



**Descriptive Psychology and Science
by
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Peter G. Ossorio – from his first writings in what became *Descriptive Psychology, Persons* (Ossorio, (1966/1995) to his final magnum opus summation *The Behavior of Persons* (Ossorio, 2006) – intended and accomplished nothing short of a transformation of the practice and understanding of the science of persons and behavior. I have argued elsewhere that his accomplishment was revolutionary, in the same way that Beethoven’s music was revolutionary: Both created works unlike any that came before, and once seen or heard, they are impossible to ignore. If you know what Ossorio has said about the science of behavior, you simply cannot with integrity continue to practice in the old ways.

The purpose of this paper is to examine Ossorio’s contributions to the science of persons and behavior. His approach forms a singular whole; nonetheless, it is useful to examine four aspects separately.

Concepts are prior to description, theory and empirical study

Historically the initial and most prominent of Ossorio’s observations about behavioral science was its lack of a shared conceptual framework. Early on in *Persons*, he pointed out the simple fact that, to theorize about some aspect of behavior and do empirical research on it, you must first be able to describe it in non-theoretical terms, and to do *that*, you need a shared framework of concepts within which to make the distinctions you use in describing. From today’s viewpoint this seems obvious; indeed, this recognition has become fairly widespread.

But it was not always so. In the 1960’s, you actually found personality texts saying “Personality is defined as whatever a particular theory says it is”, and Ossorio encountered withering indifference to this essential point. As he put it in 1971 after at least seven years of knocking on closed doors and minds: “It is not merely that to a tic-tac-toe player the world consists of noughts and crosses. It is also that his ultimate standard of criticism and the ultimate form of his reality testing is, ‘But will it get me three-in-a row?’” (Ossorio, 1971/1975/1978/2005, p. xviii)

Slowly but surely this situation has changed. For a clear examination of the issue as it stands today, see Ray Bergner’s “An Open Letter from Isaac Newton to the Field of Psychology” (Bergner, 2006).

In this light, let's look at some of the explanations of "at-a-glance" knowing offered in Malcolm Gladwell's influential bestseller, *Blink*. These "explanations" all share a common characteristic: While the findings and conclusions are about persons, their abilities and behavior, *not one* of the explanations uses person or behavioral concepts.

Take "thin-slicing", for example. That's the label Gladwell's scientists used to refer to a person's ability to reach highly accurate conclusions in a very short time. This is an example of an all-too-common practice among behavioral scientists that amounts to a kind of institutional identity theft: seeking reflected credibility by borrowing established terms from more prestigious sciences. In the 1960's the prestigious target was physics; today we try to dress in the clothes of biology.

"Thin-slicing" is in fact borrowed from biology, which has an actual practice of taking tissue samples and slicing them into very thin slices. These thin slices, perhaps treated with dyes to enhance contrast, can then be viewed under microscopes, and things can be seen that are not visible in thicker samples. Thus, in biology, "thin-slicing" is a term that refers to an actual and useful practice. And since the original research reported by Gladwell took tape recordings of behavior and presented only a brief segment for viewing, one can see how someone familiar with biological practice might, with a chuckle, refer to the method as "thin-slicing".

Used as a metaphor, not to be taken literally or seriously, "thin-slicing" could be a clever substitute for the actual and accurate description of what is going on. But there's a big problem here – no other description is offered. The research led to the conclusion that people have the ability to "thin-slice". But in real life, when there is no tape-recording, what exactly are people "slicing", and how? The real danger here is that once scientists take their "thin-slicing" metaphor seriously, they might take these "what" and "how" questions seriously as well, and set out to do research on them. Which, alas, is exactly what they have done.

I take it that what is called for here is not just pointing out that this emperor is seriously naked; what is called for is to provide some appropriate clothes. In other words, we need to replace "thin-slicing" and so on with explanations that *can* be taken seriously at face value, in terms rooted in the behavioral science of Descriptive Psychology. This is accomplished in the paper "At a Glance and Out of Nowhere" (Putman, 2009), the second in the "Ordinary Magic" series.

Behavioral science applies to the behavior of behavioral scientists.

