

In their study of whether offering a guarantee of service quality will encourage customers to visit a particular restaurant, Tucci and Talaga have found that the effect of such guarantees is mixed. For higher-priced restaurants, there is some evidence that offering a guarantee increases the likelihood of customer selection, probably reflecting the greater financial commitment involved in choosing an expensive restaurant. For lower-priced restaurants, where one expects less assiduous service, Tucci and Talaga found that a guarantee could actually have a negative effect: a potential customer might think that a restaurant offering a guarantee is worried about its service. Moreover, since customers understand a restaurant's product and know what to anticipate in terms of service, they are empowered to question its quality. This is not generally true in the case of skilled activities such as electrical work, where, consequently, a guarantee might have greater customer appeal.

For restaurants generally, the main benefit of a service guarantee probably lies not so much in customer appeal as in managing and motivating staff. Staff members would know what service standards are expected of them and also know that the success of the business relies on their adhering to those standards. Additionally, guarantees provide some basis for defining the skills needed for successful service in areas traditionally regarded as unskilled, such as waiting tables.

The primary purpose of the passage is to

- A.

question the results of a study that examined the effect of service-quality guarantees in the restaurant industry

- B.

discuss potential advantages and disadvantages of service-quality guarantees in the restaurant industry

- C.

examine the conventional wisdom regarding the effect of service-quality guarantees in the restaurant industry

- D.

argue that only certain restaurants would benefit from the implementation of service-quality guarantees

- E.

consider the impact that service-quality guarantees can have on the service provided by a restaurant

One proposal for preserving rain forests is to promote the adoption of new agricultural technologies, such as improved plant varieties and use of chemical herbicides, which would increase productivity and slow deforestation by reducing demand for new cropland. Studies have shown that farmers in developing countries who have achieved certain levels of education, wealth, and security of land tenure are more likely to adopt such technologies. But these studies have focused on villages with limited land that are tied to a market economy rather than on the relatively isolated, self-sufficient communities with ample land characteristic of rain-forest regions. A recent **study** of the Tawahka people of the Honduran rain forest found that farmers with some formal education were more likely to adopt improved plant varieties but less likely to use chemical herbicides and that those who spoke Spanish (the language of the market economy) were more likely to adopt both technologies. Nonland wealth was also associated with more adoption of both technologies, but availability of uncultivated land reduced the incentive to employ the

productivity-enhancing technologies. Researchers also measured land-tenure security: in Tawahka society, kinship ties are a more important indicator of this than are legal property rights, so researchers measured it by a household's duration of residence in its village. They found that longer residence correlated with more adoption of improved plant varieties but less adoption of chemical herbicides.

The passage suggests that in the study mentioned in highlight the method for gathering information about security of land tenure reflects which of the following pairs of assumptions about Tawahka society? (yellow)

- A.

The security of a household's land tenure depends on the strength of that household's kinship ties, and the duration of a household's residence in its village is an indication of the strength of that household's kinship ties.

- B.

The ample availability of land makes security of land tenure unimportant, and the lack of a need for secure land tenure has made the concept of legal property rights unnecessary.

- C.

The strength of a household's kinship ties is a more reliable indicator of that household's receptivity to new agricultural technologies than is its quantity of nonland wealth, and the duration of a household's residence in its village is a more reliable indicator of that household's security of land tenure than is the strength of its kinship ties.

- D.

Security of land tenure based on kinship ties tends to make farmers more receptive to the use of improved plant varieties, and security of land tenure based on long duration of residence in a village tends to make farmers more receptive to the use of chemical herbicides.

- E.

A household is more likely to be receptive to the concept of land tenure based on legal property rights if it has easy access to uncultivated land, and a household is more likely to uphold the tradition of land tenure based on kinship ties if it possesses a significant degree of nonland wealth.

The argument for "monetizing"—or putting a monetary value on—ecosystem functions may be stated thus: Concern about the depletion of natural resources is widespread, but this concern, in the absence of an economic argument for conservation, has not translated into significant conservational progress.

Some critics blame this impasse on **environmentalists**, whom they believe fail to address the economic issues of environmental degradation. Conservation can appear unprofitable when compared with the economic returns derived from converting natural assets (pristine coastlines, for example) into explicitly commercial ones (such as resort hotels). But according to David Pearce, that illusion stems from the fact that "services" provided by ecological systems are not traded on the commodities market, and thus have no readily quantifiable value. To remedy this, says Pearce, one has to show that all ecosystems have economic value—indeed, that all ecological services are economic services. Tourists visiting wildlife preserves, for example, create jobs and generate income for national economies; undisturbed forests and wetlands regulate water runoff and act as water-purifying systems, saving millions of dollars worth of damage to property and to marine ecosystems. In Gretchen Daily's view, monetization, while unpopular with many environmentalists, reflects the dominant role that economic considerations play in human behavior, and the expression of economic value in a common currency helps inform environmental

decision-making processes.

Information in the passage suggests that David Pearce would most readily endorse which of the following statements concerning monetization?

- A.

Monetization represents a strategy that is attractive to both environmentalists and their critics.

- B.

Monetization is an untested strategy, but it is increasingly being embraced by environmentalists

- C.

