The verb *solve* is a fairly common choice for introducing a solution, but a number of other verbs can be used as well. Indeed our own examples demonstrate variety in verb choice. We would like to further add that the examples are what we have referred to as skeletal phrases. In other words, these are phrases that you can adapt for your own writing, taking care that you add your own original content. For instance, in a text on fog harvesting, it is possible to write this sentence based on a skeletal phrase to introduce the solution.

> Recently, researchers have made significant progress in overcoming this difficulty by *introducing a simple fog harvesting system.*

One way to find skeletal phrases is to use Google Scholar to search for them. Rather than looking for journal articles, you can search for strings of language. For instance, you could do this search: "approach to * this problem" (note quotation marks are needed to search for the exact phrase; the * is a wild card that will reveal the language that appears between *approach* and *to this problem*). The results of this search would reveal these verbs that can complete the phrase: *overcome*, *solve*, *tackle*, and *address*, to name a few. You will also see possible grammar choices. In the example search, for instance, you will see both *approach to solving this problem* and *approach to solve this problem.* To determine which is most common in your field, you can also narrow your search by adding your area of study. If you are interested in robots, you can search for "approach to * this problem" robots.

We suggest that you exercise caution when searching for and using skeletal phrases. While skeletal phrases will help you with your academic phraseology, you do not want to borrow complete expressions of ideas, which could be considered plagiarism (see Unit Five).

TASK TWENTY

Write your own problem-solution text that includes both a process description and a definition, or write a review of the current state of knowledge in your field that raises a question about it and offers a possible or partial answer. Be sure to include the kind of detail that can convince readers of your claims.

JS: How long did the interviews last, and did you use a fixed list of questions?

ML: About an hour. I had some questions but did not always use them all. I guess my data could be said to be based on what sociologists call "semi-structured" interviews.

JS: Did you use English?

ML: The interviewees used whatever language they were most comfortable with—Mandarin, Taiwanese, or English. I think this was a strong point in my method.

Now write up Mei-Lan's investigative procedure. Maintain a formal style. You may decide to include only some of the information contained in the preceding conversation or re-order it.

Introducing the Solution

Looking back at the texts we have examined, we see these solutions introduced.

> To address this problem in the village of Chungungo, scientists implemented an interesting solution.
>
> One approach currently under study involves transplanting healthy coral into a bleached reef.

Here are some additional skeletal sentences based on sentences we found in published articles.

> Solutions to this problem are now widely discussed. One remedy is to. . . .
>
> One method to address this difficulty is to. . . .
>
> There are two possible ways of handling this problem. The first. . . . The second. . . .
>
> Several options are available to address this obstacle. However, the best one seems to be. . . .
>
> A radically different design/model of . . . can overcome this limitation.
>
> Recently, researchers have made significant progress in overcoming this difficulty by. . . .

However, there remains the issue of reliability.

Even so, this model has some serious limitations.

Even so, researchers still have to find a way to . . . .

TASK NINETEEN

One of us (John) interviewed a student writing up her first research paper for her master's in Social Work. Mei-Lan said she was interested in learning more about the Chinese elderly living in the United States. She said that she had chosen this topic because many people believed that Chinese communities traditionally had always looked after their elderly and, further, that these old people would not easily accept help from outsiders. She wondered whether this was still true in the United States. She also observed that the available research had mainly been conducted in the larger Chinese communities in the major cities on the east and west coasts. She therefore decided to study small communities in the midwest. John then asked her about her methods.

JS: How did you find your subjects?

ML: I used friends and friends of friends in the local Chinese community to introduce me.

JS: How did you collect your data?

ML: I used face-to-face interviews. I wanted one-on-one situations since I was afraid that if family members had been there, my interviewees might not have been truthful about their feelings and experiences.

JS: Did you have to get permission from the review board?

ML: Yes, because I was dealing with human subjects.

JS: Did you have any problems with this?

ML: No, not at all. Interview methods are usually quickly approved.

JS: How many people did you interview?

ML: I only managed to interview about ten. Not much time, and not all of my contacts worked out. I also got some refusals. So, this was just a small-scale pilot study. There were not enough subjects for any statistical analysis.

7. **The process uses the CPU power it needs, depending on what it doing and depending on what other processes running.**
8. **The research investigated whether time money and found that $V = \{W[(100-t)/100]\}/C$, where V is the value of an hour, W is a person's hourly wage, t is the tax rate, and C is the local cost of living.**

Indirect questions have a number of functions in academic writing; for example, they can be used in explaining purpose.

A questionnaire was distributed to determine whether . . . .

However, perhaps their most important use has been illustrated in Task Eighteen. They are often used to "problematize" issues, cases, phenomena, statements, and so on. For this reason, they are particularly common in problem-solution texts—first as one way of introducing the problem and then as one way of offering a (critical) evaluation of the solution. In Task Nineteen you will have an opportunity to use indirect questions.

Although we have stressed indirect questions as a way of introducing or discussing problems, we do not want to imply that this is the only way. In some cases, direct questions may be possible.

However, is the data reliable?

Keep in mind, however, that you should limit your use of these in academic writing, as we stated in Unit One. Another common way to introduce a problem is to use an adversative sentence connector, such as *however* or *nevertheless* (see Table 1 on page 37). Notice how each of these examples is somewhat negative.

However, this system/process/idea has its problems.

Nevertheless, few solutions have been found to . . . .

Despite this, little progress has been made in . . . .

Nevertheless, the problem remains as to how . . . .

The main difficulty in using indirect questions involves remembering that the subject and verb should not be inverted. Both research and experience suggest that not inverting is learned relatively late. The use of a "question word" may automatically trigger the inversion and lead to these incorrect forms.

It is unclear what will be the price of oil next year.

It is unclear what will the price of oil be next year.

The correct form, of course, would look like this.

It is unclear what the price of oil will be next year.

TASK EIGHTEEN

The verb *to be* is missing from these statements. Insert it in the correct position and in the correct form.

1. **The question remains whether it possible to develop a reliable earthquake warning system.**
2. **We need to know what precautions being taken to prevent the spread of the disease.**
3. **There is some question as to whether the current crisis can eventually overcome.**
4. **It has not been determined how these policies likely to affect small businesses.**
5. **It might also be of interest to investigate to what extent persistence a major factor in graduate student success.**
6. **Another issue raised by this study is whether and to what extent poverty and environmental degradation linked.**

TASK SIXTEEN

In the articles from your field of study that you chose for Task Nine in Unit One, can you identify a Methods section? Does it describe a series of procedural steps that the authors followed? If so, is the description mainly written in the active or passive? Is it written in present tense? How is the flow of information maintained? In particular, are there time adverbials at or near the beginning of some sentences?

