meeting. The linguists Jean-Marie Hombert and William Wang retraced the renewed interest in linguistics for the reconstruction and genealogy of human languages despite an obvious lack of empirical data on the earliest languages. Language dynamics models cannot address the physiological or social issues, but they do show how an 'invisible hand' pushes populations towards a coherent language.

Second, semiotic dynamics, the processes whereby individuals invent and share signs and meanings, is not something from the past but an ongoing phenomenon. Existing human languages do not change so quickly, except in their vocabularies, but there are other new human communication systems that are undergoing rapid development, such as the 'folksonomies' that emerged in the course of a few years on the World Wide Web[5,6]. In his contribution, Les Gasser pointed out that the insights obtained from the analytical models and computer simulations discussed at the summer school can help to design and understand new collective communication systems and therefore further revolutionize human communication and knowledge sharing through information technology.

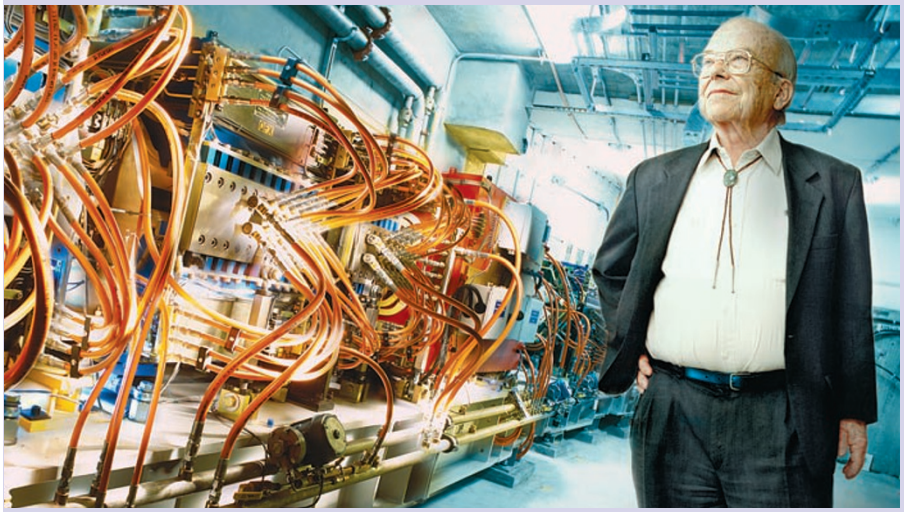
The study of semiotic dynamics is still in its infancy and many basic problems have hardly been touched upon, but, as this summer school showed, the momentum is clearly there and the powerful results already obtained after only a few years of investigation bode well for the future of the field.

References

1. *Statistical Physics of Social Dynamics: Opinions, Semiotic Dynamics, and Language*; http://pil.phys.uniroma1.it/erice2007.
2. Axelrod, R. *The Evolution of Cooperation* (Basic Books, New York, 1984).
3. Steels, L. *Connection Science* **17,** 213–230 (2005).
4. Yule, U. G. *Phil. Trans. R. Soc. Lond.* **213,** 21–87 (1925).
5. Cattuto, C., Loreto, V. & Pietronero, L. *Proc. Natl Acad. Sci.* **104,** 1461–1464 (2007).
6. http://www.tagora-project.eu

WOLFGANG PANOFSKY

Man and machine



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If ever a career exemplified the stunningly rapid development of high-energy physics since the Second World War, it was that of Wolfgang Panofsky. In 1950, working at the pioneering 184-inch cyclotron in Berkeley, California, he was one of the first to produce a particle in an accelerator, confirming the existence of the neutral pion. His undoubtedly greatest achievement was the building in the 1960s of the 3.2-km-long accelerator at the Stanford Linear Accelerator Center, SLAC. On his retirement from SLAC in 1984, after 23 years as the facility's director, what had become the standard model of particle physics was largely complete — in no small measure through discoveries made under his aegis.

Of Jewish stock, Panofsky was born in Berlin in 1919 and raised in Hamburg, where his father was a professor of art history. Fleeing Germany with his family in 1934, he reached Berkeley via Princeton University, Caltech and the wartime Manhattan project, where he designed a device for measuring the pressure wave from the first nuclear bombs detonated over the Nevada desert.

His production of the neutral pion at Berkeley after the war, in collaboration with Jack Steinberger, was a masterwork of experiment. Cecil Powell, César Lattes and Giuseppe Occhialini of the University of Bristol had just discovered pions in cosmic rays, and the Berkeley cyclotron had produced the first charged pions in 1948. But the neutral pion's lack of charge made it impossible to spot directly in the photographic emulsions then used for tracking particles. Its existence had instead to be inferred from the energy and angular distributions of electrons produced following the pion's initial decay into photons.

In 1951, Panofsky left Berkeley for Stanford in protest at the insistence that he sign the McCarthyite anticommunist oath. He worked on upgrading Stanford's existing electron accelerator, while lobbying hard for a more powerful machine. The green light for SLAC — at $114 million, then the most expensive physics facility ever built — came from the US Congress in 1961, and Panofsky became the centre's founding director. Shares of three Nobel prizes were awarded for work during his tenure: to Burton Richter (1976) for the discovery of the J/Ψ charmed meson; to Richard Taylor (1990) for fleshing out the quark model through studies of electron–proton scattering; and to Martin Perl (1995) for the discovery of the heaviest lepton, the tau.

Wolfgang Panofsky's history and wartime experience gave him great moral authority in the sabre-rattling of the cold war. He was an advisor to US administrations from Eisenhower to Carter on nuclear proliferation, and was instrumental in securing both the atmospheric test-ban treaty (1963) and the anti-ballistic-missile treaty (1972). At SLAC, he fostered scientific exchange with the Soviet Union and China as a direct contribution to *détente*. Such issues continued to move him in retirement: he excoriated current US nuclear policy as an "overly broad and obsolete relic of the cold war" at a public colloquium at SLAC in March this year. He died on 24 September, aged 88.

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