Monetization should at present be restricted to ecological services and should only gradually be extended to such commercial endeavors as tourism and recreation.

- D.

Monetization can serve as a means of representing persuasively the value of environmental conservation.

- E.

Monetization should inform environmental decision-making processes only if it is accepted by environmentalist groups.

Which of the following can be inferred from the passage concerning the environmentalists mentioned in line 8? (red)

- A.

They are organized in opposition to the generation of income produced by the sale of ecological services.

- B.

They are fewer in number but better organized and better connected to the media than their opponents.

- C.

They have sometimes been charged with failing to use a particular strategy in their pursuit of conservational goals.

- D.

They have been in the forefront of publicizing the extent of worldwide environmental degradation.

- E.

They define environmental progress differently and more conservatively than do other organized groups of environmentalists.

Historians remain divided over the role of banks in facilitating economic growth in the United States in the late eighteenth and early nineteenth centuries. Some scholars contend that banks played a minor role in the nation's growing economy. Financial institutions, they argue, appeared only after the economy had begun to develop, and once organized, followed conservative lending practices, providing aid to established commercial enterprises but shunning those, such as manufacturing and transportation projects, that were more uncertain and capital-intensive (i.e., requiring greater expenditures in the form of capital than in labor).

A growing number of historians argue, in contrast, that banks were crucial in transforming the early national economy. When state legislatures began granting more banks charters in the 1790s and early 1800s, the supply of credit rose accordingly. Unlike the earliest banks, which had primarily provided short-term loans to well-connected merchants, the banks of the early nineteenth century issued credit widely. As Paul Gilje asserts, the expansion and democratization of credit in the early nineteenth century became the driving force of the American economy, as banks began furnishing large amounts of capital to transportation and industrial enterprises. The exception, such historians argue, was in the South; here, the overwhelmingly agrarian nature of the economy generated outright opposition to banks, which were seen as monopolistic institutions controlled by an elite group of planters.

Much research has been devoted to investigating what motivates consumers to try new products. Previous consumer research suggests that both the price of a new product and the way it is advertised affect consumers' perceptions of the product's performance risk (the possibility that the product will not function as consumers expect and/or will not provide the desired benefits). Some of this research has concluded that a relatively high price will reduce a consumer's perception of the performance risk associated with purchasing a particular product, while other studies have reported that price has little or no effect on perceived performance risk. These conflicting findings may simply be due to the nature of product advertisements: a recent study indicates that the presentation of an advertised message has a marked effect on the relationship between price and perceived performance risk.

Researchers have identified consumers' perception of the credibility of the source of an advertised message – i.e. the manufacturer-as another factor affecting perceived performance risk: one study found that the greater the source credibility, the lower the consumer's perception of the risk of purchasing an advertised new product. However, past research suggests that the relationship between source credibility and perceived performance risk may be more complex: source credibility may interact with price in a subtle way to affect consumers' judgments of the performance risk associated with an advertised product.

Arboria is floundering in the global marketplace incurring devastating losses in market position and profits. The problem is not Arboria's products, but Arboria's trade policy. Arboria faces the prospect of continuing economic loss until Arborian business and political leaders recognize the fundamental differences between Arborian and foreign economic systems. Today the key trade issue is not free trade versus protectionism but diminishing trade versus expanding trade.

Arboria is operating with an obsolete trade policy, an artifact of the mid-1940s when Arboria and Whorfland dominated the global economy, tariffs were the principal obstacle to trade, and Arborian supremacy was uncontested in virtually all industries. In the intervening decades, economic circumstances have shifted radically. Arborian trade policy has not.

Today, Arboria's trade policy seems paralyzed by the relentless conflict between proponents of "free" and

"fair" trade. The free traders argue that Arborian markets should be open, and the movement of goods and services across national borders unrestrained. The fair traders assert that access to Arborian markets should be restricted until Arborian businesses are granted equal access to foreign markets. They contend that free trade is impossible while other nations erect barriers to Arborian exports.

Both are correct: fair trade requires equal access and equal access leads to free trade. But both sides base their positions on the same two outdated premises:

1. Global commerce is conducted under the terms of the General Agreement on Tariffs and Trade (GATT) and dominated by Arboria and similar economic systems abroad.
2. Multilateral negotiations are the most effective way to resolve pressing trade issues.

Both assumptions are wrong. The 40-year-old GATT now covers less than 7 percent of global commerce. World trade is no longer dominated by the free-trade economies: nearly 75 percent is conducted by economic systems operating with principles at odds with those of Arboria. Forging a multilateral trade policy consensus among so many diverse economic systems has become virtually impossible. And while multilateral talks drag on, Arboria misses opportunities for trade expansion.

It can be inferred that the author of the passage would most likely agree with which of the following statements about multilateral trade negotiations?

- A.

They are the most effective way to resolve trade problems.

- B.

They are most effective in dealing with fair trade issues between nations.

- C.

They have only recently begun to make an impact on world trade.

- D.

Arborian reliance on multilateral trade negotiations, while appropriate in the past, is inadequate for today's global marketplace.

- E.

The principles of multilateral trade negotiations are incompatible with current Arborian foreign trade policy.

The author mentions all of the following as characteristic of world trade in the mid- 1940s EXCEPT:

- A.

