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Managing Editor
P.G. Boswell, EPS Geneva
E-mail: peter.boswell@cern.ch

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Unique Contributions

The European Science and Technology Assembly's view that every European Union Framework programme should have a bottom-up basic science component (page 113) has not been specifically back up by the European Parliament's report on the European Commission's green (discussion) paper on innovation. However, Parliament went most of the way by saying that there needed to be more coordination between the Training and Mobility of Researchers (TMR) programme and other programmes. In other words, every European Union science and technology programme may need a training component. This is effectively the same thing as saying that each needs a basic science component since TMR is "centre stage" for basic research (p. 116).

So reflection at high levels seems to be turning in a favour of science. Steering lofty thoughts into hard cash is another matter. Plans to boost science spending (Japan) or at least not to cut it as severely as other parts of the budget (US) have met a fairly smooth road. So perhaps the public is looking more kindly on science. But discussion about how much should be spent is dimmed by the fact that recent years have seen a significant shift in the balance between public- and private-sector research, notably in Europe, and much of the traditional public sector finds itself in private or quasi-private hands (p. 113). Perhaps this explains why recent surveys show that the general public's awareness of the need for science remains unchanged.

The situation naturally tempts some to seek radically different approaches for increasing society's appreciation of the importance of basic research in particular and of science in general. An intriguing case in point is Piergiorgio Odifreddi, professor of mathematics at the University of Turin and author of *Classical Recursion Theory* (North Holland, 1989). He took the opening of exhibits on scientific instrumentation at the Automobile Museum in Turin last February to make the point in *La Stampa* (7 February) that the "humanities are hidden in numbers" (*Umanesimo nascosto nei numeri*) and not in the physical sciences.

He argued that mathematics *grosso modo* develops deductively by seeking theorems from assumptions while the sciences develop inductively by seeking observations in support of theories. The distinction is, of course not crystal clear, as in 19th century when Euclidean geometry was thought to be an experimental fact. There are also cases where physical concepts are founded on assumptions, notably in mathematical physics which sometimes rewrites current theories in purely abstract terms where the physical meaning is hidden.

But no such separation exists between mathematics and the humanities. Both describe "imaginary worlds" starting with assumptions that can be either tangible or abstract, without any requirement other than the internal coherence to the "story". So one expects the humanities to have inspired mathematics and *vice versa*. This is indeed the case. John Bell, for instance, extended quantum mechanics from the visible to the invisible world and Lewis Carroll and Jorge Luis Borges took up mathematical ideas in their books.

The inference is that there is a distinction between the humanities and the physical sciences, and one cannot "approach science in the spirit of approaching a form of art". Professor Odifreddi thinks a visit to the museum's exhibits will help one appreciate mathematics as a part of human culture; perhaps it will also help us appreciate science's many unique contributions.

P.G. Boswell