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From the Editor

Alvin White
Harvey Mudd College

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The Exxon Education Foundation is celebrating its 40th anniversary in 1995. The Mathematics Education Program of the Foundation, begun in 1987, has supported, encouraged, and made possible so many activities that the landscape of mathematics has been transformed and beautified.

Allyn Jackson was asked by the Foundation to listen to the "voices from the reform movement" and to tell what she had learned. Our journal is pleased to reprint her essay. We read about the K-3 Mathematics Specialist Program, the MSEB and other programs started or helped by the EEF; it is tempting to believe that because of their support, mathematics is flourishing and improving almost everywhere. The spirit of their support has certainly improved mathematics over a broad swath at all levels.

This journal began the same year as the EEF Mathematics Education Program, and both the readers and the contributors have benefited from the program's support.

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Abe Shenitzer has treated us to a translation of a lecture by Hermann Weyl that appears in *The American Mathematical Monthly* Vol.102, No.5, May 1995. I quote the early part of the lecture because, I believe, it describes a part of the Humanistic Mathematics Network.

Weyl quotes Klein about the importance of intuition. He also describes the true Dirichlet principle: to conquer problems with a minimum of blind concentration and a maximum of insightful thoughts.

Weyl continues: "The great art is in the first, analytic, step of appropriate separation and generalization.... Perhaps the only criterion of the naturalness of a severance and an associated generalization is their fruitfulness."

Humanistic Mathematics is in the spirit of Weyl, Wilder, Whitehead.... We who associate with the spirit and the network have a rich heritage from which to draw encouragement.

Thanks again to Abe Shenitzer and the MAA.

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Excerpts from "...Two Roads of Mathematical Comprehension" by Hermann Weyl

We are not very pleased when we are forced to accept a mathematical truth by virtue of a complicated chain of formal conclusions and computations, which we traverse blindly, link by link, feeling our way by touch. We want first an overview of the aim and of the road; we want to understand *[article continues on back cover]*

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the *idea* of the proof, the deeper context. A modern mathematical proof is not very different from a modern machine, or a modern test setup: the simple fundamental principles are hidden and almost invisible under a mass of technical details. When discussing Riemann in his lectures on the history of mathematics in the 19th century, Felix Klein said:

> Undoubtedly, the capstone of every mathematical theory is a convincing proof of all of its assertions. Undoubtedly, mathematics inculpates itself when it foregoes convincing proofs. But the mystery of brilliant productivity will always be the posing of new questions, the anticipation of new theorems that make accessible valuable results and connections. Without the creation of new viewpoints, without the statement of new aims, mathematics would soon exhaust itself in the rigor of its logical proofs and begin to stagnate as its substance vanishes. Thus, in a sense, mathematics has been most advanced by those who distinguished themselves by intuition rather than by rigorous proofs.

Recently, there have been attempts in the philosophy of science to contrast understanding, the art of interpretation as the basis of the humanities, with scientific explanation, and the words intuition and understanding have been invested in this philosophy with a certain mystical halo, an intrinsic depth and immediacy. In mathematics, we prefer to look at things somewhat more soberly. I cannot enter into these matters here, and it strikes me as very difficult to give a precise analysis of the relevant mental acts. But at least I can single out, from the many characteristics of the process of understanding, one that is of decisive importance.

One separates in a natural way the different aspects of a subject of mathematical investigation, makes each accessible through its own relatively narrow and easily surveyable group of assumptions, and returns to the complex whole by combining by combining the appropriately specialized partial results. This last synthetic step is purely mechanical. The great art is in the first, analytic, step of appropriate separation and generalization.

The mathematics of the last few decades has revelled in generalizations and formalizations. But to think that mathematics pursues generality for the sake of generality is to misunderstand the sound truth that a natural generalization *simplifies* by reducing the number of assumptions and by thus letting us understand certain aspects of a disarranged whole. Of course, it can happen that different directions of generalization enable us to understand different aspects of a particular concrete issue. Then it is subjective and dogmatic arbitrariness to speak of the true ground, the true source of an issue. Perhaps the only criterion of the naturalness of a severance and an associated generalization is their fruitfulness.