Again, Ossorio raised this point early and often in his writings (Ossorio, 1966/1995). He referred to it as the issue of "reflexivity", pointing out that a standard of adequacy for behavioral science is that the concepts and theoretical assertions of behavioral science must apply to *all* behavior, including the behavior of

behavioral scientists *doing* behavioral science. This was embarrassing to the field at the time, since no “behavioral science” in the 1960’s came close to meeting this standard. A Skinnerian, for example, would have been forced to admit that his assertion that “All behavior is the result of operant conditioning” was just the result of his own history of operant conditioning. If you took seriously the requirement for reflexivity, no assertions by these partial behavioral sciences could be taken seriously, as contrasted with being explained away by their own concepts.

Status dynamic therapists get good mileage from the Descriptive Psychology concept of “unthinkability”, which says that anything that leaves a person with zero behavior potential will be literally unthinkable to that person. “Reflexivity” taken seriously left behavioral scientists of the 1960’s with zero behavioral potential; accordingly, it is not surprising that they simply refused to think about it no matter what anyone, including Ossorio, said.

Descriptive Psychology was designed from the ground up to meet the “reflexivity” standard. (See Ossorio 1966/1992, Ossorio, 1971/1975/1978/2005, Ossorio, 2006). To date it is the only behavioral science that does. This leaves other approaches with three options:

1. Ignore the unthinkable and slowly fade away. This describes what happened to a large number of theoretical schools from the 1960’s. (When was the last time you saw research papers on whether S-R or S-O-R was the better model for human behavior?)
2. Continue to ignore the unthinkable and proceed. This predictably leads to conceptualizations that cannot be taken at face value and which lead to conceptual and practical dead ends. I submit that this describes the condition of most behavioral science in 2010.
3. Acknowledge the reflexivity standard, declare yours to be a special-purpose theory rather than a general theory of behavior, and root it firmly in the conceptual ground of Descriptive Psychology. As it turns out, this is a viable option that creates space for many different approaches. A very early attempt of this sort was made in 1968 by Lyle Bourne, who worked with Ossorio to formulate some standard learning research within the Descriptive Psychology framework (see Ossorio, 1969/1978/2010, *Meaning and Symbolism*, p. 135-146). The result was remarkable, but it unfortunately turned out to be a drop in a much-too-large bucket. More recently and extensively, Wynn Schwartz has succeeded in rooting psychoanalysis and its practice in Descriptive Psychology (Schwartz, 1979, 1988, 2002, 2008, 2010), and Ray Bergner has done the same for psychotherapy (Bergner, 2007, 2005, 2000, 1988). These are promising efforts; the jury is still out on their long-term success.

It is clear that the science underlying *Blink* fails to meet the reflexivity standard. Since people are not inclined to give the unthinkable much thought, we have supported these scientists by working on their behalf, attempting to root their

approach and practice firmly in Descriptive Psychology. This is also accomplished in “At a Glance and Out of Nowhere.”

The non-computational use of computation

We now move into somewhat deeper waters. This third aspect is not so widely known even in the Descriptive Psychology community for two reasons:

1. A great deal of Ossorio’s early work in this area appeared in his largely unknown 1969 masterpiece, *Meaning and Symbolism* (Ossorio, 1969/1978/2010). Some, but by no means all, of this work appeared later in other works by Ossorio (Ossorio, 1971/1975/1978/2005, Ossorio 2006).
2. Things get technical and mathematical very quickly here, and not everyone is prepared to follow the issues and arguments.

The non-computational use of computation was part of Ossorio’s approach even before he wrote *Persons*. It is reflected in his 1960 doctoral dissertation at UCLA, and formed the basis for his early, ground-breaking work for the Rome Air Development Center. Over the course of almost 50 years, Ossorio’s non-computational use of computation has resulted in a body of technical work that is still, to this day, beyond the state-of-the art. This includes:

- Ossorio’s seminal work on document classification and retrieval (Ossorio, 1964, 1965, 1966b);
- Tom Mitchell’s computer simulation of the Maximum Want model, extended by both Mitchell and Putman (Ossorio 1969/1978/2010, pp. 171-198);
- A number of applications of Judgment Space technology by Ossorio, Jeffrey and others;
- The MENTOR project on replicating the social practices of a complex organization (Jeffrey and Putman, 1983) and the DIAMOND language for the computer implementation of social practice representations (Jeffrey, Schmid, Zeiger and Putman, 1989);
- Work by Ossorio and colleagues on (among other things) galaxies and authentic robots (Ossorio & Kurtz, 1989; Kurtz, Mussio, & Ossorio, 1990; Erickson, Aucoin, & Ossorio, 1992); and
- Joe Jeffrey’s recent ground-breaking papers on structure (Jeffrey 2010a), economics (Jeffrey 2006, 2010b), and knowledge representation in biology (Jeffrey 2009).

