ERROR

by John H. Lienhard

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Today, let us dare to make a mistake. The University of Houston's College of Engineering presents this series about the machines that make our civilization run, and the people whose ingenuity created them.

My favorite among Josquin Desprez's motets is an odd piece, *Tu Pauperum Refugium* -- Thou art the Refuge of the Poor. It begins with soul-settling chords. Then it moves off into the complex polyphony Josquin so perfected 500 years ago.

The text recites the attributes of God -- "alleviator of weakness, hope of the exiled." But when Josquin reaches the line, "path for the erring," a strange thing happens. The grand order of the music seems to break down. The countertenor line stumbles about like a man lost in the woods. Where is it going?

Josquin had the mind of a linguist. His music is rich in word games and subtle text settings. What he does here is to teach us all a lesson about the word *error*.

It's from the same root as *errant*, which means embarked on a searching journey. Five hundred years ago, the two meanings were closer together. A person in error was a person searching for the truth. So Josquin's errant countertenors search for order.

Lewis Thomas picks up on that theme as he looks at DNA molecules. Surely DNA is nature's most wonderful invention. It's been the formative element of all life on Earth. DNA replicates us today just as it did when we were no more than primordial slime.

DNA is a marvel in the way it flawlessly replicates any living species -- well, almost flawlessly. For the DNA molecule does err. Every now and then it makes errors and provides mutations that change living species.

Thomas points out that if humans had designed DNA, they'd have found a way to get rid of that design flaw. And if they had, we'd still be no more than anaerobic bacteria. There never would've been a Josquin.

So DNA makes its errors -- living species do change. And I find a line of Chaucer, written a generation before Josquin's birth. In it, Troylus cries, "O weary ghost, that errest to and fro." Troylus tells the painful wandering of his own spirit since he lost Cressida. In this sense, erring is far more than simple blundering. It is searching for answers.

That's what Josquin was telling us about human error. It is the path of our search. That's how DNA works. Through repeated error it searches out new life forms.

Today we begin to see that's the core of the creative process. Engineering design teams are learning to make errors rapidly and correct them. To create is to wander off the path, to be errant, to start in one place so we might, in the end, find another place we never dreamed was even there.

I'm John Lienhard, at the University of Houston, where we're interested in the way inventive minds work.

(Theme music)

Thomas, L., *The Medusa and the Snail: More Notes of a Biology Watcher*. New York: Bantam Books, 1980.

See entries under *err*, *error*, and *errant* in the *Oxford English Dictionary*, 2nd ed. (J.A. Simpson and E.S.C. Weiner, eds.). Oxford: Clarendon Press, 1989.

For the Josquin piece, see, e.g., Davison, A.T., and Apel, W., *Historical Anthology of Music*. Cambridge, MA: Harvard University Press, 1957, pp. 92-93 and 249.

For more on Josquin, see Episode 1166. For a picture of Josquin and an extract from the *New Grove*, see the following website:

http://w3.rz-berlin.mpg.de/cmp/josquin.html.

The complete text of the *Tu Pauperum* motet is:

Tu pauperum refugium,
tu languorum remedium,
spes exsulum,
fortitudo laborantium,
via errantium,
veritas et vita.
Et nunc redemptor Domine,
ad te solum confugio,
te veru Deum adoro,
in te spero,
In te confido,
salus mea, Jesu Christe
Adjuva me,
ne unquam ob dormiat in morte anima mea.

The English translation is:

Thou art the refuge of the poor,
alleviator of weakness,
hope of the exiled,
strength of the heavy laden,
path for the erring,
truth and life.
And now, Lord Redeemer,
I take refuge in Thee alone;
I worship Thee, the true God.
in Thee I hope,
in Thee I trust,
My salvation, Jesus Christ,
uphold me,
that my soul may never sleep in death.