TASK SEVENTEEN

Write a process description of your own choice. If possible, choose a topic that you can later incorporate into a full problem-solution text. Consider choosing a topic in your field.

Language Focus: Indirect Questions

In one important sense, this unit has focused on formulating questions (problems) and evaluating the answers to those questions (evaluations). For example, if we look back at the text in Task Fourteen, we can see an example.

> ⑩ Researchers are now investigating whether this recovery time can be accelerated.

You probably noticed that in both cases the writer has opted to use an indirect question rather than a direct question. As you know, indirect questions follow the standard word order (the subject followed by the verb). They do not require that the subject and the verb be inverted, as in a direct question. Indirect questions also end with a period rather than a question mark. Here is an example.

> Direct question: What was the response rate?
>
> Indirect question: The editor asked what the response rate was.

There is a close parallel between process descriptions and descriptions of methods in research papers (see Unit Seven). If there is a difference, it is that process descriptions deal with standard procedures, while methods descriptions are typically new modifications or developments of earlier methods.

TASK FIFTEEN

Researchers have been trying to develop artificial muscles for medical purposes and have recently developed a way to re-create muscle action using a type of artificial silk. Here is a set of instructions for the preparation of the material, followed by information on how the material simulates actual muscle. Write a problem-solution text that uses the information as part of the solution. Use your imagination to create a situation and problem that could be solved through the use of an artificial muscle. Be sure to include all the required parts of a problem-solution text and to present the process in an appropriate manner, using passive voice and sequential connectors. Show cause-and-effect relationships where appropriate.

1. **Cook the Orlon. Orlon is a form of artificial silk.**
2. **Boil the Orlon until it turns into a liquid rubbery substance.**
3. **Pour the solution onto Plexiglas to form a thin film.**
4. **Vacuum away excess water from the film. Allow the film to dry.**
5. **Cut the dried film into 2 centimeter–wide strips. Bake it in a 90°C oven. The material is ready for use after it has been baked.**
6. **Prepared Orlon has a structure similar to that of human muscle fiber and is naturally negatively charged with electricity.**
7. **If you apply acid to the material, you introduce a positive charge and you cause the ions to attract. This attraction contracts the material like a muscle.**
8. **If you apply a base material, you introduce a negative charge, the ions repel, and the muscle expands.**

1. **Identify the situation, problem, solution, and evaluation.**

	Sentence Numbers
Situation	
Problem	
Solution	
Evaluation	

Which of these sections receives the greatest treatment? Why?

2. **What linking words and phrases are used to indicate cause and effect?**
3. **In Sentence 10, the author wrote *are now investigating.* Why was the progressive used?**
4. **Also, Sentence 10 includes a passive construction—*can be accelerated.* Why was this used rather than the active?**
5. **In Sentence 2 the author wrote... *they are often thought to be the marine equivalent of terrestrial rainforests.* How would the meaning change if the author had omitted the phrase in the passive voice (i.e., *they are often thought to be*) and opted for *they are the marine equivalent of*?**

If a process description employs verbs that indicate a change of state, such as *expand, rise, cool, fracture,* and *form,* active voice is often used.

> The Sun *rises* in the east and *sets* in the west.
>
> Most metals *expand* and *contract* with variations in temperature.
>
> The beam *fractures* when the load upon it becomes too great.
>
> Tropical storms *can form* only in areas of high humidity and temperature. First, the warm sea *heats* the air above its surface. The warm, moist air then *rises* above the sea, creating a center of low pressure.
>
> When demand *increases,* prices are likely to rise.

Can you think of some other examples?

TASK FOURTEEN

Read this problem-solution text and then discuss the questions on page 131. Note the frequent use of active voice in the process.

❶ Coral reef ecosystems are well known for their beauty and diversity. ❷ Found throughout tropical and subtropical regions of the world, they are often thought to be the marine equivalent of terrestrial rainforests. ❸ During the last several decades, however, coral reefs have been undergoing alarming changes as a result of environmental stresses, the most serious of which is whitening or bleaching. ❹ Although the mechanism of bleaching is not fully understood, this phenomenon is linked to the breakdown of the symbiotic relationship between the coral and an algae known as *zooxanthellae*. ❺ The algae, which give the coral its color, live inside the coral and perform photosynthesis, sharing the food that they produce. ❻ When the coral is stressed as a result of increases in temperature or the amount of light, the zooxanthellae carry out too much photosynthesis and in response the coral expels the algae. ❼ The loss of the algae exposes the white calcium carbonate skeletons, thus leaving the coral unable to grow or reproduce. ❽ Coral can survive for brief periods of time without the zooxanthellae, but if the reef environment does not return to normal, the coral dies.

❾ Coral reefs require from 30 to 100 years to recover from bleaching, if they recover at all. ❿ Researchers are now investigating whether this recovery time can be accelerated. ⓫ One approach currently under study involves transplanting healthy coral into a bleached reef. ⓬ However, thus far, the process has seen limited success.

5. Geyser eruption

Water from rain or melted snow percolates into the ground through cracks. The water is heated by the underlying rocks to temperatures well above the boiling point. The water does not boil. It becomes superheated. It also becomes pressurized. The water bursts out of the ground in an explosive steam eruption.

6. Now re-write the instructions for inoculating eggs with influenza virus as a process description. For convenience, we provide the text again here.

Inoculation of eggs in flu vaccine development

a. Place eggs into egg trays with the blunt end up, and label eggs with a specific identification number. Allocate 3 eggs for each specimen.
b. Wipe the blunt end of each egg with 70% ethanol and punch a small hole in the shell over the air sac.
c. Aspirate 0.6 ml of processed specimen into a tuberculin syringe with a 22 gauge, 1 1/2-inch needle.
d. Hold the egg up to the candler and locate the embryo. Insert the needle into the hole in the shell and, using a short stabbing motion, pierce the amniotic membrane and inoculate 100 µl of the specimen into the amniotic cavity. Withdraw the needle by about 1/2 inch (1.25 cm) and inoculate 100 µl of the specimen into the allantoic cavity. Remove the needle.

Active Voice in Process Descriptions

So far we have emphasized the use of the passive voice in process descriptions. Part of the reason for this is that until now we have concentrated on processes that involve human action. There are, however, many natural processes that take place without direct human intervention. In such cases, active voice is often used, or there may be a mix between active and passive, depending on the process.