Arboria played a major role in the global marketplace.

- B.

Whorfland played a major role in the global marketplace.

- C.

Tariffs were the main obstacle to trade.

- D.

Fair-trade economies dominated international trade.

- E.

Arborian manufacturers were unsurpassed in most industries.

Biologists have advanced two theories to explain why schooling of fish occurs in so many fish species. Because schooling is particularly widespread among species of small fish, both theories assume that schooling offers the advantage of some protection from predators.

Proponents of theory A dispute the assumption that a school of thousands of fish is highly visible. Experiments have shown that any fish can be seen, even in very clear water, only within a sphere of 200 meters in diameter. When fish are in a compact group, the spheres of visibility overlap. Thus the chance of a predator finding the school is only slightly greater than the chance of the predator finding a single fish swimming alone. Schooling is advantageous to the individual fish because a predator's chance of finding any particular fish swimming in the school is much smaller than its chance of finding at least one of the same group of fish if the fish were dispersed throughout an area.

However, critics of theory A point out that some fish form schools even in areas where predators are abundant and thus little possibility of escaping detection exists. They argue that the school continues to be of value to its members even after detection. They advocate theory B, the "confusion effect," which can be explained in two different ways.

Sometimes, proponents argue, predators simply cannot decide which fish to attack. This indecision supposedly results from a predator's preference for striking prey that is distinct from the rest of the school in appearance. In many schools the fish are almost identical in appearance, making it difficult for a predator to select one. The second explanation for the "confusion effect" has to do with the sensory confusion caused by a large number of prey moving around the predator. Even if the predator makes the decision to attack a particular fish, the movement of other prey in the school can be distracting. The predator's difficulty can be compared to that of a tennis player trying to hit a tennis ball when two are approaching simultaneously.

In *Winters v. United States* (1908), the Supreme Court held that the right to use waters flowing through or adjacent to the Fort Belknap Indian Reservation was reserved to American Indians by the treaty establishing the reservation. Although this treaty did not mention water rights, the Court ruled that the federal government, when it created the reservation, intended to deal fairly with American Indians by reserving for them the waters without which their lands would have been useless. Later decisions, citing *Winters*, established that courts can find federal rights to reserve water for particular purposes if (1) the land in question lies within an enclave under exclusive federal jurisdiction, (2) the land has been formally withdrawn from federal public lands—i.e., withdrawn from the stock of federal lands available for private use under federal land use laws—and set aside or reserved, and (3) the circumstances reveal the government intended to reserve water as well as land when establishing the reservation.

Some American Indian tribes have also established water rights through the courts based on their

traditional diversion and use of certain waters prior to the United States' acquisition of sovereignty. For example, the Rio Grande pueblos already existed when the United States acquired sovereignty over New Mexico in 1848. Although they at that time became part of the United States, the pueblo lands never formally constituted a part of federal public lands; in any event, no treaty, statute, or executive order has ever designated or withdrawn the pueblos from public lands as American Indian reservations. This fact, however, has not barred application of the Winters doctrine. What constitutes an American Indian reservation is a question of practice, not of legal definition, and the pueblos have always been treated as reservations by the United States. This pragmatic approach is buttressed by *Arizona v. California* (1963), wherein the Supreme Court indicated that the manner in which any type of federal reservation is created does not affect the application to it of the Winters doctrine. Therefore, the reserved water rights of Pueblo Indians have priority over other citizens' water rights as of 1848, the year in which pueblos must be considered to have become reservations.

Which of the following most accurately summarizes the relationship between *Arizona v. California* in the highlighted text, and the criteria citing the Winters doctrine in the highlighted text? (green)

- A.

Arizona v. California abolishes these criteria and establishes a competing set of criteria for applying the Winters doctrine.

- B.

Arizona v. California establishes that the Winters doctrine applies to a broader range of situations than those defined by these criteria.

- C.

Arizona v. California represents the sole example of an exception to the criteria as they were set forth in the Winters doctrine.

- D.

Arizona v. California does not refer to the Winters doctrine to justify water rights, whereas these criteria do rely on the Winters doctrine.

- E.

Arizona v. California applies the criteria derived from the Winters doctrine only to federal lands other than American Indian reservations.

In corporate purchasing, competitive scrutiny is typically limited to suppliers of items that are directly related to end products. With "indirect" purchases (such as computers, advertising, and legal services), which are not directly related to production, corporations often favor "supplier partnerships" (arrangements in which the purchaser forgoes the right to pursue alternative suppliers), which can inappropriately shelter suppliers from rigorous competitive scrutiny that might afford the purchaser economic leverage. There are two independent variables--availability of alternatives and ease of changing suppliers--that companies should use to evaluate the feasibility of subjecting suppliers of indirect purchases to competitive scrutiny. This can create four possible situations.

In Type 1 situations, there are many alternatives and change is relatively easy. Open pursuit of alternatives – by frequent competitive bidding, if possible—will likely yield the best results. In Type 2 situations, where there are many alternatives but change is difficult—as for providers of employee health-care benefits—it

is important to continuously test the market and use the results to secure concessions from existing suppliers. Alternatives provide a credible threat to suppliers, even if the ability to switch is constrained. In Type 3 situations, there are few alternatives, but the ability to switch without difficulty creates a threat that companies can use to negotiate concessions from existing suppliers. In Type 4 situations, where there are few alternatives and change is difficult, partnerships may be unavoidable.