But what exactly is meant by “the non-computational use of computation”? It refers to using computation to give computing systems abilities that *categorically* transcend what is possible via computation (as that term is understood and used by computational theorists.) Ossorio articulated this computability issue in depth in section 10.4.6 of *Meaning and Symbolism* (Ossorio, 1969/1978/2010).

Briefly: computers can of course only manipulate numbers – “bits” – and what can be done with those bits is governed totally by deterministic processes described in the formal theory of computation. But what those bits *represent* – their meaning – is entirely outside the realm of numbers and computation.

Two important recognitions:

1. We can, and frequently do, use numbers to stand in for non-numeric things. Consider blood pressure of 120/80 and body temperature of 98.6. These are numerical values whose medical *meaning* is not contained within the computer-based system in which they are stored. Although 120/80 and 98.6 are numbers, no possible computation can transform them into their meaning; to convey that meaning in a computer-based system requires a person to code the meaning as input, and to interpret it as output. They are facts in the *human* world, with human significance. Similarly, Ossorio and colleagues constructed elaborate geometric structures to compute distances between items in a factor space, as a means of assessing similarity and differences among them, but the resultant use of these calculations depends wholly on a person’s ability to interpret them as saying something meaningful in a real-world endeavor.
2. Computer-based simulations typically set out to model the process involved in doing something, paying attention to *how* something is done. Ossorio and his colleagues set out to create a computer-based system with capabilities similar to an expert person, paying attention to the *achievement* of what is done. The difference is profound. The Descriptive Psychology approach opens the door to a vast array of very precise methods a computer can use to achieve results, with no concern whatsoever with whether this is in fact how human experts do it. In fact, it is taken as given that this is *not* how humans do it; so long as the *achievement* is comparable, the process is irrelevant.

An example may help. An artist makes an exact copy of her lithograph using time-honored methods involving the original template, inks, paper and pressure. A clerk makes an exact copy of the same lithograph using a very-high resolution camera and a download link to a state-of-the art printer. The achievement in both cases is the same – an exact copy of the lithograph – but the process is different in every respect. The non-computational use of computation is like the camera and printer: highly technical means of achieving what humans achieve in a wholly different way.

Real World and Reality

This fourth aspect of Descriptive Psychology and science is arguably the most profound and transformative. Ossorio did nothing less than change in fundamental ways our working conception of the Real World, on which and

within which the entire enterprise of science rests. To appreciate the scope and import of this accomplishment, we should first remind ourselves of what, in the standard account, we take the Real World to be.

Physics is widely acknowledged as the gold standard: science if ever there was a science. As such, its view of the Real World is as close as we can get to a certified scientific given.

That view was nicely summarized in a 2006 book by Lee Smolin, a theoretical physicist with impeccable credentials and standing in the physics community. Smolin writes:

“Physicists have traditionally expected that science should give an account of reality as it would be in our absence. Physics should be more than a set of formulas that predict what we will observe in an experiment; it should give a picture of what reality *is*. We are accidental descendants of an ancient primate, who appeared very recently in the history of the world. It cannot be that reality depends on our existence. ...

“Philosophers call this view *realism*.” [And Smolin later in his book proudly identifies himself as a realist.] “It can be summarized by saying that the real world out there (or RWOT, as my first philosophy professor used to put it) must exist independently of us. It follows that the terms by which science describes reality cannot involve in any essential way what we choose to measure or not measure.” (Smolin, 2006, pp. 6-7)

In other words, “Pay no attention to the man behind the curtain.” This, from the good folks who gave us quantum electrodynamics and general relativity. That just goes to show what the “accidental descendants of an ancient primate” can do when they put their minds to it.

