

Paragraph**Collective Behavior**

► Many types of animals combine the advantages of family association with those conferred by membership in still larger groups. Bees congregate in hives; some fish move in schools; ants gather in crowds; wolves live in packs; and so on. This type of coordinated, or collective, behavior gives animals some of these distinct advantages over other species that rely on more solitary behaviors. While defense of the group is a clear benefit for animals that gather in groups, another way collective species profit is through their system of foraging for food. Congregational species have developed methods, ranging from straightforward to complex, of searching for, obtaining, and transporting nutrients back to the "home" spot.

► The behavior in which a group of social animals (or insects) imitates or copies the behavior of others is referred to as allomimetic. During this behavioral activity, one member, or a small group, of the species discloses info about food source. Through signals, the animals tend to give species location of the nutrients source and communicated to a larger group of the community. This group follows the signal to the food source, and if required, in turn communicates the location to yet another group. For example, bee colonies often send out small groups of bees that scout—look for—flowers that contain the essential nutrients they require. These scouts then return to the hive and through a complicated "dance" communicate the location of the flowers to others in the hive that can use the scout's information to obtain their own food. Allomimetic is a commonly observed phenomenon in studies of insects such as bees, ants, and others.

► Scientists and other experts have long assumed that certain collective species follow allomimetic almost exclusively, but this is inaccurate. The original assumption resulted in the adoption of set parameters to describe this group behavior. Actions that fell within the parameters were assumed to be allomimetic, while those that did not were not. This behavior, yet, this is, in fact, not the case. More recent research by scientists indicates that allomimetic is not always the prevalent form of behavior for collective groups; individuals within these species do, at times, differ in their actions, even when working toward the common purpose of acquiring nutrients. Thus, foraging behaviors have now been more accurately categorized into what are known as exploratory and sedentary strategies.

► The differentiation of foraging strategies within a particular group seems to depend on factors such as the availability of adequate nutrients in the food supply. In other words, when a species detects an imbalance in nutrients, either instinctively, or through other natural mechanisms, their foraging strategy adapts in an attempt to compensate for this lack. For some members of a species, this displays itself through a more active role in searching for food; whereas in others, it results in a more passive reaction.

► One species that has been studied in some detail regarding this phenomenon is the active caterpillar. When food source is adequately balanced, this species follows the pattern of allomimetic; each member of the group maintains a consistent level of foraging activity with others in the search for food. In contrast, when the source becomes imbalanced the species separates into two distinguishable categories of foragers: exploratory and sedentary. The observation of this phenomenon is fascinating, in that it shows behavior contradictory to what might be assumed. The more active caterpillars, the ones that take responsibility for finding food, spend less time consuming nutrients than their less active counterparts. These sedentary caterpillars move more moderately than the active caterpillars, yet they take in more food.

► While it may seem that the more passive caterpillars take advantage of the active caterpillars, this is not the case. The active caterpillars are more important for group cohesion. One study, at least, suggests that colonies consisting of more active, as opposed to passive, caterpillars demonstrate less unity within their groups than when there are more passive than active ones. Apparently, because the active caterpillars tend to divide their resources among various plants to find nutrients, they lose focus on the group as a whole. On the other hand, the more sedentary caterpillars usually focus on one food source at a time. Therefore, they are able to keep the groups within the colony intact. Consequently, it seems a balanced proportion of active and passive caterpillars in a colony ensure that both the nutritional and communal needs of the colony are met.

1. The word "those" in paragraph 1 refers to
 - types
 - animals
 - advantages
 - group
2. The word "they" in paragraph 2 refers to
 - small groups
 - flowers
 - nutrients
 - bee colonies
3. The word "others" in paragraph 2 refers to
 - studies
 - insects
 - bees
 - ants
4. The word "their" in paragraph 3 refers to
 - collective groups
 - species
 - scientists
 - individuals
5. The phrase "this lack" in paragraph 4 refers to
 - imbalance in nutrients
 - natural mechanisms
 - foraging strategy
 - attempt
6. The word "what" in paragraph 5 refers to
 - foragers
 - observation
 - phenomenon
 - behavior
7. The word "ones" in paragraph 6 refers to
 - resources
 - colonies
 - caterpillars
 - groups
8. The word "they" in paragraph 6 refers to
 - active caterpillars
 - resources
 - groups
 - sedentary caterpillars

Paragraph**The Smartphone Revolution**

► Smartphones have rapidly increased their dominance in the mobile phone market in recent years, accounting for more than half of all mobile phones sold globally. These multifunctional devices have revolutionized the way in which users communicate, correspond, and interact with the world, and others, around them. Since smartphones have combined the tasks of previously separate devices into one exceptionally efficient product, their appeal to consumers cannot be overestimated. Prior to the modern development of the smartphone, people required a combination of machines, such as computers, calculators, and phones, to perform a variety of functions to accomplish all of the functions that are currently handled with a single piece of technology.