Which of the following can be inferred about supplier partnerships, as they are described in the passage?

- A.

They cannot be sustained unless the goods or services provided are available from a large number of suppliers.

- B.

They can result in purchasers paying more for goods and services than they would in a competitive-bidding situation.

- C.

They typically are instituted at the urging of the supplier rather than the purchaser.

- D.

They are not feasible when the goods or services provided are directly related to the purchasers' end products.

- E.

They are least appropriate when the purchasers' ability to change suppliers is limited.

It can be inferred that the author of the passage would be most likely to make which of the following recommendations to a company purchasing health care benefits for its employees?

- A.

Devise strategies for circumventing the obstacles to replacing the current provider of health care benefits.

- B.

Obtain health care benefits from a provider that also provides other indirect products and services.

- C.

Obtain bids from other providers of health care benefits in order to be in a position to negotiate a better deal with the current provider.

- D.

Switch providers of health care benefits whenever a different provider offers a more competitive price.

- E.

Acknowledge the difficulties involved in replacing the current provider of health care benefits and offer to form a partnership with the provider.

Carotenoids, a family of natural pigments, form an important part of the colorful signals used by many animals. Animals acquire carotenoids either directly (from the plants and algae that produce them) or indirectly (by eating insects) and store them in a variety of tissues. Studies of several animal species have shown that when choosing mates, females prefer males with brighter carotenoid based coloration. Owens and Olson hypothesize that the presence of carotenoids, as signaled by coloration, would be meaningful in the context of mate selection if carotenoids were either rare or required for health. The conventional view is that carotenoids are meaningful because they are rare: healthier males can forage for more of the pigments than can their inferior counterparts. Although this may be true, there is growing evidence that carotenoids are meaningful also because they are required: they are used by the immune system and for detoxification processes that are important for maintaining health. It may be that males can use scarce carotenoids either for immune defense and detoxification or for attracting females. Males that are more susceptible to disease and parasites will have to use their carotenoids to boost their immune systems, whereas males that are genetically resistant will use fewer carotenoids for fighting disease and will advertise this by using the pigments for flashy display instead.

The idea that carotenoid-based coloration is significant partly because carotenoids are required for health suggests that a lack of bright coloration in a male is most likely to indicate which of the following?

- A.

Inefficient detoxification processes

- B.

Immunity to parasite infestation

- C.

Low genetic resistance to disease

- D.

Lack of interest in mating

- E.

Lack of carotenoid-storing tissues

Information in the passage suggests that which of the following is true of carotenoids that a male animal uses for detoxification processes?

- A.

They were not acquired directly from plants and algae.

- B.

They cannot be replenished through foraging.

- C.

They cannot be used simultaneously to brighten coloration.

- D.

They do not affect the animal's susceptibility to parasites.

- E.

They increase the chances that the animal will be selected as a mate.

Linda Kerber argued in the mid-1980s that after the American Revolution (1775–1783), an ideology of "republican motherhood" resulted in a surge of educational opportunities for women in the United States. Kerber maintained that the leaders of the new nation wanted women to be educated in order to raise politically virtuous sons. A virtuous citizenry was considered essential to the success of the country's republican form of government; virtue was to be instilled not only by churches and schools, but by families, where the mother's role was crucial. Thus, according to Kerber, motherhood became pivotal to the fate of the republic, providing justification for an unprecedented attention to female education.

Introduction of the "republican motherhood" thesis dramatically changed historiography. Prior to Kerber's work, educational historians barely mentioned women and girls; Thomas Woody's 1929 work is the notable exception. Examining newspaper advertisements for academies, Woody found that educational opportunities increased for both girls and boys around 1750. Pointing to "An Essay on Woman" (1753) as reflecting a shift in view, Woody also claimed that practical education for females had many advocates before the Revolution. Woody's evidence challenges the notion that the Revolution changed attitudes regarding female education, although it may have accelerated earlier trends. Historians' reliance on Kerber's "republican motherhood" thesis may have obscured the presence of these trends, making it difficult to determine to what extent the Revolution really changed women's lives.

The passage suggests that, with regard to the history of women's education in the United States, Kerber's work differs from Woody's primarily concerning which of the following?

- A.

The extent to which women were interested in pursuing educational opportunities in the eighteenth century

- B.

The extent of the support for educational opportunities for girls prior to the American Revolution

- C.

The extent of public resistance to educational opportunities for women after the American Revolution

- D.

Whether attitudes toward women's educational opportunities changed during the eighteenth century

- E.

Whether women needed to be educated in order to contribute to the success of a republican form of government

In the Sonoran Desert of northwestern Mexico and southern Arizona, the flowers of several species of columnar cacti—cardon, saguaro, and organ pipe—were once exclusively pollinated at night by nectar-feeding bats, as their close relatives in arid tropical regions of southern Mexico still are. In these tropical regions, diurnal (daytime) visitors to columnar cactus flowers are ineffective pollinators because, by sunrise, the flowers' stigmas become unreceptive or the flowers close. Yet the flowers of the Sonoran Desert cacti have evolved to remain open after sunrise, allowing pollination by such diurnal visitors as bees and birds. Why have these cacti expanded their range of pollinators by remaining open and receptive in daylight?