Revision

The plants are selected and planted at a particular site based on the type of metals present and other site conditions. After the plants have been allowed to grow for some time, they are harvested and either incinerated or composted to recycle the metals.

1. **Oil spill cleanup**

   The oil is skimmed from the surface using a boom. The oil is pumped into a tank for recycling.

   _____

   _____

2. **Banana virus infection**

   Banana trees become infected with the banana bunchy top virus. In the early stages of the disease, the banana trees produce fruit that is deformed. Eventually, in later stages of the disease, the plants yield no fruit at all.

   _____

   _____

3. **Tempering glass**

   The glass is cut to size. It is inspected to determine if it has any imperfections. The glass is heated to over 600°C. The glass is cooled in a step known as quenching.

   _____

   _____

4. **Coronary bypass surgery**

   A vessel is taken from the leg. The vessel is grafted to the aorta and the coronary artery beyond the narrowed area. The vessel allows blood to flow to the heart muscle.

   _____

   _____

Participles

You may also have noticed, through the flu virus examples, that flow can be maintained by taking the *-ed* participle in the passive construction and using it as an adjective.

> First, the virus strains most likely to cause disease are identified and three are *selected* for vaccine development. The virus samples of each *selected* strain are injected into separate batches of fertilized eggs to amplify the amount of virus. Each virus strain is grown separately inside the eggs over the course of several days, after which it is harvested, inactivated, and *purified*. The *purified* virus strains are then combined to create the vaccine, blended with a carrier fluid and dispensed into vials.

By using *selected* and *purified* as adjectives, the writer establishes a strong connection between the sentences and indicates a newly acquired characteristic of the virus. This form of repetition contributes to the overall old-to-new flow of ideas.

TASK THIRTEEN

Improve the flow of ideas for the process descriptions by adding a time adverbial, linking passive, or using an *-ed* participle. There may be several possibilities. To help you, we have identified the process being partially described.

Example

Phytoremediation—using plants to remove metal from the soil

Original

The plants are selected. The plants are planted at a particular site based on the type of metals present and other site conditions. The plants are allowed to grow for some time. The plants are harvested. They are either incinerated or composted to recycle the metals.

TASK TWELVE

Consider these two versions of a passage discussing treatment for water birds after an oil spill. Underline the parts in Text B that differ from Text A, including the linked passives. Why does B have better "flow" than A? Consider old-to-new information flow as well as other devices to establish a good flow of ideas that were discussed in Unit One.

A. ❶ Once a bird has been brought to a rehabilitation center, basic procedures are followed. ❷ The bird is sedated, if necessary. ❸The bird is examined to detect broken bones, cuts, or other injuries. ❹ Oil is flushed from its eyes and intestines. ❺ Heavily oiled birds are then wiped with absorbent cloths to remove patches of oil. ❻ Stomach-coating medicines may be administered orally to prevent additional absorption of oil inside the bird's stomach. ❼ The bird is warmed. ❽ It is placed in a quiet area. ❾ Curtains are hung around the area to limit the bird's contact with people.

B. ❶ Once a bird has been brought to a rehabilitation center, basic procedures are followed. ❷ First, the bird is sedated, if necessary, and examined to detect broken bones, cuts, or other injuries. ❸ Next, oil is flushed from its eyes and intestines. ❹ Heavily oiled birds are then wiped with absorbent cloths to remove patches of oil. ❺ Stomach-coating medicines may be administered orally to prevent additional absorption of oil inside the bird's stomach. ❻ The bird is then warmed and placed in a quiet area. ❼ Finally, curtains are often hung around the area to limit the bird's contact with people.

In addition to the linked passives, good flow is also achieved in Text B through the use of several time adverbials that help establish the sequence of events—*once, first, next, then,* and *finally.* (See also the time adverbials in the passage in Task Three.)

implantable devices, environmental monitoring applications, wireless devices for agriculture, and various security and military uses. ⓫ This is because the kinetic energy in these applications is not periodic and occurs less often.

Flow of Ideas in a Process Description

Unit One introduced the concept of flow, focusing mainly on old-to-new information flow, sentence connectors, and summary words. A good flow of ideas can also be achieved by combining or linking verb phrases. In the clouds and fog passage in Task Four (pages 109–110), there were no occasions where two or more passives were linked in the same sentence. Often, however, this may be desirable, as in our example of the flu vaccine.

> Each virus strain is grown separately inside the eggs over the course of several days, after which it is harvested, inactivated, and purified.

Some care needs to be taken when linking verbs in this way because this can sometimes lead to an unfortunate ambiguity. How are these sentences ambiguous, and what can you do about it?

1. The liquid is collected and kept for 24 hours.
2. The sample is collected and stored in a sterile container.
3. In consumer research, individuals are selected and interviewed by telephone.

TASK ELEVEN

Read this text that discusses energy harvesting as a means to achieve a clean power generation process that has a long lifetime. Underline the instances of the passive voice. Then discuss with a partner whether you think passive was the right choice. Notice there are three instances of unattended *this* in the passage. Would you add a noun phrase to any of them? Why or why not?

A Piezoelectric Frequency-Increased Power Generator for Scavenging Low-Frequency Ambient Vibration

Galchev, T., Aktakka, E.E., Kim, H., and Najafi, K. (2010). *IEEE 23rd International Conference on Micro Electro Mechanical Systems*, 1203–1206.

❶ Rapid advances in silicon-based wireless microsystems technology over the past few decades has [sic] led to devices with unprecedented performance and utility with low power consumption. ❷ These technological advancements have led to the recent pervasiveness of wireless technology. ❸ However, for these systems to truly become ubiquitous, the issue of power has to be addressed. ❹ Batteries power most of these devices. ❺ However, they typically cannot last the entire lifetime of the device, and periodic replacement or recharging is needed. ❻ This is preventing different applications of wireless devices from being feasible.

❼ Energy scavenging from ambient sources can enable many new uses for wireless microsystems. ❽ While several ambient energy sources have been explored, kinetic energy is one of the most prevalent [1, 2]. ❾ However, the vast majority of the reported devices are designed to operate at mechanical resonance and at high frequencies (>30 Hz), limiting them to scavenging vibrations from periodic sources such as motors and other man made machinery. ❿ This leaves out a number of applications that are prime candidates for energy scavenging such as wearable or

The *by* + process statements provide no details. Such *by* phrases are typical in published journal articles, especially in the Methods section (see Unit Seven) of articles in the sciences. However, sometimes further information is useful. For instance, when you are writing a paper for a class, it might be to your advantage to make the *by* phrases more informative.

