conducting an unbiased trial of the efficacy of prayer.

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Two letters of 9 May discuss "testing" the power of prayer. One cites a study that found no statistically significant influence of prayer on the longevity of those prayed for. Such tests are based on the premise that the principal criterion for determining the efficacy of prayer is whether God answers the petitioner, that is, whether he cures or saves someone. But in my understanding of Christianity and some other religions, that criterion is not the principal purpose for prayer, for it places God in the role of a supreme being accommodating the bidder's requests. Rather, the purpose of prayer is to open or expand contact with God so that one who prays can deepen one's spiritual life and discern God's will (not man's will). This deepening of the spiritual life may allow a person to deal better with—but need not eliminate—a crisis.

So, do people who pray somehow deal better with crises than those who do not? People who pray while thinking of God as someone whose primary purpose is to do their bidding could be screened from a study designed to answer that question. A study with such screening could provide a more accurate assessment of the power of prayer.

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Mayer criticizes Benson's choice of controls in trials to determine the effect of prayer on coronary bypass patients and says that Benson should have included a control group of patients who know they are not being prayed for. One should also keep in mind the ethics of clinical trial design, however. Such a control group would not, by Benson's criteria, be receiving the best possible care.

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Consumption and Sustainable Development

The recent Policy Forums by Norman Myers and by Jeffrey R. Vincent and Theodore Panayotou (4 Apr., p. 53) on consumption and sustainable development reveal why debate in this field has been so frustrating and unproductive. Because Myers defines consumption biophysically as "human transformations of materials and energy," its environmental importance appears to be self-evident to him. Because Vincent and Panayotou define it economically, in terms of exchanges of goods and services in markets, they conclude that "there is no distinct consumption problem." Given the difference in orientation, it is not surprising that the authors do not agree about whether (economic) consumption is or is not "generally linked to declining environments."

The answer has long been known: it depends on the type of economic consumption; its social, political, and geographical context; and the level of analysis (*1*). For instance, economic growth in the United States has been closely linked to energy consumption in some periods (1953–1973), but not in others (1973–1985). The era of delinking was nearly unique in this century (*2*), and increasing energy use in this de-

cade suggests that it is past. Analysts are beginning to put aside debates at broad levels of generality and to develop better understanding of the socioeconomic and institutional conditions affecting particular kinds of environmentally significant biophysical consumption (*3*). This approach can help find ways to improve human well-being while sustaining environmental quality. Understanding cannot be deduced from theory in either economics or ecology; careful and fine-grained empirical investigation is the route to progress. Context is everything in this debate.

Another frustrating aspect of the debate is the emphasis on "full cost pricing" as the magic bullet for sustainable development. We agree that prices are an important influence on decisions and that they are currently too low to signal sustainable rates of many kinds of consumption. But how are the "right" prices to be determined? Scientific analysis alone is unlikely ever to arrive at a price that correctly represents the many dimensions of value reflected in ecosystem services, human health, noise and annoyance, sacred and pristine places, and the many other things affected by trade in a good or service. As we have learned from debates over risk assessment, techniques that reduce many such dimensions to a single metric "necessarily embed value choices, some of them highly contentious" (*4*, p. 103). Moreover, defining a "full cost" price does not address the price mechanism's well-known problems of equity and political feasibility.

Scientists should continue to build understanding of the environmental and other consequences of various types of economic activity in order to inform those making tradeoffs. They also need to work to improve the decision-making process. This means developing and testing techniques of social deliberation that allow parties with different values and interests to determine what information they need, debate value tradeoffs, and decide whether particular ways of calculating costs are helpful for making decisions and sending the right signals to economic actors (*4*, *5*).

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2. S. H. Schurr, *Annu. Rev. Energy* **9**, 409 (1984).
3. See National Research Council, *Environmentally Significant Consumption: Research Directions*, P. C. Stern *et al.*, Eds. (National Academy Press, Washington, DC, 1997); T. Dietz, Ed., in preparation.
4. National Research Council, *Understanding Risk: Informing Decisions in a Democratic Society*, P. C. Stern and H. V. Fireberg, Eds. (National Academy Press, Washington, DC, 1996).
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The contention between Myers and Vincent and Panayotou about whether "consumption" is a cause of, or a cure for, development problems seems to be largely a question of semantics. Myers defines "consumption" as "human transformations of materials and energy," and his examples—fossil fuels, cars, iron and steel, paper, water, and biological resources—back up this intuitive view of consumption as the transformation of a real,

physical resource into waste.

On the other hand, Vincent and Panayotou include in "private consumption" all marketable goods and services. A college education, for instance, is "privately consumed" in their definition; in Myers', as in common parlance, it is only bought, sold, and enjoyed (or not).

Vincent and Panayotou actually use "consumption" more broadly still: according to them, when I sit in the garden I "consume" chair, garden, apple blossom, birdsong, sunshine, the neighbors' conversation, and all. These word games serve merely to draw an academic veil over issues that need to be clear to everybody. If rising wealth enables us to enjoy more while consuming less (in Myers' sense), then prosperity can cause less damage to our planet. But if people equate wealth with ownership of the pretty objects they see on the television, then we will drown in our own "riches." This simple fact seems to have escaped the development economists. Maybe they need to take time out to consume the roses.

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Metabolic Rates

In the Research News article "Fractal geometry gets the measure of life's scales" (4 Apr., p. 34), Nigel Williams propagates a distressingly common misperception: that the scaling of metabolic rate to a power less than 1 means that "the bigger the creature, the slower its metabolism." In fact, a larger animal expends energy at a "faster" rate (as measured in watts or a proxy variable such as oxygen consumed per hour). The idea that larger animals have lower metabolic rates is an artifact of expressing such rates in mass-specific units (that is, divided by body mass to give joules per gram per second, which practice, although conventional for decades in animal physiology, obscures the more ecologically relevant whole-animal measurement while failing to correct for the confounding variable of body size. The question of "why" metabolic rates scale allometrically to body mass is fascinating and elusive, and the approach of Geoffrey West *et al.* (Reports, 4 Apr., p. 122) is an interesting one.

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Corrections and Clarifications

The report "An occurrence of metastable cristobalite in high-pressure garnet granulite" by R. S. Darling *et al.* (4 Apr., p. 91) and the accompanying Perspective "Seeing a mountain in a grain of garnet" by J. G. Liou *et al.* (p. 48), should have stated that the length of time that cristobalite remained at temperatures greater than 600°C was 50 to 100 million years.

The letter "The cause of obesity" by Per Södersten (7 Mar., p. 1405) was not listed in the Table of Contents of the same issue (p. 1390).

Letters to the Editor

Letters may be submitted by e-mail (at science_letters@aaas.org), fax (202-789-4669), or regular mail (*Science*, 1200 New York Avenue, NW, Washington, DC 20005, USA). Letters are not routinely acknowledged. Full addresses, signatures, and daytime phone numbers should be included. Letters should be brief (300 words or less) and may be edited for reasons of clarity or space. They may appear in print and/or on the World Wide Web. Letter writers are not consulted before publication.