This development at the northernmost range of columnar cacti may be due to a yearly variation in the abundance—and hence the reliability—of migratory nectar-feeding bats. Pollinators can be unreliable for several reasons. They can be dietary generalists whose fidelity to a particular species depends on the availability of alternative food sources. Or, they can be dietary specialists, but their abundance may vary widely from year to year, resulting in variable pollination of their preferred food species. Finally, they may be dietary specialists, but their abundance may be chronically low relative to the availability of flowers.

Recent data reveals that during spring in the Sonoran Desert, the nectar-feeding bats are specialists feeding on cardon, saguaro, and organ pipe flowers. However, whereas cactus-flower abundance tends to be high during spring, bat population densities tend to be low except near maternity roosts. Moreover, in spring, diurnal cactus pollinating birds are significantly more abundant in this region than are the nocturnal bats. Thus, with bats being unreliable cactus-flower pollinators, and daytime pollinators more abundant and therefore more reliable, selection favors the cactus flowers with traits that increase their range of pollinators. While data suggest that population densities of nectar-feeding bats are also low in tropical areas of southern Mexico, where bats are the exclusive pollinators of many species of columnar cacti, cactus-flower density and bat population density appear to be much more evenly balanced there: compared with the Sonoran Desert's cardon and saguaro, columnar cacti in southern Mexico produce far fewer flowers per night. Accordingly, despite their low population density, bats are able to pollinate nearly 100 percent of the available flowers.

Manufacturers have to do more than build large manufacturing plants to realize economies of scale. It is true that as the capacity of a manufacturing operation rises, costs per unit of output fall as plant size approaches "minimum efficient scale," where the cost per unit of output reaches a minimum, determined roughly by the state of existing technology and size of the potential market. However, minimum efficient scale cannot be fully realized unless a steady "throughput" (the flow of materials through a plant) is attained. The throughput needed to maintain the optimal scale of production requires careful coordination not only of the flow of goods through the production process, but also of the flow of input from suppliers and the flow of output to wholesalers and final consumers. If throughput falls below a critical point, unit costs rise sharply and profits disappear. A manufacturer's fixed costs and "sunk costs" (original capital investment in the physical plant) do not decrease when production declines due to inadequate supplies of raw materials, problems on the factory floor, or inefficient sales networks. Consequently, potential economies of scale are based on the physical and engineering characteristics of the production facilities—that is, on tangible capital—but realized economies of scale are operational and organizational, and depend on knowledge, skills, experience, and teamwork—that is, on organized human capabilities, or intangible capital.

The importance of investing in intangible capital becomes obvious when one looks at what happens in new capital-intensive manufacturing industries. Such industries are quickly dominated, not by the first firms to acquire technologically sophisticated plants of theoretically optimal size, but rather by the first to exploit the full potential of such plants. Once some firms achieve this, a market becomes extremely hard to enter. Challengers must construct comparable plants and do so after the first movers have already worked out problems with suppliers or with new production processes. Challengers must create distribution networks and marketing systems in markets where first movers have all the contacts and know-how. And challengers must recruit management teams to compete with those that have already

mastered these functional and strategic activities.

The passage LEAST supports the inference that a manufacturer's throughput could be adversely affected by

- A.

a mistake in judgment regarding the selection of a wholesaler

- B.

a breakdown in the factory's machinery

- C.

a labor dispute on the factory floor

- D.

an increase in the cost per unit of output

- E.

a drop in the efficiency of the sales network

The primary purpose of the passage is to

- A.

point out the importance of intangible capital for realizing economies of scale in manufacturing

- B.

show that manufacturers frequently gain a competitive advantage from investment in large manufacturing facilities

- C.

argue that large manufacturing facilities often fail because of inadequate investment in both tangible and intangible capital

- D.

suggest that most new industries are likely to be dominated by firms that build large manufacturing plants early

- E.

explain why large manufacturing plants usually do not help manufacturers achieve economies of scale

A small number of the forest species of lepidoptera (moths and butterflies, which exist as caterpillars during most of their life cycle) exhibit regularly recurring patterns of population growth and decline -- such fluctuations in population are known as population cycles. Although many different variables influence population levels, a regular pattern such as a population cycle seems to imply a dominant,

driving force. Identification of that driving force, however, has proved surprisingly elusive despite considerable research. The common approach of studying causes of population cycle by measuring the mortality caused by different agents, such as predatory birds or parasites, has been unproductive in the case of lepidoptera. Moreover, population ecologists' attempts to alter cycles by changing the caterpillars' habitat and by reducing caterpillar populations have not succeeded. In short, the evidence implies that these insect populations, if not self-regulating, may at least be regulated by an agent more intimately connected with the insect than are predatory birds or parasites.