The passive voice allows you to keep the focus on the something other than the agent and also allows you to maintain a good flow of ideas. Thus, it is reasonable to use passive constructions in sections other than a process description.

TASK TEN

Expand these statements, making them more informative by replacing the noun phrase with one or more verb phrases. Here is an example.

Teaching can be improved by in-service training. →
Teaching can be improved by asking teachers to attend a range of short courses throughout much of their careers.

1. **Bacteria found in meat can be killed by radiation.**
2. **Possible harmful effects of drugs can be reduced by testing.**
3. **Information on political preferences can be obtained by polling.**
4. **Cultures are partly preserved by ceremony and ritual.**
5. **Changes in land use can be detected by remote sensing.**
6. **The spread of infectious diseases can be controlled by vaccination programs.**

However, this now looks more like a job specification or duty roster than a process description. If information about the agent is important—which is uncommon—it would be better to describe the process in the following way.

> The virus samples of each selected strain are injected by Technician 1 into separate batches of fertilized eggs to amplify the amount of virus. Each virus strain is grown separately inside the eggs over the course of several days, after which it is harvested, inactivated, and purified by Technician 2. The purified virus strains are then combined by Technician 3 to create the vaccine, which is then blended with a carrier fluid and dispensed into vials.

According to research studies, using *by* + a human agent is rather uncommon in formal academic writing, except when describing the history of the field, as in these examples.

> The theory of transformational grammar was first developed *by Noam Chomsky.*
>
> The Bayesian method has been used *by statisticians* for many years to aid decision making on the basis of limited information.

In fact, we are more likely to find *by* + process or *by* + a non-human agent.

> The impact velocity can be obtained *by calculating* the difference of the arrival times of the two waves.
>
> This enzyme is used *by the cancer cells* to replicate.
>
> The increased mobility provided *by this new joint* allows wearers of the finger prosthesis to hold a cup, to pick up a piece of paper, and in some cases to write again.

Do the three *by* phrases in this next short passage introduce a process or a non-human agent?

> The rate at which heat will be lost by conduction from the body will be determined by the magnitude of the temperature gradient—the steeper the gradient, the greater the heat loss—and the rapidity with which the cooler air in contact with the skin is replaced by colder air.

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>
> Source for flu vaccine content: World Health Organization, 2011, *Manual for the Laboratory Diagnosis and Virological Surveillance of Influenza.* Geneva.

Notice that each sentence now refers to a particular stage in the process: the identification stage, the preparation stage, and the dispensing stage.

What would be the effect if the process were described using the active voice? As you can see from the following passage, the focus on the stages is lost and the emphasis shifts to the agent (the person doing the steps—the researchers or technicians). If the person performing the activity is part of the sentences and becomes the link of familiar or old information, the process itself is backgrounded (less in focus).

> First, researchers identify the virus strains most likely to cause disease and select three for vaccine development. Technicians inject virus samples of each selected strain into separate batches of fertilized eggs to amplify the amount of virus. Technicians grow each virus strain separately inside the eggs over the course of several days, after which they harvest, inactivate, and purify it. The technicians then combine the purified virus strains to create the vaccine, blend it with a carrier fluid and dispense it into vials.

Of course, there may be some occasions when different agents are an important part of different steps in the process.

> Technician 1 injects virus samples of each selected strain into separate batches of fertilized eggs to amplify the amount of virus. Technician 2 grows each virus strain separately inside the eggs over the course of several days, after which the technician harvests, inactivates, and purifies it. Technician 3 then combines the purified virus strains to create the vaccine, blends it with a carrier fluid, and dispenses it into vials.

Selected virus strains	Manufacturers inject the virus samples of each selected strain into separate batches of fertilized eggs to amplify the amount of virus. Each virus strain is grown separately inside the eggs over the course of several days, after which it is harvested, inactivated, and purified.
Inactivated virus strains	The three virus strains are then combined to create the vaccine, blended with a carrier fluid and dispensed into vials.

These steps are descriptive and not intended as a set of instructions. If the goal is to offer instructions, imperative forms are used to indicate the necessary steps, as shown in this example of how to inoculate eggs with the influenza virus.

Inoculation of eggs in flu vaccine development

1. Place eggs into egg trays with the blunt end up, and label eggs with a specific identification number. Allocate 3 eggs for each specimen.
2. Wipe the blunt end of each egg with 70% ethanol and punch a small hole in the shell over the air sac.
3. Aspirate 0.6 ml of processed specimen into a tuberculin syringe with a 22 gauge, 1 1/2-inch needle.
4. Hold the egg up to the candler and locate the embryo. Insert the needle into the hole in the shell and, using a short stabbing motion, pierce the amniotic membrane and inoculate 100 µl of the specimen into the amniotic cavity. Withdraw the needle by about 1/2 inch (1.25 cm) and inoculate 100 µl of the specimen into the allantoic cavity. Remove the needle.

However, if we are interested not in providing guidance for actually performing a particular task, but in explaining how something is done—as in a process—we would be more likely to write this.

> First, the virus strains most likely to cause disease are identified and three are selected for vaccine development. The virus samples of each selected strain are injected into separate

3. Second, wildlife management programs have contributed to growth in the populations of many species of wildlife that are often involved in strikes. For example, the once-endangered Canada goose population has grown by more than 10% each year for the last 30 years. Canada geese and other birds, such as gulls, have expanded into urban and suburban areas, including airports. Third, the number of commercial and non-commercial flights has more than doubled over the last two decades _____.

   a. ; therefore, the parallel increases in wildlife populations and air traffic contribute to a higher probability of a wildlife strike
   b. . This concurrent increase in wildlife populations and air traffic contributes to a higher probability of a wildlife strike
   c. , contributing to a higher probability of a wildlife strike

Language Focus: Passive Voice

In most technical solutions, it is necessary to describe a process or a method. In the passages in Tasks Four and Five, the explanation of how the water is collected provides this necessary information. In addition, when you are describing the method you used to carry out some research, you will essentially be writing a process description. We have looked at adverbs in process descriptions; it is now time to turn to verbs.

The passive voice often plays an important role in process descriptions. We can see why in this example. Look at these brief notes about how influenza vaccines are produced.

Three sample virus strains	The virus strains most likely to cause disease are identified and three are selected for vaccine development.

