal*, 2006. The purpose of the contest is to encourage better communication to general readers of the value of computational science and engineering to society.

To engage GRs, Julianne uses several strategies:

1. Has a creative and interesting title
2. Humanizes the research for less informed readers
3. Creates a visual to show research
4. Uses non-technical vocabulary

Can you find all four features in Julianne's text? Use a highlighter to mark and label them. The first two paragraphs have been done for you as examples.

Student Model 2: Engages a Public Audience and General Readers

Julianne Chung wrote, *"I am a graduate student in the math department, pursuing a PhD in computational mathematics. My primary research is in image restoration—specifically, medical imaging applications. I really enjoyed writing this essay because it challenged me to think about my research from a different perspective. I learned to be more creative and concise in my explanations so that technical concepts don't seem so daunting."*

Making Blurry Images a Thing of the Past

(has a creative and interesting title)

My family loves to take pictures. We see stars on Christmas Eve, not from the twinkling night sky, but from the hundreds of flashes coming from my mom's and aunt's 35 mm cameras. When asked why they take so many pictures, they always respond, "Just in case some of them don't turn out" **(humanizes the research/non-technical vocabulary)**.

Nowadays, the convenience of digital cameras allows us to immediately see our picture and take another if we are unsatisfied. But what if it costs $5,000 to take one picture? Would you pay another $5,000 if the picture was blurry or contaminated with specks of dust? Instead, I think you would try to fix the image you already have **(humanizes the research)**. With the help of advanced mathematics and high-performance computers, researchers are finding new ways to take the blur out of images.

You may be wondering what kind of picture costs $5,000. One example is a medical image from a device called a PET scan. This particular camera can scan for cancer, detect Alzheimer's disease and diagnose heart disease. But the image will be blurred if the subject fidgets. Performing the scan again is costly, not to mention possibly detrimental to the patient's health. The radiologist, which is just a fancy name for a doctor who interprets medical images, must now face a blurred, degraded image of, say, your heart. She has no hope of a clearer image.

The goal of my research is to take that blurry image and work backwards to "*undo*" the blur. The reconstruction must be done using a computer. As a computational scientist, I work to develop sophisticated algorithms or instructions for the computer. Now, a good detective knows that prior to starting any major operation, we need the proper tools and research. That is, we need some knowledge about our problem. The first line of investigation is determining what caused the blur. There could be many culprits; one example is motion blur. If you take a picture of a fast-moving car, you may see lines and streaks in the image. Many photographers desire this artistic effect, but medical doctors and radiologists want to eliminate it. To alleviate the smearing effects, the radiologist will ask you to lie still during the test. No matter how hard you try, you will breathe, itch, sneeze and/or twitch, thereby causing motion blur in the image.

Once we know the kinds of blur contaminating our image, the next step is to arm ourselves with the tools needed to do the reconstruction. We start with the basics. A digital image is a picture sitting inside a computer. Each image consists of pixels that snap together in a grid-like formation. Each pixel has an associated value, like each tile of a mosaic has its own color. A typical medical image has a grid of 256 pixels by 256 pixels, giving a total of 65,536 pixels in the image. That's equivalent to the seating capacity of a large football stadium. Now imagine we line up all the players and fans into one single-file line and assign each person a number. This is similar to how images are stored in the computer. We organize them by putting all 65,536 pixel values into a very long list, making it easier to access each value individually. Remember that our goal is to "undo" the blur in the image. Thus, it is important to understand what happens during the blur process. We do this through mathematical modeling, which is just a fancy expression for using math to explain real-life phenomena. For example, suppose we want to motion blur. Imagine a scenerio in which we paint red, yellow and blue stripes side-by-side on the wall. While the paint is still wet, a child runs his fingers straight through all the colors. The mixture of paints causes a rainbow of colors to appear. In the same way that the motion of the kid's hand causes the colors to mix along the wall, motion in an image causes an average (or smearing) of neighboring pixel values. Mathematically, this phenomenon is characterized by a formula we learned in elementary school: to compute an average, sum up the values and divide by the total number of items. Since a typical image has 65,536 pixels, we have to do this "averaging" 65,536 times! That's a lot of values to manage, so computational scientists conveniently store the information in a large table. This is where computers are helpful and important. Not only do we have to store all of these numbers, but massive computing power also is required to execute instructions that work with these huge tables. So far, we seem to have everything needed to perform the reconstruction, but we have overlooked the most notorious villain of all: the "specks of dust" on the image, which scientists call noise. Looking at an image degraded by noise is like trying to see an image behind the black and white static in a bad TV transmission. Due to the random or accidental nature of noise, the chance of us ever getting back to the exact original image now is like finding a pin in a haystack the size of China. I and many other researchers are trying to solve this problem. No definitive answer has been found, but we will NOT give up.

Even though we cannot reconstruct the original image, many computational mathematicians and researchers are investigating ways to get a good approximation. With the advent of novel mathematical techniques and the help of modern computer technologies, we are getting closer and closer to finding a reliable and automated way to "undo" the blur in any image. Clearing up blurry images is important to many aspects of life, whether to clear up the motion blur in your $5,000 PET scan or to avoid taking yet another family photograph. With my research, maybe one day I will be able to convince my family that one picture is enough.

From Chung J. (2004), published in *COMPOSE: The DOE Annual Essay Contest Journal,* Krell Institute.

Writing Assignment: Brief Research Interest Statements

Prepare two research interest statements.

1. Write a 200-word statement introducing your research interest to a general reader. Think about your interest from the public's perspective and how you can communicate this to the public. Engage the audience with an opening sentence, state what you know about the subject, why you are interested in the area, and the possible applications of the research. Use the ideas and strategies on page 12 to engage the readers.

2. Write a 200-word statement introducing your research interest to field expert reader (professors who share your research interest). Think about your interest from their perspective. Engage them with an opening sentence, state what you know about the subject, why you are interested in the subject, and the possible applications of the research.

Inside Academic Writing

Understanding Audience and Becoming Part of an Academic Community

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