Recent work suggests that this agent may be a virus. For many years, viral disease had been reported in declining populations of caterpillars, but population ecologists had usually considered viral disease to have contributed to the decline once it was underway rather than to have initiated it. The recent work has been made possible by new techniques of molecular biology that allow viral DNA to be detected at low concentrations in the environment. Nuclear polyhedrosis viruses are hypothesized to be the driving force behind population cycles in Lepidoptera in part because the viruses themselves follow an infectious cycle in which, if protected from direct sunlight, they may remain virulent for many years in the environment, embedded in durable crystals of polyhedron protein. Once ingested by a caterpillar, the crystals dissolve, releasing the virus to infect the insect's cells. Late in the course of the infection, millions of new virus particles are formed and enclosed in polyhedron crystals. These crystals reenter the environment after the insect dies and decomposes, thus becoming available to infect other caterpillars.

One of the attractions of this hypothesis is its broad applicability. Remarkably, despite significant differences in habitat and behavior, many species of lepidoptera have population cycles of similar length, between eight and eleven years. Nuclear polyhedrosis viral infection is one factor these disparate species share.

Resin is a plant secretion that hardens when exposed to air; fossilized resin is called amber. Although Pliny in the first century recognized that amber was produced from "marrow discharged by trees," amber has been widely misunderstood to be a semiprecious gem and has even been described in mineralogy textbooks. Confusion also persists surrounding the term "resin," which was defined before rigorous chemical analyses were available. Resin is often confused with gum, a substance produced in plants in response to bacterial infections, and with sap, an aqueous solution transported through certain plant tissues. Resin differs from both gum and sap in that scientists have not determined a physiological function for resin.

In the 1950s, entomologists posited that resin may function to repel or attract insects. Fraenkel conjectured that plants initially produced resin in nonspecific chemical responses to insect attack and that, over time, plants evolved that produced resin with specific repellent effects. But some insect species, he noted, might overcome the repellent effects, actually becoming attracted to the resin. This might induce the insects to feed on those plants or aid them in securing a breeding site. Later researchers suggested that resin mediates the complex interdependence, or "coevolution," of plants and insects over time. Such ideas led to the development of the specialized discipline of chemical ecology, which is concerned with the role of plant chemicals in interactions with other organisms and with the evolution and ecology of plant antiherbivore chemistry (plants' chemical defenses against attack by herbivores such as insects).

Among the myths taken as fact by the environmental managers of most corporations is the belief that environmental regulations affect all competitors in a given industry uniformly. In reality, regulatory costs - and therefore compliance - fall unevenly, economically disadvantaging some companies and benefiting others. For example, a plant situated near a number of larger noncompliant competitors is less likely to attract the attention of local regulators than is an isolated plant, and less attention means lower costs.

Additionally, large plants can spread compliance costs such as waste treatment across a larger revenue

base; on the other hand, some smaller plants may not even be subject to certain provisions such as permit or reporting requirements by virtue of their size. Finally, older production technologies often continue to generate toxic wastes that were not regulated when the technology was first adopted. New regulations have imposed extensive compliance costs on companies still using older industrial coal-fired burners that generate high sulfur dioxide and nitrogen oxide outputs, for example, whereas new facilities generally avoid processes that would create such waste products. By realizing that they have discretion and that not all industries are affected equally by environmental regulation, environmental managers can help their companies to achieve a competitive edge by anticipating regulatory pressure and exploring all possibilities for addressing how changing regulations will affect their companies specifically.

According to the passage, which of the following statements about sulfur dioxide and nitrogen oxide outputs is true?

- A.

older production technologies cannot be adapted so as to reduce production of these outputs as waste products.

- B.

under the most recent environmental regulations, industrial plants are no longer permitted to produce these outputs.

- C.

Although these outputs are environmentally hazardous, some plants still generate them as waste products despite the high compliance costs they impose.

- D.

Many older plants have developed innovative technological processes that reduce the amounts of these outputs generated as waste products.

- E.

since the production processes that generate these outputs are less costly than alternative processes, these less expensive processes are sometimes adopted despite their acknowledged environmental hazards.

Findings from several studies on corporate mergers and acquisitions during the 1970's and 1980's raise questions about why firms initiate and consummate such transactions. One study showed, for example, that acquiring firms were on average unable to maintain acquired firms' premerger levels of profitability. A second study concluded that postacquisition gains to most acquiring firms were not adequate to cover the premiums paid to obtain acquired firms. A third demonstrated that, following the announcement of a prospective merger, the stock of the prospective acquiring firm tends to increase in value much less than does that of the firm for which it bids. Yet mergers and acquisitions remain common, and bidders continue to assert that their objectives are economic ones. Acquisitions may well have the desirable effect of channeling a nation's resources efficiently from less to more efficient sectors of its economy, but the individual acquisitions executives arranging these deals must see them as advancing either their own or their companies' private economic interests. It seems that factors having little to do with corporate economic interests explain acquisitions. These factors may include the incentive compensation of executives, lack of monitoring by boards of directors, and managerial error in estimating the value of firms targeted for acquisition. Alternatively, the acquisition acts of bidders may derive from modeling: a manager does what other managers do.

The author of the passage implies that which of the following is a possible partial for acquisition behavior during the 1970's and 1980's?

- A.

Managers wished to imitate other managers primarily because they saw how financially beneficial other firms' acquisitions were.

- B.

Managers miscalculated the value of firms that were to be acquired.