► While smartphones have only been in existence since the 1990s, the original concept was introduced in 1973 by Theodosios Paraskevopoulos. In that year, the innovative entrepreneur obtained a patent for his idea of uniting the functions of data processing activities, intelligent applications, and visual displays with those of a telephone. At that time, Paraskevopoulos made note of such tasks as banking and bill paying in his outline; two commonplace activities many users today perform with their smartphones. Paraskevopoulos may have come up with his concept of an advanced phone as a result of his earlier success with transmitting electronic data through telephone lines, a process that became the foundation for the "Caller ID [identification]" function available on virtually all contemporary phones. Since beginning his engineering work in 1968, Paraskevopoulos has obtained over 20 patents worldwide which are based on this technology.

► Despite the fact that it took almost 20 years to bring the first smartphone to market, once it appeared, subsequent generations of enhanced versions have emerged with increasing functionality, offering a variety of functions of kinds found in such phones. In 1992, the IBM Corporation demonstrated a prototype of a phone that incorporated PDA capabilities with traditional phone functions. A couple of years later, an improved version was put on the market for the public. By this time, several competitors were working on their own adaptations of what would later be called a "smartphone," and by the end of the first decade of the twenty-first century, the popularity of the smartphone approached that of its predecessor, the "feature phone."

► Though mobile phones are divided into three categories—those that provide only basic phone and text services, feature phones, and smartphones—the line between a feature phone and a smartphone is somewhat blurred. In general, a feature phone differs from a smartphone in that it provides access to less functions than the smartphone does, although it does have a variety of functions over and above those of a basic mobile phone. One of the challenges of distinguishing between feature phones and smartphones is that, with the rapid evolution of successive generations of phones, the features exclusive to yesterday's smartphones are often found on today's feature phones. So while modern feature phones may still be behind in terms of the capabilities of their smartphone contemporaries, they may in fact be more advanced than smartphones of just a few years ago. For example, in the early part of the first decade of the twenty-first century, functions such as GPS (Global Positioning System) and Wi-Fi (Wireless Fidelity) access belonged solely to smartphones, whereas, by the end of that decade, many feature phones had evolved to include these functions.

► One of the main ways people agree differentiates smartphones from feature phones is the use of "apps," application programs designed specifically for the individual operating systems of smartphones. These apps are programs that can be downloaded directly onto the smartphone, or downloaded through a website. Apps have become one of the most popular features of smartphones in recent years, and cover a wide range of fields. Some apps, such as word processing or spreadsheet programs, help users complete tasks. Other apps provide information, such as weather or location. Still others are a source of entertainment, allowing for books and music to be downloaded, or for games to be played on the smartphone screen. For example, Angry Birds, one of the most popular apps on the market when it was created, was a game first devised for the Apple iPhone. Its enormous fame led to versions being devised for other smartphone operating systems, and then for other devices, such as computers and gaming consoles.

9. The word "their" in paragraph 1 refers to
 - smartphones
 - tasks
 - separate devices
 - consumers
10. The word "those" in paragraph 2 refers to
 - intelligent applications
 - functions
 - data processing activities
 - displays
11. The word "this technology" in paragraph 2 refers to
 - contemporary phones
 - telephone lines
 - electronic data
 - Caller ID
12. The phrase "an improved version" in paragraph 3 refers to
 - a variety
 - a phone
 - a PDA
 - a prototype
13. The word "its" in paragraph 3 refers to
 - the first decade
 - the public
 - the smartphone
 - the feature phone
14. The word "they" in paragraph 4 refers to
 - feature phones
 - capabilities
 - contemporaries
 - functions

When you are reading, always practice connecting pronouns and adjectives to their referents. This helps with general comprehension as well as with answering referent questions.