Smolin’s quote highlights precisely two inherent aspects of the physicist’s “realist” view of the Real World which disqualify it for being taken seriously in behavioral science:

1. While physics may be able to get away with ignoring the physicist and the doing of physics, behavioral science cannot. The “reflexivity” standard eliminates this convenient fiction (which interestingly may have proved to be rather inconvenient for physicists in the 21st century; the title of Smolin’s book is *The Trouble with Physics*.)
2. Smolin follows standard practice in physics in using “reality” as equivalent to the real world. As it turns out, this doesn’t work in behavioral science; one of Ossorio’s truly astonishing contributions is his 1969 articulation in *Meaning and Symbolism* of Real World and Reality as related but separate concepts. To do justice to persons and behavior, we need both.

What, then, is the Descriptive Psychology view of Real World and Reality? Fasten your seat belts; we are about to begin a journey into something entirely different.

The Real World as a world of persons, not things

The Real World

Descriptive Psychology takes the Real World to be, fundamentally and essentially, “a world of persons and their ways” (Ossorio, 2006a, p. 3). In this view, the world consists essentially of persons and their actions. Everything that appears in the “realist” view – apples, trees, stars, birds, beasts, quarks and quacking ducks – all appear in this view as well, as parts of actions taken by people. Furthermore, the Real World is not “out there” in any sense; it is a world I “construct, maintain, and reconstruct through my behavior”, to again quote Ossorio (2010).

In other words, we ordinary people create the Real World.

This is a rather breath-taking assertion. Taking it seriously requires some reflection and explanation. Here’s Ossorio on this exact issue:

Outside of Descriptive Psychology a reference to world construction, world maintenance, and world reconstruction is not unlikely to meet with a bright smile and a disclaimer: “You must be speaking metaphorically. *Surely*, you don’t mean, *literally*, world construction, maintenance, and reconstruction.” The appropriate answer in the present case is, “No, it’s not a metaphor, and, yes, I mean *literally* world construction, maintenance, and reconstruction.” Questions then tend to be along the lines of how one could do that, why one would do that, what guarantees does one have that it has been done right, and so on.

When it comes to world reconstruction, we can sometimes use the poets as one source of ideas. For example, we have our old friend Omar Khayyam, who says:

“Ah, love, could you and I with Him conspire
To change this sorry scheme of things entire
Would we not shatter it to bits, and then
Remold it nearer to our hearts’ desire?”

To those who look askance when we say, “No, I mean, *literally*, ...” I suspect it must seem that we are referring to some Godly exercise of power such as this. What Khayyam describes so vividly is what one might call a brute force, straight wish-fulfillment approach to the matter. And it is not open to us. We can’t “shatter it to bits, and then remold it nearer to our hearts’ desire.” Unless we can, of course.

How, then, and what, then? What mechanism, what procedure, what agency is available for reconstructing my world?

There is a certain kind of alternative to the “shatter it to bits” approach. A philosopher, Stanley Cavell, in explaining the difference between Wittgenstein’s philosophy and traditional philosophy, said roughly the following. “For Aristotle, to speak the truth is to say of what is *that* it is. In this new way of talking, to speak the truth is to say of what is *what* it is.”

In creating worlds, and in reconstructing worlds, we don’t do it by creating stuff and moving it around. Rather, what we create is its being what it is. (Ossorio, 2009).

This orientation turns out to be essential to understanding and re-formulating current behavioral science, including the science in *Blink*. The research establishes *that* it is; our re-formulation says *what* it is.

Reality

Having recognized that we create the Real World, we immediately confront the fact that we do not, in fact have God-like powers. We can’t just create any old world we like; we run into actual constraints on what we can get away with. Our old friend Gil can talk about his “comebacker” golf shot which goes past the green, pauses in the air, and comes back to land near the hole, but neither he nor anyone else can actually make that shot. I might want a world in which I am a billionaire, or a Nobel Prize winner, or Paul Newman’s best friend, but no real world I know how to create includes those heart’s desires.

Ossorio articulated these inherent limits on what we can actually do in the concept of Reality. Reality in the Descriptive Psychology view is not equivalent to the Real World. Nor is it, as in common usage, some special and privileged kind of Real World (the *really* real world, so to speak). Instead, Reality is conceived as a set of boundary conditions on our behavior as Persons. (Ossorio, 1969/1978/2010) Since our behavior as Persons includes constructing, maintaining and re-constructing worlds, Reality is a set of constraints on our Real Worlds.