- C.

Lack of consensus within boards of directors resulted in their imposing conflicting goals on managers.

- D.

Total compensation packages for managers increased during that period.

- E.

The value of bidding firms' stock increased significantly when prospective mergers were announced.

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The introduction of new drugs into the market is frequently prevented by a shortage of human subjects for the clinical trials needed to show that the drugs are safe and effective. Since the lives and health of people in future generations may depend on treatments that are currently experimental, practicing physicians are morally in the wrong when, in the absence of any treatment proven to be effective, they fail to encourage suitable patients to volunteer for clinical trials.

Which of the following, if true, casts most doubt on the conclusion of the argument?

- A.

Many drugs undergoing clinical trials are intended for the treatment of conditions for which there is currently no effective treatment.

- B.

Patients do not share the physician's professional concern for public health, but everyone has a moral obligation to alleviate suffering when able to do so.

- C.

Usually, half the patients in a clinical trial serve as a control group and receive a nonactive drug in place of the drug being tested.

- D.

An experimental drug cannot legally be made available to patients unless those patients are subjects in

clinical trials of the drug.

- E.

Physicians have an overriding moral and legal duty to care for the health and safety of their current patients.

Scientists have modified feed corn genetically, increasing its resistance to insect pests. Farmers who tried out the genetically modified corn last season applied less insecticide to their corn fields and still got yields comparable to those they would have gotten with ordinary corn. Ordinary corn seed, however, costs less, and what these farmers saved on insecticide rarely exceeded their extra costs for seed. Therefore, for most feed-corn farmers, switching to genetically modified seed would be unlikely to increase profits.

Which of the following would it be most useful to know in order to evaluate the argument?

- A.

Whether there are insect pests that sometimes reduce feed-corn yields, but against which commonly used insecticides and the genetic modification are equally ineffective

- B.

Whether the price that farmers receive for feed corn has remained steady over the past few years

- C.

Whether the insecticides typically used on feed corn tend to be more expensive than insecticides typically used on other crops

- D.

Whether most of the farmers who tried the genetically modified corn last season applied more insecticide than was actually necessary

- E.

Whether, for most farmers who plant feed corn, it is their most profitable crop

Proponents of the recently introduced tax on sales of new luxury boats had argued that a tax of this sort would be an equitable way to increase government revenue because the admittedly heavy tax burden would fall only on wealthy people and neither they nor anyone else would suffer any economic hardship. In fact, however, 20 percent of the workers employed by manufacturers of luxury boats have lost their jobs as a direct result of this tax.

The information given, if true, most strongly supports which of the following?

- A.

The market for luxury boats would have collapsed even if the new tax on luxury boats had been lower.

- B.

The new tax would produce a net gain in tax revenue for the government only if the yearly total revenue

that it generates exceeds the total of any yearly tax-revenue decrease resulting from the workers' loss of jobs.

- C.

Because many people never buy luxury items, imposing a sales tax on luxury items is the kind of legislative action that does not cost incumbent legislators much popular support.

- D.

Before the tax was instituted, luxury boats were largely bought by people who were not wealthy.

- E.

Taxes can be equitable only if their burden is evenly distributed over the entire population.

Conodonts, the spiky phosphatic remains (bones and teeth composed of calcium phosphate) of tiny marine animals that probably appeared about 520 million years ago, were once among the most controversial of fossils. Both the nature of the organism to which the remains belonged and the function of the remains were unknown. However, since the 1981 discovery of fossils preserving not just the phosphatic elements but also other remains of the tiny soft-bodied animals (also called conodonts) that bore them, scientists' reconstructions of the animals' anatomy have had important implications for hypotheses concerning the development of the vertebrate skeleton.

The vertebrate skeleton had traditionally been regarded as a defensive development, champions of this view postulating that it was only with the much later evolution of jaws that vertebrates became predators. The first vertebrates, which were soft-bodied, would have been easy prey for numerous invertebrate carnivores, especially if these early vertebrates were sedentary suspension feeders. Thus, traditionalists argued, these animals developed coverings of bony scales or plates, and teeth were secondary features, adapted from the protective bony scales. Indeed, external skeletons of this type are common among the well-known fossils of ostracoderms, jawless vertebrates that existed from approximately 500 to 400 million years ago. However, other paleontologists argued that many of the definitive characteristics of vertebrates, such as paired eyes and muscular and skeletal adaptations for active life, would not have evolved unless the first vertebrates were predatory. Teeth were more primitive than external armor according to this view, and the earliest vertebrates were predators.

The stiffening notochord along the back of the body, V-shaped muscle blocks along the sides, and posterior tail fins help to identify conodonts as among the most primitive of vertebrates. The lack of any mineralized structures apart from the elements in the mouth indicates that conodonts were more primitive than the armored jawless fishes such as the ostracoderms. It now appears that the hard parts that first evolved in the mouth of an animal improved its efficiency as a predator, and that aggression rather than protection was the driving force behind the origin of the vertebrate skeleton.

Jon Clark's study of the effect of the modernization of a telephone exchange on exchange maintenance work and workers is a solid contribution to a debate that encompasses two lively issues in the history and sociology of technology: technological determinism and social constructivism.