TASK NINE

Read the passage, which has been divided into three parts. Choose the item that best completes each part. Each of the choices is grammatically correct; however, not all will work equally well. Before making your choices, consider the flow of the entire passage, not just the individual items.

1. Since the onset of air travel in the early 1900s, aircraft collisions with birds and other wildlife have been an ongoing threat to human safety. These collisions, known as wildlife strikes, occur on average nearly 20 times per day and have damaged or destroyed more than 400 aircraft

   _____.

   a. ; as a result, the average cost is $117,787 per incident
   b. , resulting in an average cost of $117,787 per incident
   c. . These collisions have resulted in an average cost of $117,787 per incident

2. Over the last 40 years the number of wildlife strikes has been increasing. Two years ago, 7,600 strikes were reported. Last year that number rose to 8,000. Over the last decade there has been a threefold increase. Several factors have contributed to this growing threat. First, most airlines are replacing older three- or four-engined aircraft with quieter, more efficient aircraft with two engines

   _____.

   a. ; thus, aircraft have less engine redundancy and a greater likelihood of engine failure in a collision with wildlife
   b. , resulting in less engine redundancy and a greater likelihood of engine failure in a collision with wildlife
   c. , which has resulted in less engine redundancy and a greater likelihood of engine failure in a collision with wildlife

4. Users have access to information, thus supporting smarter purchasing decisions that affect a company's bottom line.

_____

_____

5. The propellant evaporates, leaving behind only the desired product.

_____

_____

Re-write each sentence without the *–ing* clause and instead use a traditional linking word or phrase to indicate a causal relationship. See Table 1 on page 37 if you need some ideas.

TASK EIGHT

Combine the ideas presented in each of the statements by using an *-ing* clause of result. Work with a partner.

1. Technical improvements in resource efficiency can lower demand for resources. This results in lower prices.
2. Avatars can use graphics capabilities to build new artifacts individually or collaboratively in real time. This leads to the creation of an effect referred to as "immediacy of artifacts."
3. The payment processing division of the bank announced that its systems had been breached by unknown intruders. Because of this breach, the personal information belonging to about 1.5 million cardholders was compromised.
4. The plants extract nickel and zinc; hence, the soil is left uncontaminated.
5. Rainfall levels plummeted. A slow, but steady, loss of grasses occurred. As a result, the region was transformed into a desert.
6. Countries sign treaties on the use of "free resources" such as air and ocean fish. Serious ownership questions arise; therefore, it is difficult to enforce any agreement.

Optional subordinate clause	When the ABS controller senses that a wheel is about to lock up,
Main clause	it automatically changes the pressure in the brake lines of the car to prevent the lockup,
(optional thus/thereby*)* –ing	(thus) resulting in maximum brake performance.

This structure is particularly useful in problem-solution texts because it can be used to express the next step in the process, a resulting problem, or a resulting solution. Here is a simple example.

Process: Prices rise, thus leading to a drop in demand.

Problem: Prices rise, thus increasing the chance of hyperinflation.

Solution: Prices rise, thus increasing earnings that can then be reinvested in the enterprise.

TASK SEVEN

Read the sentences containing *-ing* clauses of result. Would you expect to find these sentences in the problem, solution, or evaluation part of a text? Discuss your decisions with a partner.

1. **The laser light forms an EM field, thereby slowing the vibration of the atoms.** _____

   _____

2. **When manufacturing output drops, demand for business loans falls, leaving banks with a strong lending capacity.**

   _____

   _____

3. **Contact among humans, livestock, and wildlife may increase, thus creating opportunities for the emergence of new livestock diseases.**

   _____

   _____

Language Focus: *–ing* Clauses to Indicate Cause and Effect

In order to help your reader understand a problem and/or a solution, you may need to use expressions to highlight causes and effects. For example, the well-known relationship between supply and demand in the field of Economics can be conveyed as a cause-and-effect statement. Such statements can take many forms. Here are a few.

An increase in demand *causes* a rise in prices.

The tsunami was *triggered by* a very powerful earthquake.

Researchers worldwide are *increasingly pressured to* publish in English language journals, *thus leading to* a decline in publications written in languages other than English.

The last sentence contains a *thus* + *–ing* clause of result. Such clauses of result can be particularly useful as alternatives to traditional logical connectors like *therefore* and *as a result.* Compare the sentences in each set.

a. The magma flows into the pores of the rocks; as a result, the rocks rupture.

   The magma flows into the pores of the rocks, *thus* causing them to rupture.

b. A current is sent through the material. As a result, the electrons are polarized.

   A current is sent through the material, *thus* polarizing the electrons.

Note that *thus* is optional in *–ing* clauses of result and that sometimes writers also use a preliminary subordinate clause to set the scene for the process.

c. When the ABS controller senses that a wheel is about to lock up, it automatically changes the pressure in the brake lines of the car. As a result, maximum brake performance is achieved.

   When the ABS controller senses that a wheel is about to lock up, it automatically changes the pressure in the car's brake lines to prevent the lockup, (*thus*) resulting in maximum brake performance.

The fog harvesting texts discuss some causes and effects, the topic of the next Language Focus (pages 115–116). Before exploring cause and effect in more detail, we turn your attention to Task Six.

TASK SIX

Work with a partner and underline the language that establishes a cause-and-effect connection.

⓱ Despite the success of fog harvesting in Chungungo, the system is, unfortunately, no longer in use (de la Lastra, 2002). ⓲ The availability of water led to a tripling of the population from 300 to 900, putting pressure on the water supply (IDRC, 2003). ⓳ Because the community lacked a clear commitment to the project (see Diehl, 2010, for a full explanation), they did not add new nets to increase the water supply, and instead petitioned for water to be piped in from 20 km away. ⓴ Although the village abandoned this viable alternative technology, the Chungungo experience has led to successful implementation of fog harvesting initiatives in other mountainous coastal areas of Chile, Ecuador, Mexico, and Peru, providing much needed fresh water to small communities.

You likely noticed *because* and the verb phrase *led to* as a means to show a cause and effect, but perhaps less familiar to you are *–ing* verbs that can also be used to establish a causal connection.

1. How would you describe the information given in the first two sentences? Would you say it is common knowledge, knowledge familiar to most journal readers, or expert knowledge? What does the inclusion of this information perhaps reveal about the authors' assumptions regarding potential readers?

2. What similarities and/or differences in terms of content do you see between the text in Task Four and this text? Why do you suppose these differences exist?