“So we create the Real World, which can vary depending on lots of things, but Reality is in fact fixed and secure, which keeps us honest, right?”

Well, almost, but not exactly. It is true that Reality is fixed at any given time; we either can, or cannot, actually bring off a given behavior. But it is also true that the limits on human behavior change over time, sometimes dramatically. In the 18th century if you wanted to hear a Beethoven symphony you would need to find a public performance of it somewhere, get invited to a private performance, or hire an orchestra to perform it for you. Today, if I want to hear a Beethoven symphony, I take my ipod out of my pocket, put on earphones and plug them in, look for the right file and press Play. I can listen to a Beethoven symphony anytime I like; the real world of the 18th century *in reality* did not include that behavioral possibility.

Reality itself, then, can change as our behavior potential changes. This proves to be both exciting and challenging in reformulating behavioral science to in fact meet all criteria for adequacy.

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References

- Bergner, R. (2007). *Status dynamics: Creating new paths to therapeutic change*. Ann Arbor, MI: Burns Park Publishers.
- Bergner, R. (2006). An open letter from Isaac Newton to the field of psychology. In K. Davis & R. Bergner (Eds.), *Advances in Descriptive Psychology* (Vol. 8, pp. 69-80). Ann Arbor, MI: Descriptive Psychology Press.
- Bergner, R. (2005). Status dynamic treatment of a case of bulimia. *Clinical Case Studies*, 4, 295-303.
- Bergner, R. (2000). Love and barriers to love: An analysis for psychotherapists and others, *American Journal of Psychotherapy*, 54, 1-17.
- Bergner R (1988). Status dynamic psychotherapy with depressed individuals. *Psychotherapy*, 25, 266-272.
- Erickson, J., Aucoin, P., & Ossorio, P. G. (1992). Person-like intelligent systems architectures for robotic shared control and automated operations. In J. Erickson (Ed.), *Cooperative Intelligent Robotics in Space III* (Vol. 1829, pp. 149-160).
- Jeffrey, H. J. and Putman, A. O. (1983). MENTOR: Replicating the Functioning of an Organization. in K. E. Davis (Ed.), *Advances in Descriptive Psychology*, (Vol. 3, pp. 243-270). Greenwich, CT: JAI Press.
- Jeffrey, H. J., Schimid, T., Zeiger, H. P, and Putman, A. O. (1989). LDS/UCC: Intelligent Control of the Loan Documentation Process. *Proceedings of the Second International Conference on Industrial & Engineering Applications of Artificial Intelligence and Expert Systems*, University of Tennessee Space Institute, Tullahoma, Tennessee, June, 1989, ACM Press, 1989, pp. 573-591.

- Jeffrey, H.J. Cognition without processes. (1998) In H. J. Jeffrey and R. M. Bergner (Eds.), *Advances in Descriptive Psychology* (Vol. 7, pp. 33-66). Ann Arbor, MI: Descriptive Psychology Press.
- Jeffrey, H.J. (2006). "Expanding the Range of Behavioral Factors in Economic Simulations" *The Journal of Behavioral Finance* Vol. 7, No. 2, 97–106.
- Jeffrey, H. J. (2009). Mathematical Description of Biological States, Structures and Mechanisms. *International Journal on Advances in Life Sciences, International Academy, Research, and Industry Association* (<http://www.iaia.org/>).
- Jeffrey, H.J. (2010a) Structure. In K. E. Davis, F.L. Lubuguin & W. Schwartz (Eds.), *Advances in Descriptive Psychology* (Vol. 9, pp. nnn-mmm). Ann Arbor, MI: Descriptive Psychology Press.
- Jeffrey, H.J (2010b) Homo Communitatis: A rigorous foundation for behavioral finance. In B. Bruce (Ed.) *Handbook of Behavioral Finance*. Edward Elgar Publishing, Cheltenham, Glos, GL50 2JA, England.
- Kurtz, M. J., Mussio, P., & Ossorio, P. G. (1990). A cognitive system for astronomical image interpretation. *Pattern Recognition Letters*, 11, 507-515.
- Ossorio, P. G. (1964). *Classification space analysis* (RADC-TR-64-287). Rome, NY: Rome Air Development Center. (Original work published 1964 as LRI Report No. 1. Los Angeles, CA and Boulder, CO: Linguistic Research Institute.)
- Ossorio, P. G. (1965). *Dissemination research* (RADC-TR-65-314). Rome, NY: Rome Air Development Center.
- Ossorio, P. G. (1966b). Classification space. *Multivariate Behavioral Research*, 1, 479-524.
- Ossorio, P. G. (1966/1995). *Persons. The collected works of Peter G. Ossorio, Vol. I*. Ann Arbor, MI: Descriptive Psychology Press. (Original work published 1966 as LRI Report No. 3. Los Angeles, CA & Boulder, CO: Linguistic Research Institute.)
- Ossorio, P.G. (1969/1979/2010). *Meaning and Symbolism. The collected works of Peter G. Ossorio, Vol. VI*. Ann Arbor, MI: Descriptive Psychology Press. (Original work published 1969 as LRI Report No. 10. Los Angeles, CA & Boulder, CO: Linguistic Research Institute. Later listed as LRI Report No. 15.)
- Ossorio, P. G. (1971/1975/1978/2005). "What actually happens": *The representation of real world phenomena. The collected works of Peter G.*