Clark makes the point that the characteristics of a technology have a decisive influence on job skills and work organization. Put more strongly, technology can be a primary determinant of social and managerial organization. Clark believes this possibility has been obscured by the recent sociological fashion, exemplified by Braverman's analysis, that emphasizes the way machinery reflects social choices. For Braverman, the shape of a technological system is subordinate to the manager's desire to wrest control of the labor process from the workers. Technological change is construed as the outcome of negotiations among interested parties who seek to incorporate their own interests into the design and

configuration of the machinery. This position represents the new mainstream called social constructivism.

The constructivists gain acceptance by misrepresenting technological determinism: technological determinists are supposed to believe, for example, that machinery imposes appropriate forms of order on society. The alternative to constructivism, in other words, is to view technology as existing outside society, capable of directly influencing skills and work organization.

Clark refutes the extremes of the constructivists by both theoretical and empirical arguments. Theoretically he defines “technology” in terms of relationships between social and technical variables. Attempts to reduce the meaning of technology to cold, hard metal are bound to fail, for machinery is just scrap unless it is organized functionally and supported by appropriate systems of operation and maintenance. At the empirical level Clark shows how a change at the telephone exchange from maintenance-intensive electromechanical switches to semielectronic switching systems altered work tasks, skills, training opportunities, administration, and organization of workers. Some changes Clark attributes to the particular way management and labor unions negotiated the introduction of the technology, whereas others are seen as arising from the capabilities and nature of the technology itself. Thus Clark helps answer the question: “When is social choice decisive and when are the concrete characteristics of technology more important?”

The information in the passage suggests that Clark believes that which of the following would be true if social constructivism had not gained widespread acceptance?

- A.

Businesses would be more likely to modernize without considering the social consequences of their actions.

- B.

There would be greater understanding of the role played by technology in producing social change.

- C.

Businesses would be less likely to understand the attitudes of employees affected by modernization.

- D.

Modernization would have occurred at a slower rate

- E.

Technology would have played a greater part in determining the role of business in society.

When asteroids collide, some collisions cause an asteroid to spin faster; others slow it down. If asteroids are all monoliths—single rocks—undergoing random collisions, a graph of their rotation rates should show a bell-shaped distribution with statistical “tails” of very fast and very slow rotators. If asteroids are rubble piles, however, the tail representing the very fast rotators would be missing, because any loose aggregate spinning faster than once every few hours (depending on the asteroid’s bulk density) would fly apart. Researchers have discovered that all but five observed asteroids obey a strict limit on rate of rotation. The exceptions are all smaller than 200 meters in diameter, with an abrupt cutoff for asteroids larger than that.

The evident conclusion—that asteroids larger than 200 meters across are multicomponent structures or

rubble piles—agrees with recent computer modeling of collisions, which also finds a transition at that diameter. A collision can blast a large asteroid to bits, but after the collision those bits will usually move slower than their mutual escape velocity. Over several hours, gravity will reassemble all but the fastest pieces into a rubble pile. Because collisions among asteroids are relatively frequent, most large bodies have already suffered this fate. Conversely, most small asteroids should be monolithic, because impact fragments easily escape their feeble gravity.

According to the passage, which of the following is a prediction that is based on the strength of the gravitational attraction of small asteroids?

- A.

Small asteroids will be few in number.

- B.

Small asteroids will be monoliths.

- C.

Small asteroids will collide with other asteroids very rarely.

- D.

Most small asteroids will have very fast rotation rates.

- E.

Almost no small asteroids will have very slow rotation rates.

The author of the passage mentions “escape velocity” (see line 22) in order to help explain which of the following? (yellow)

- A.

The tendency for asteroids to become smaller rather than larger over time

- B.

The speed with which impact fragments reassemble when they do not escape an asteroid's gravitational attraction after a collision

- C.

The frequency with which collisions among asteroids occur

- D.

The rotation rates of asteroids smaller than 200 meters in diameter

- E.

The tendency for large asteroids to persist after collisions

Most attempts by physicists to send particles faster than the speed of light involve a remarkable phenomenon called quantum tunneling, in which particles travel through solid barriers that appear to be impenetrable. If you throw a ball at a wall, you expect it to bounce back, not to pass straight through it. Yet subatomic particles perform the equivalent feat. Quantum theory says that there is a distinct, albeit small, probability that such a particle will tunnel its way through a barrier; the probability declines exponentially as the thickness of the barrier increases. Though the extreme rapidity of quantum tunneling was noted as early as 1932, not until 1955 was it hypothesized—by Wigner and Eisenbud—that tunneling particles sometimes travel faster than light. Their grounds were calculations that suggested that the time it takes a particle to tunnel through a barrier increases with the thickness of the barrier until tunneling time reaches a maximum; beyond that maximum, tunneling time stays the same regardless of barrier thickness. This would imply that once maximum tunneling time is reached, tunneling speed will increase without limit as barrier thickness increases. Several recent experiments have supported this hypothesis that tunneling particles sometimes reach superluminal speed. According to measurements performed by Raymond Chiao and colleagues, for example, photons can pass through an optical filter at 1.7 times the speed of light.

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B

A

D

C

D

D

B

B

C

C

B

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C

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D

B

B

B

E