3. At the end of the excerpt from the article, the authors describe how the water reaches the users. What verb tense did they use? How does this compare to the process description in Task Four?

4. Think about the word *fog*. Is this word typically count or non-count? The excerpt uses a plural form.

   Fogs produced by the advection of clouds over higher terrain tend to have higher liquid contents (8) than do fogs produced at the land or sea surface (9) and it is these high elevation fogs that are of primary interest for the production of water in arid lands.

   What do you think about the use of *fogs*? Why did the authors use it?

5. One way to expand your academic vocabulary is to identify expressions that you think would contribute to your own writing. These are usually chunks of language (2 to 4 words) that do not convey original content but are like skeletons upon which you can build a point or an idea. One such expression in the first paragraph is "____ *produced by* ____ *tend to* ____." Using this stretch of language as a starting point, students from various fields could write these sentences.

   Layering *produced by* deformation *tends to* have sharply defined dark and light layers.

   The vinegar *produced by* this method *tends to* be of inferior quality due to uncontrolled conditions.

   The introduction of technologies *produced by* research *tends to* be a minor source of innovation in industry.

   Can you find any phrases in the excerpt that you might be able to use in your own writing?

TASK FIVE

Read the text and discuss the questions on page 113 with a partner.

Fog-Water Collection in Arid Coastal Locations

Schemenauer, R. S., and Cereceda, P. (1991).
Ambio, 20(7), 303–308.

FOG HARVESTING

Fog is composed of liquid droplets. Fog, in the simplest terms, is a cloud which is touching the ground and the type of fog is determined by the physical process which has created the fog. When a cloud with a base some distance above the sea or the land moves over a mountain, the mountain is covered by fog. Fogs produced by the advection of clouds over higher terrain tend to have higher liquid contents (8) than do fogs produced at the land or sea surface (9) and it is these high elevation fogs that are of primary interest for the production of water in arid lands.

The collection of fog droplets depends on the diameter of the droplets, the wind speed and nature of the collection surface. Fog droplets have diameters which are typically from 1 to 3μm in diameter. The mean volume diameters at the high elevation (780 m) site in Chile are in the 8 to 12μm range and droplet concentrations are typically 100 to 400 per cm^3. Fog droplets are collected by a simple impaction process. An object (collector) is placed in the path of the droplets and as the droplets approach the surface, some flow around the object and some strike the surface. Enormous numbers of fog droplets must be collected since it requires about 10 million to a drop the size of a match head.

The efficiency of the large polypropylene meshes used in Chile has been both measured in the field and modeled (10). The meshes are woven from a flat polypropylene fibre 1 mm wide and 0.1 mm thick into a mesh with triangular openings approximately 1 cm on a side. A double layer of mesh is used in Chile. The collection efficiency at the center of a 12 m by 4 m collector was found to increase with wind speed up to 3.5 m s^{-1} (the upstream wind speed) and then remained constant at about 65%. But the collector as a whole has a lower efficiency of closer to 20% due to lowered efficiencies away from the center of the mesh and due to water losses in the system. The array of fog water collectors is completely passive. Water drips from the bottom of the meshes into plastic troughs and then a gravity flow system delivers the water through a network of pipes to the point of use.

9. As you may have noticed, the passage is a bit short on details. Put a check mark (✓) next to the details you think would help the writer create a text that displays expertise and familiarity with the topic. Some details are better candidates than others. Where in the passage would you place the details?

   ____ a. the dimensions of the nets
   ____ b. the brand name of the netting
   ____ c. where the netting can be purchased
   ____ d. the method of connecting the mesh to the posts
   ____ e. the time of day the fog comes in
   ____ f. the size of the fog water droplets
   ____ g. a description of the post material
   ____ h. the trough material
   ____ i. the storage tank materials and dimensions
   ____ j. the duration of the fog season
   ____ k. the time needed to construct the system

10. This passage could be extended to provide information on maintenance of the fog collection system. This would include a discussion of the importance of regular inspection, cleaning, and repair of the nets, troughs, and tanks. Where would you place this information?

11. Where might you add the following information about cost?

    > The cost of operating and maintaining the system, which averages nearly $12,000 annually, is quite low compared to other means of providing water.

12. What is your reaction to the discussion of the eventual failure of the water collection system in Chile?

We were in fact able to locate a published journal article written by two of the researchers who promoted the fog harvesting system. The full article was published in a journal called *Ambio*, a multidisciplinary journal focusing on topics ranging from Ecology and Hydrology to Environmental Economics and Meteorology. Task Five provides the section that describes fog harvesting.

⑰ Despite the initial success of fog harvesting in Chungungo, the system is, unfortunately, no longer in use (de la Lastra, 2002). ⑱ The availability of water led to a tripling of the population from 300 to 900, putting pressure on the water supply (IDRC, 2003). ⑲ Because the community lacked a clear commitment to the project (see Diehl, 2010, for a full explanation), they did not add new nets to increase the water supply, and instead petitioned for water to be piped in from 20 km away. ⑳ Although the village abandoned this viable alternative technology, the Chungungo experience has led to successful implementation of fog harvesting initiatives in other mountainous coastal areas of Chile, Ecuador, Mexico, and Peru, providing much needed fresh water to small communities.

1. This passage has three paragraphs rather than four. Why?
2. This passage contains a process description in Paragraph 2. Make a sketch or timeline of the process.
3. What is the predominant verb tense used in Sentences 7 through 16? Why is this?
4. Underline the instances of passive voice in Paragraph 2. Why was passive used?
5. Underline the adverbs in Paragraph 2. How many of them are mid-position adverbs?
6. Identify the phrases consisting of *this* + noun in the text. How many are *this* + summary? Does the placement of *this* + summary noun tell us anything?
7. How is the solution introduced?
8. In the end, what is the overall evaluation of the system? What evaluative language can you find in the final paragraph?

TASK FOUR

Read the passage and answer the questions on pages 110–111. The passage is a problem-solution text about an area in Chile that has a desert climate—the Atacama Desert.

Clouds and Fog as a Source of Water in Chile

❶ Many of Chile's poor, northern coastal villages have suffered for years from water shortages, despite the abundance of cloud cover and fog in the region. ❷ When the cold air from the Pacific Ocean's Humboldt Current mixes with the warm coastal air, a thick, wet fog, called *camanchaca* by the Andes Indians, forms along with clouds (Darak, 2008). ❸ However, rather than developing into rain, the fog and clouds quickly evaporate in the hot sun. ❹ This lack of rainfall has imposed severe hardships on communities. ❺ They cannot grow crops and must carefully ration their water, which is often delivered by truck.

❻ To address this problem scientists in the 1990s implemented an interesting solution on El Tofo mountain near the village of Chungungo. ❼ Using conventional technology, they redevised a centuries-old method to capture the water droplets of the fog in a process referred to as fog harvesting (Schemenauer and Cereceda, 1991). ❽ In this method, triangular-weave polypropylene nets are attached to support posts to serve as water collectors. ❾ Each of these nets is designed to collect approximately 40 gallons of water each day. ❿ When the fog develops, droplets of water are trapped in the nets and join to form larger drops that then fall into a trough. ⓫ From the troughs the water drains through filters into a series of underground tanks. ⓬The water is then piped to a 25,000-gallon storage tank, where it is chemically treated to kill disease-causing organisms. ⓭ Finally, the water flows to individual households, just as in traditional water systems. ⓮This collection system can supply as much as 2,500 gallons per day, enough for a small community to drink, wash, and water small gardens. ⓯The water is not only clean, but far less expensive than water delivered to the area. ⓰ Moreover, it is collected at no apparent cost to the environment.

1. **Which sentences indicate the beginnings of the four parts of a problem-solution text: situation, problem, solution, evaluation?**
2. **If you were to divide this paragraph into two, where would you divide it? Would you opt for two paragraphs or three? Why?**
3. **Can you produce a version of an opening sentence from your own discipline using the following phrase?**

   The problem of . . . was suggested as residing in . . . .

4. **Underline all the time expressions in the passage. What conclusions can you draw?**
5. **What is your opinion regarding the dominance of English in publication? What kinds of studies would, in your opinion, actually resolve the debate?**
6. **Do you have information to share about the language policies of journals in another country?**

Procedures and Processes

The text on the role of English is a typical research question example of a problem-solution text. In essence, it uses the problem-solution structure to review the current state of knowledge. This review approach allows the author to raise a question about the current state of knowledge and to offer a possible or partial answer. However, some "classic" problem-solution texts are more technical in nature and may describe procedures and processes. We see this in the passage in Task Four.

TASK THREE

Now consider this passage and answer the questions on page 108.

The Role of English in Research and Scholarship

❶ The problem of accurately assessing the role of English in contemporary research has been suggested as residing in the pro-Western and pro-Anglophone bias in major databases such as the Web of Science. ❷ Thus, to more accurately determine the predominance of English as the language of research and scholarship, studies have examined published articles describing small-scale empirical research papers. ❸ These early examinations of small studies suggested that the role of English was exaggerated. ❹ They concluded that "a more accurate percentage for English as the language of publication would be around 50% rather than 80%." ❺ These studies, however, failed to recognize that over the last thirty years many leading European (and Japanese) journals have switched from publishing in German, French, Dutch, Swedish, Japanese, etc., to new editorial policies that increasingly require submissions written in English. ❻ As long ago as 1978, Lippert listed 33 German journals from the health and life sciences which by 1977 had changed their titles and editorial policies from German to English. ❼ More recently, comparable accounts have been produced for German chemistry (Wood, 2001), Swedish medical research (Gunnarsson, 1998), and French geology (Dressen, 2002). ❽ This new data, together with studies showing the increasing Anglicization of doctoral dissertations in many countries, now suggests that the figure of 80% (or higher) may be more accurate than previously believed. ❾ Even so, there is also evidence that the dominance of English may be causing a counterreaction, especially in situations where local concerns and interests encourage publication in local languages. ❿ Rey-Rocha & Martin-Sempere (1999), for example, have shown this to be the case for earth scientists in Spain. ⓫ Clearly, further research is necessary to fully understand the dominance of English in academia.

TASK TWO

Find a single adverb to replace the phrase in italics and then place the adverb in mid-position.

1. The provisions of the law must be applied *with care.*
2. Part II of this paper describes the laws of the U.S. that pertain to agricultural biotechnology *in only a couple of paragraphs.*
3. Myopia, which is referred to as shortsightedness *most of the time,* is a common cause of visual disability throughout the world.
4. This study revealed that American and Japanese thresholds for sweetness and saltiness did not differ *a lot.*
5. *As a rule,* pulsed semiconductor lasers do not use the broad gain bandwidth to full advantage in the generation of subpicosecond pulses.
6. Environmental managers are faced with having to determine the extent of environmental contamination and identifying habitats at risk *on a regular basis.*
7. The water supply lines must be inspected to prevent blockages *now and then.*
8. Although many elaborations of this model have been developed over the years, *to a considerable extent* all of them have followed the traditional specification in presupposing that an individual will choose to make a tax report.

The text on novice writers includes a few references to other published papers to support the claims (Sentences 7 and 11–13). Whether and why to include references is a matter of some complexity and is dealt with in Unit Eight. Here we simply point out that a well-placed and well-chosen reference can give credibility to your points. In this next task, pay attention to the references and consider why they were included.

Language Focus: Mid-Position Adverbs

In the section on style in Unit One (beginning on page 14), we noted that adverbs tend to occur within or near the verb in formal academic writing. In this Language Focus, we develop the point further. First, look at this occurrence from the text in Task One (Sentence 2).

> . . . scientific writing involves the consideration of numerous factors, while building up an argument that would convince readers and *possibly* enable them to arrive at a decision.

You might wonder why it matters where the adverb is placed. After all, you could, following the rules of grammar, place *possibly* at the beginning or the end of the main clause.

> . . . *possibly* scientific writing involves the consideration of numerous factors, while building up an argument that would convince readers and enable them to arrive at a decision.

> . . . scientific writing involves the consideration of numerous factors, while building up an argument that would convince readers and enable them to arrive at a decision *possibly.*

While grammatically acceptable, the placement of adverbs in sentence-initial position in written academic texts is rather uncommon (Virtanen, 2008). More importantly, if the adverb is in sentence-final position, this may have an unintended effect on the reader. Specifically, if you recall from Unit One, the old-to-new pattern of information flow places the new information at the end of the sentence. Information at the end is therefore a reasonably good candidate for the beginning focus of the next sentence (Virtanen, 2008). In our example, then, the placement of *possibly* at the end could create the expectation that the next sentence will explore why the authors are not fully committed to the point.

> . . . scientific writing involves the consideration of numerous factors, while building up an argument that would convince readers and enable them to arrive at a decision *possibly.*
> While some readers . . . , other readers . . . .