- Ossorio, Vol. IV.* Ann Arbor, MI: Descriptive Psychology Press. Also published Columbia, SC: University of South Carolina Press, 1975, 1978. (Original work published 1971 as LRI Report No. 10a. Whittier, CA & Boulder, CO: Linguistic Research Institute. Later listed as LRI Report No. 20.)
- Ossorio, P. G. (1982/1998). *Place. The collected works of Peter G. Ossorio, Vol. III.* Ann Arbor, MI: Descriptive Psychology Press. (Original work published 1982 as LRI Report No. 30a. Boulder, CO: Linguistic Research Institute.)
- Ossorio, P. G. (2006a). *The behavior of persons. The collected works of Peter G. Ossorio, Vol. V.* Ann Arbor, MI: Descriptive Psychology Press.
- Ossorio, P. G. (2006b). Out of nowhere. In K. E. Davis & R. M. Bergner (Eds.), *Advances in Descriptive Psychology* (Vol. 8, pp. 107-144). Ann Arbor, MI: Descriptive Psychology Press.
- Ossorio, P.G. (2010). Out of nowhere (Complete Version). In K. E. Davis, F.L. Lubuguin & W. Schwartz (Eds.), *Advances in Descriptive Psychology* (Vol. 9, pp. nnn-mmm). Ann Arbor, MI: Descriptive Psychology Press.
- Ossorio, P. G., & Kurtz, M. J. (1989). Automated classification of resolved galaxies. In V. Di Gesu, L. Scarsi, P. Crane, J. Friedman, S. Levialedi, & M. Maccarone (Eds.), *Data analysis in astronomy* (Vol. 3, pp. 121-129). New York: Plenum Press.
- Putman, A.O. (2010). Ordinary Magic: What Descriptive Psychology Is, and Why It Matters. In K. E. Davis, F.L. Lubuguin & W. Schwartz (Eds.), *Advances in Descriptive Psychology* (Vol. 9, pp. nnn-mmm). Ann Arbor, MI: Descriptive Psychology Press.
- Putman, A.O. (2009). At a Glance and Out of Nowhere: How Ordinary People Create the Real World. Descriptive Psychology Institute: http://www.descriptivepsychologyinstitute.org/At_a_Glance_and_Out_of_Nowhere_revised_2.pdf
- Schwartz, W. (1979). Degradation, accreditation, and rites of passage. *Psychiatry*, 42(2), 138-146.
- Schwartz, W. (1988). What makes something psychoanalytic? *Psychiatry*, 51(4), 417-426.
- Schwartz, W. (2002). From passivity to competence: A conceptualization of knowledge, skill, tolerance and empathy. *Psychiatry*, 65(4), 338-345.
- Schwartz, W. (2008). Self presentation and the status dynamics of psychotherapy and supervision. *American Journal of Psychotherapy*. 62(1), 51-65.

Schwartz, W. (2010). On saying “no”. In K. E. Davis, F.L. Lubuguin & W. Schwartz (Eds.), *Advances in Descriptive Psychology* (Vol. 9, pp. nnn-mmm). Ann Arbor, MI: Descriptive Psychology Press.

Smolin, L. (2006). *The Trouble With Physics*. Boston: Houghton Mifflin.