writer's awareness that a problem exists—often dimly felt, unclarified, and blurry—and that the writer's thesis must be a tentative, risky proposition in response to that problem, a proposition that competes for readers' allegiance with other differing propositions.

Teaching Multiple Drafts as a Thinking Process

Fortunately, the writing process itself provides one of the best ways to help students learn the active, dialogic thinking skills valued in academic life. Students need to understand that even for the most skilled writers, composing an essay is a tortuous process because, as writing theorist Peter Elbow (1973) has argued, "meaning is not what you start out with but what you end up with. . . . Think of writing then not as a way to transmit a message but as a way to grow and cook a message" (p. 15). Thus, the elegance and structure of thesis-governed writing—as a finished product— evolves from a lengthy and messy process of drafting and redrafting. An across-the-curriculum emphasis on multiple drafts encourages the messy process whereby writers become engaged with a problem and, once engaged, formulate, develop, complicate, and clarify their own ideas. The habit of problem posing and thesis making does not come naturally to beginning college students, who write more clearly when given assignments that do *not* challenge them as thinkers. The next sections explore this phenomenon in more detail.

Avoiding a Thesis: Three Cognitively Immature Essay Structures

To see more clearly the relationship between a dialogic view of knowledge and the approach to writing instruction advocated here, let's examine several cognitively immature organizational structures that students often resort to when unable to produce thesis-governed prose.

"And Then" Writing, or Chronological Structure

By "and then" writing I mean a chronological narrative in which the writer tells what happens between time point A and time point B without focus, selection, pacing, or tension. Students produce "and then" writing when they resort inappropriately to chronological organization. Typical examples are students' writing a plot summary of a film or short story instead of an analysis. Another example, commonly encountered in the sciences, is students' writing a literature review that simply summarizes articles in the order in which the student read them without creating an argument about what's known or unknown.

"And then" writing can be illustrated by the following student's difficulty in producing an interpretive argument about Shakespeare's *The Tempest*. This excerpt is from the introduction of the student's first draft:

> *Prospero cares deeply for his daughter. In the middle of the play Prospero acts like a gruff father and makes Ferdinand carry logs in order to test his love for Miranda and Miranda's love for him. He is also very cruel to the servant Caliban. In the end, though, Prospero is a loving father who rejoices in his daughter's marriage to a good man.*

Here the student seems to be summarizing the plot of *The Tempest* without forecasting an argument or proposing a thesis. The body of this draft contained similar passages of lengthy plot summary. However, in an office conference the instructor discovered that the student actually intended an argument. She thought that Prospero was a loving father, in contrast to several of her classmates who thought that Prospero was a tyrannical ruler and parent. The instructor helped her recast the introduction to set up a thesis.

> *Many persons believe that Prospero is an evil person in the play. They claim that Prospero exhibits a harsh, destructive control over Miranda and also, like Faust, seeks superhuman knowledge through his magic. However, I contend that Prospero is a kind and loving father.*

The student is now prepared to make an argument. The paper poses a problem (What kind of father is Prospero?), indicates an opposing view (Prospero is harsh and hateful), and asserts a contestable thesis (Prospero is loving). She now needs to develop her reasons for arguing that Prospero is loving and organize her paper hierarchically to support these reasons with appropriate textual details.

It must be noted, however, that it is not just inexperienced writers who produce chronological structures. In their classic study, Linda Flower and John R. Hayes (1977) show that long passages of chronological writing characterize the early drafts of expert writers (see also Flower, 1979). In fact, they argue that chronological thinking provides a natural way of retrieving ideas and details from long-term memory. But experienced writers convert "and then" material into hierarchically focused material as they revise, whereas novice writers seem satisfied with the draft at the "and then" stage.

"All About" Writing, or Encyclopedic Order

Whereas the "and then" paper strings details on a chronological frame, the "all about" paper tries to say a little bit of everything about a topic. When well written, such papers may seem organized hierarchically because the writer usually groups data by category or topics. But the categories do not function as reasons in support of a thesis. Rather, like the headings in an encyclopedia article, they are simply ways of arranging information that do not add up to an argument.

Unfortunately, educators in America have a long tradition of rewarding "all about" writing. We encourage such writing when we assign a "report on North Dakota" in fifth-grade social studies, a "library paper on General Rommel" in eleventh-grade history, or "a term paper on schizophrenia" in college psychology. Assignments like these have endured because they have one major virtue: they increase students' general store of knowledge about North Dakota, General Rommel, or schizophrenia. But they often do little to increase students' maturity as writers and thinkers.

Consider the difference between a student who is asked to write a traditional "term paper" on, say, Charles Darwin versus a student who is asked to write a research paper on Darwin that must begin with the presentation of a problem or question that the writer will investigate and try to resolve.

Without guidance, the first student will tend toward "all about" writing, perhaps producing an initial outline with headings like these:

I.   Early childhood

II.   How Darwin became interested in evolution

III. The voyage of the *Beagle*

IV.   An explanation of Darwin's theory

V.   Darwin's influence

This paper promises to be encyclopedic and devoid of surprise. But when the student is guided toward a focus on a significant question that grows out of the writer's interests and that demands critical thinking, undergraduate research writing can spring to life. Flower (1993, p. 299) describes a successful undergraduate term paper on Darwin written at Carnegie Mellon University for a course in cognitive psychology. Flower's student Kate, a sophomore, posed the following problem about Darwin at the end of her introduction:

In this paper I will look at the creativity of Charles Darwin by asking two questions. Does Darwin's work support or contradict current psychological definitions of creativity? And secondly, what is the best way to account for Darwin's own kind of creativity? Which of the major theories best fits the facts of Darwin's life and work?