Alternatively, it might suggest that the author is not convinced by the point just made. Thus, the placement of the adverb can influence your reader's ability to anticipate the development of your ideas.

5. Put a check mark (✓) next to the aspects of the text that contribute to the authors' attempts to convince you. How convinced are you that novices should receive instruction in scientific writing?

   ____ a. the problem-solution organization

   ____ b. the flow of ideas

   ____ c. references to other published papers (indicated by the superscripted numbers at the ends of some of the sentences)

   ____ d. claims that are stated cautiously (see Unit Four)

   ____ e. the explanation of the causes of the writing challenges

6. Where do you think the authors are more convincing? Is it in stating the problem or in suggesting the solution? Why?

7. Put a check mark (✓) next to the items that you think could strengthen the text and would lend support to the argument.

   ____ a. a quote from a study that shows the progress of science is slowed because researchers do not write up their work

   ____ b. some statistics indicating that writing instruction is beneficial

   ____ c. some data on the relationship between writing (publishing) and career advancement

   ____ d. an explanation of the writing to learn movement mentioned in Sentence 11

8. Do you have any experience of your own to contribute to the discussion? Have you been involved in a publication? Would you agree or disagree with the authors' point that scientific writing involves the creation of an argument?

2. **The passage includes the four parts of the standard problem-solution text, as shown in Table 2. Which sentences belong to each part? What is the general point being discussed in each part?**

TABLE 2. Parts of a Problem-Solution Text

Situation	background information on a particular set of circumstances	
Problem	reasons for challenging the accuracy of the figures; criticisms of or weaknesses surrounding the current situation; possible counterevidence	
Solution	discussion of a way or ways to alleviate the problem	
Evaluation	assessment of the merits of the proposed solution(s)	

Note that sometimes an incomplete solution is offered; an incomplete solution may introduce a new problem, which then needs to be addressed. This type of text may look different (see Table 3).

TABLE 3. Variation of a Problem-Solution Text

Situation	background information on a particular set of circumstances
Problem	reasons for challenging the accuracy of the figures; criticisms of or weaknesses surrounding the current situation; possible counterevidence
Partial solution	discussion of a way or ways to alleviate the problem
Evaluation	assessment of the merits and limitations of the proposed solution(s)
New solution	discussion of a new way or ways to alleviate the problem
Evaluation	assessment of the merits of the proposed solution(s)

3. **Do you agree or disagree with the opening sentence? Why or why not? What would be the reaction if the statement were about a field other than biomedicine? Why do you suppose the authors chose this as their starting point?**

4. **What is your reaction to the point made in Sentence 7?**

❻ The ability to accurately and effectively communicate ideas, procedures, and findings according to readers' expectations is the primary skill required for scientific writing. ❼ Additionally, skills such as the ability to relate and interlink evidence, to lend permanence to thoughts and speech, to enable one's writing to serve as a future reference to others, and to protect intellectual property rights[1] need to be developed and tempered* over a period of time. ❽ These skills are necessary for all researchers, but especially for novice researchers in the beginnings of their careers so that they do not face failure and lose valuable time learning these skills later.

❾ Individuals entering the research field with no or little experience with past publications qualify as novice researchers. ❿ Even clinicians intending to explore and publish findings about research questions based on their clinical practice need to learn these skills to effectively contribute to health care.

⓫ Instruction in scientific writing and subsequent publication in peer-reviewed journals will help novice researchers refine their ideas and increase their expertise, because the act of writing is itself a valuable tool for learning and for fostering the scientific thought process[2]—this aligns with the principles of the writing to learn movement.[3,4] ⓬ Effective writing skills help new scientists take part in the ongoing, ever-evolving scientific conversation.[5] ⓭ The practice of scientific writing develops habits of reflection[2] that make for better researchers, and publication in respected journals strengthens the scientific process, while playing a crucial role in career advancement.

*made stronger through experience.

The Structure of Problem-Solution Texts

We begin this unit with a passage on a topic that is likely of interest to you and others who want or perhaps need to publish. Although it is written from the perspective of research in Biomedicine, we think it raises some points that are relevant for all junior scholars.

TASK ONE

This passage discusses the need for junior scholars or novices to receive training in scientific writing. Before you read, discuss the first question with a partner.

1. **How important is it for you to publish in journals in your field? Why? What are some challenges that novices may face?**

Scientific Writing of Novice Researchers: What Difficulties and Encouragements Do They Encounter?

Shah, J., BA, MS; Shah, A., MD, MPH; Pietrobon, R., MD, PhD, MBA. (2009). *Academic Medicine, 84*, 511–516.

❶ Clear communication of research findings is essential to sustain the ever-evolving biomedical research field. ❷ Serving as the mainstay for this purpose, scientific writing involves the consideration of numerous factors, while building up an argument that would convince readers and possibly enable them to arrive at a decision. ❸ Those who report research must attend to the soundness of the subject matter, to the nature of the intended audience, and to questions of clarity, style, structure, precision, and accuracy. ❹ These factors, along with the weight of responsibility to the scientific community, make scientific writing a daunting task. ❺ Consequently, many researchers shy away from this critical element of research, which may impede the progress of science and their own scientific careers.

Unit Three

Problem, Process, and Solution

In Unit Two we mainly explored one common kind of underlying structure to academic writing, that of general-specific movement. This structure will prove useful in later units when producing data commentaries (Unit Four) or writing introductions to research papers (Unit Eight). In this unit, we explore and practice a second underlying structure in academic writing, that of problem-to-solution (PS) movement, which we introduced briefly in Unit One and touched on in Unit Two. This structure will again prove useful later when writing critiques (Unit Six) and Introductions (Unit Eight). So, clearly this structure is one of the more important ones in academic writing, especially if you consider how much academic research activity is aimed at solving problems, which may be discussed in published research articles, various kinds of research proposals, and case reports in certain fields, to name a few examples. Beyond looking at the overall organization, we have built into the problem-solution structure some discussion of process descriptions. In many cases, it makes sense to see describing the parts of a process as the steps required to provide a solution to some problem. Alternatively, a problem may be described in terms of a process—for example, how malware infects a mobile phone or how a tsunami (tidal wave) forms.

As we have seen, general-specific passages tend to be descriptive and expository. In contrast, problem-solution texts tend to be more argumentative and evaluative. In the former, students and junior scholars will most likely position themselves as being informed and organized and in the latter as questioning, perceptive, and convincing. We say this because you may need to convince your reader that your problem is indeed a problem and/or that your solution is reasonable.