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letters

original meaning of the word." He argued for descriptions of particles in terms of "continuous matter" and the different particles as the "spectrum of matter." He states in his closing argument: "In the theory one should try to make precise assumptions concerning the dynamics of matter, without any philosophical prejudices. The dynamics must be taken seriously, and we should not be content with vaguely defined hypotheses that leave essential points open. Everything outside of the dynamics is just a verbal description of the table of data, and even then the data table probably yields more information than the verbal description can." I've followed Heisenberg's lead, and results to date show reasonable qualitative and quantitative agreement with the "particle spectrum" and the four basic forces using simple numerical methods based on mass density, differential density, surface tension, and relative velocity.³ An update paper that includes quantitative results will be published later this year.

References

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3/83

Is capitalism to blame?

It's truly irksome and disappointing to witness so distinguished a scholar as Sheldon Glashow (Guest Comment, April, page 9) lapse into the all-too-familiar academic's posture of blaming a problem of our nation on American capitalism (in his letter, Glashow used the code word "marketplace" instead of capitalism). "How is it that the forces of the marketplace have failed us?" he asks, in discussing the decline of US technology. These "forces of the marketplace" are driving our "few good science teachers" into the "arms of US industry," he complains.

Are our faltering industries suffering simply from capitalism? Do science teachers who decide to move to industry respond solely to capitalism? Are the scientific and mathematical illiteracy noted by Glashow in many Harvard undergraduates simply the products of capitalism? I doubt it.

Our economy is a mixed one, composed of substantial capitalistic and government-controlled elements. Thus, industry's capacity to invest in advanced technology and novel products is strongly influenced by interest

rates, which depend on the interactions among key public- and private-sector elements such as the sizes of Federal deficits, Federal Reserve Bank money supply policy, international monetary exchange rates and market competition for investment dollars. The science teacher's decision to transfer to industry may weigh both the attractiveness of the marketplace and the repulsiveness of teaching situations affected by short-sighted legislators, politicized school administrations and misguided social theories. The scientific and mathematical illiteracy of many high-school graduates may owe much more to a lack of student interest and raw capability than to an insufficiency of teachers. (By the way, why does Harvard admit such illiterates to the nation's ruling class?)

Let's try to be very careful to describe our problems accurately and try to avoid simplistic ascriptions of blame for them.

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4/83

Limits on knowledge

It seems to me that the last point in Joseph Ford's article ("How random is a coin toss?" April, page 40) is the most profound, and, at the same time, the least appreciated. Our prejudices die hard.

Most people would agree that our knowledge is "stored" somewhere in our brains, and this implies that our knowledge of the external world (assuming that there is such a thing) cannot be complete since our brains are so much smaller. It is not just that there are things we choose not to learn, but that our knowledge of things that we believe we know is incomplete in ways of which we are often not aware. For example, it has been known for a long time that the seemingly infinite variety of colors in all their glory is composed from three primitive responses, and although there seems to be such a variety of colors, no one can tell the difference between the D lines of sodium without an instrument. More recent research on the way in which visual information is processed in the brain reveals that the things we find important are so because of the way our brains are constructed. In many cases things seem obviously different, not because they are different but because we are "wired" to make this distinction. The map in our brains is not in one-to-one correspondence with the external world that it represents, and it cannot possibly be—Plato's illustrations of people living in a cave and trying to discover what the external world is like from shadows on