Within her paper, Kate presented different theories of creativity and examined Darwin's work in the light of each theory. She proposed that Darwin was indeed creative and that his creativity could best be accounted for by the "problem-solving theory" of creativity, as opposed to the "romantic imagination theory," the "Freudian sexual energy theory," or "Wallis's four-stage theory."

Kate's essay reveals how successful undergraduate writing can be when students are actively engaged in posing and exploring questions. Emphasizing inquiry and question asking is thus a promising antidote to "all about" writing.

Data Dump Writing, or Random Organization

Both "and then" writing and "all about" writing have discernible organizational plans—chronological in the former case and encyclopedic in the latter. Data dump writing, by contrast, has no discernible structure. It reveals a student overwhelmed with information and uncertain what to do with it. Commonly encountered in research papers, data dump writing patches together quotes, statistics, and other raw information without a thesis or a coherent organizational plan. It takes all the data the writer gathered about topic X and dumps it, as it were, on the reader's desk. Data dump writing is particularly facilitated by the Internet because it is so easy to cut and paste material from websites; students often lift material word for word without assimilating it into their own language. Data dump papers can create nightmares for teachers with their exasperating mix of incomprehensible structure and possible plagiarism. Because data dump writing is familiar to all teachers, it needs no specific illustration here.

What Causes These Organizational Problems?

The "and then" paper, the "all about" paper, and the data dump paper all reveal a retreat, in some manner, from the kind of reasoned analysis and argumentation that we value in academic writing. Why do these problems occur? A number of explanations have been posed. For example, writing theorists influenced by the Swiss psychologist Jean Piaget have

hypothesized that the immature organizational patterns just described are symptomatic of concrete operational reasoners, who tend to focus on data, objects, or things as opposed to propositions or forms (Lunsford, 1979; Bradford, 1983). In writing, concrete operational reasoners can string details together chronologically ("and then" writing) or arrange them in simple informational categories ("all about" writing). But creating the kinds of nested hierarchical structures required in propositional writing requires the abstract thinking that characterizes formal operations.

Other explanations focus on theories of intellectual development such as Perry's developmental theory (1970) based on research with male students at Harvard or by Belenky, Clinchy, Goldberger, and Tarule (1986), who focus on women. In both schemas, students come to college imagining knowledge as the acquisition of correct information rather than the ability, say, to argue a position. Eventually, students develop a complex view of knowledge, where individuals have to take stands in the light of their own values and the best available reasons and evidence. Composition scholars using these theories have hypothesized that students will produce cognitively immature prose as long as their attitude toward knowledge remains in the early stages of intellectual growth (Hays, 1983; Lunsford, 1985). The best teaching strategies for accelerating students' growth are tasks that ask students to consider multiple points of view, to confront clashing values, and to imagine, analyze, and evaluate alternative solutions to problems. Many of the assignments used as illustrations throughout this book have these aims.

Still other explanations focus on the different cognitive processes of novices versus experts (Beaufort, 2007; Graff, 2004; Alexander, 2003; Bransford, Brown, and Cocking, 2000; Voss, 1989; Kurfiss, 1988; Sommers, 1980; Flower and Hayes, 1977). Novice/expert theory provides perhaps the most hopeful of all explanations because it implies fairly quick improvements in student writing derived from improved teaching practices. In this view, students simply have not been taught the kind of writing admired in the academy. "And then" structures, "all about" structures, and data dumping are the result of poorly designed writing assignments and uncoordinated teaching.

For example, many teachers report improvement in their students' writing when they use Booth, Colomb, and Williams (2008) to explain how expert academic writers construct an introduction: early in the introduction the writer must identify a problem, show why the problem is problematic, and motivate readers to see the problem's importance. Other teachers report the benefits of teaching students what Graff and Birkenstein (2009) call "the moves that matter in academic prose." Building on Graff's

(2004) earlier analysis of students as outsiders to academic prose, Graff and Birkenstein set out to demystify academic prose by showing students how to insert their own voices into academic conversations. (Later in this chapter I summarize some of the "moves" taught by Graff and Birkenstein—see pages 31–32.)

Pedagogical Strategies for Promoting Critical Thinking

This overview of writing and critical thinking points toward a consistent set of teaching practices aimed at promoting critical thinking about subject matter problems. If we are to create a pedagogy truly aimed at the development of thinking skills, we should consider adopting the following strategies.

Create Cognitive Dissonance for Students

According to Meyers (1986), "Students cannot learn to think critically until they can, at least momentarily, set aside their own visions of the truth and reflect on alternatives" (p. 27). A good way to promote this process is to create what psychologists call *cognitive dissonance*, which undermines students' confidence in their own settled beliefs or assumptions. Research in neuroscience, as summarized by Zull (2002), offers a material explanation for how cognitive dissonance helps restructure neuronal networks in the brain. Zull explains how knowledge exists as elaborate networks of neurons and synapses. Because learners build new knowledge on existing neuronal networks, these existing networks must be partially dismantled if the learner is to create new networks that embrace fuller, more detailed knowledge. To encourage new networks, Zull recommends assignments that help students dismantle an older mistaken or inadequate view. Thus a physics teacher might facilitate this process by giving an assignment like this:

> *Many people believe, mistakenly, that summer is hotter than winter because the summer sun is closer to the earth. Imagine someone who holds this mistaken belief (your kid brother, for example). Send this person an e-mail attachment that explains why this belief seems logical but is in fact wrong. Then offer a better explanation.*

In similar fashion, a teacher might challenge views that oversimplify a concept or make the concept too comfortable. Here is a professor's assignment for a first-year seminar on the nature/nurture controversy in gender identity: