Art and Science

There seems to be an ancient struggle in human conceptual evolution between what might be called the *yin* and *yang* of epistemology (the study of learning and knowing): on the *yin* (receptive, peaceful) side is what I would call *knowledge of the Particular*, or the primitive, intimate knowledge of an instant's experience of reality, without words or explanations or internal dialogue. There are many names (ironically) for this form of knowing, some popular today, such as "Being Here Now," or "Surrender to the *Tao*." There is no denying that a wise person seeks this form of knowledge. The other, *yang* (creative, aggressive) side of knowing I call *knowledge of the Abstract*, which is intrinsically verbal — it is the passion for *naming* which sets humans apart (for better or worse) from other reasonably intelligent animals. And it is the answer to "What's in a name?" — namely, everything we know *that can be communicated* about the thing named. This side has numerous hazards for us, but it is essential for the existence of communication or the improvement of "comprehension."

Here is a tidy example of the distinction between these two forms of knowing: suppose you are walking in the woods and come upon a tiny flower growing in the shade of a large tree; suppose you have never seen a flower like this one before. On the one hand, your *experience* of *this particular flower* can be deepened and explored: smell the flower, study it from all sides, touch it, lie down in the pine needles and look up through the branches to get the flower's viewpoint on things, etc. In all this you are best served by a *lack of words* and a receptive spirit. On the other hand, you can tell by the structure of the stamen, etc., that this is an *orchid* and probably (since it is on a red stem with no leaves) a specied of "coralroot" — perhaps a new variety of *corallorhiza maculata*. And so on. There is real satisfaction in finding a verbal "box" to put this experience in for classification, categorization, filing and retrieval. If we were dealing with a brightly coloured *snake*, rather than a flower, the practical value of the *yang* form of knowing would be more obvious.

Physics, like most philosophy, is devoted to knowledge of the Abstract. This is not to say that physicists are disinterested in knowledge of the Particular, either in their personal lives or in the laboratory; but I believe they agree almost unanimously upon the *yang* principle as the æsthetic basis for their work. All sciences are not necessarily so devoted to Abstraction; a more *empirical* science will attach more significance to Particular information, and this is neither good nor bad — it is merely in æsthetic discord with the "spirit" of Physics.

Such conflict can grow more acute at the ill-defined interface between "science" (æsthetically yang-based pursuits) and "art" (æsthetically yin-based pursuits), and this sometimes leads to unpleasant misunderstandings in which an insecure scientist will label all artists as ignorant buffoons or an insecure artist will lash out at all scientists as callous androids. (Brilliant members of both species rarely need to elevate their own importance by downgrading others.) From the silly coffee-room dispute between "pure" and "applied" physicists over what constitutes valid or "legitimate" science to the total alienation of a culture from the technology on which it depends for survival, all such conflicts are pitiful stupidity. To be human involves an integration of both ways of knowing, and neither a poet nor a physicist can perform competently without this integration.

This interdependence is nowhere as obvious as in the *tools* used by physicists and poets. How, for instance, does either devise a means for expressing a truly new idea? (For surely the goal of poetry is to say what has never before been said in quite the same way — *i.e.* to create a new idea/feeling for the reader/listener.) One seemingly logical answer is that there *is* no way; that language includes a finite number of ideas and images which can be expressed by a finite number of words or combinations of words, and that this large but finite space of old ideas can never be escaped through language. This notion is the source of the pessimistic aphorism "There's nothing new under the sun." It is patently absurd, inasmuch as all languages were once nonexistent and were built up gradually — are still in the process of being created today, mostly by poets and their close relatives. This process is called *Emergence* by Michael Polanyi, my favorite modern philosopher, who used to be a physical chemist. As he carefully points out, the same is true of Physics, the poetry of nature: new ideas are always Emerging as older ideas become familiar and "tacit."

To return to the original question, how does this happen? What is the essential mechanism for Emergence in both science and art? The answer, I believe, is that *metaphor* (and its less ambitious ally, *simile*) is the vehicle for all Emergence of ideas and feelings, whether we are explicitly aware of it or not. Half the descriptive idioms in our language involve explicitly metaphorical images ("leaf" through a book?) which vividly convey the desired idea and at the same time add to the connotative richness of the individual words; these images were originally created by poets (for my purposes a "poet" is defined as one who creates new language through such images). Similarly, in Physics we speak of "isospin" as a particle property, even though it certainly has nothing to do with rotation in normal space, because this esoteric quantity seems to have transformation properties analogous to those of angular momentum. The metaphor is a little more explicit and a little less tangible to everyday experience than "leafing," but the same process is at work.

Thus today's Physics rests, like today's language, on a monumental pyramid of metaphors and similes, leading back to our most primitive notions of space and time and force, which are ultimately indefinable. When I subtitled this *HyperReference* "Physics *as* Poetry" I was being most literal-minded!

Table 1.1 The Great False Dichotomy

KNOWLEDGE OF THE PARTICULAR	*vs.*	**KNOWLEDGE OF THE ABSTRACT**
YIN the Receptive	← **THEME** →	*YANG* the Creative
Perceptual Private Intimate Wordless Accepting Wondering Intuitive	**QUALITIES and ACTIVITIES**	Analytical Extrovert Impersonal Communicative Cataloguing Naming Logical
Calm Peaceful Integrated Mystical	**EFFECTS**	Impatient Agressive Alienated Egotistical
Vast but Unreliable & Inconsistent	**POWERS**	Circumscribed but Reliable & Predictable
Aristotle (details = essence)	**Classical Protagonists**	Plato, Galileo (ideal = essence)
ART & MAGIC	**MODERN POLITICAL DIVISION**	SCIENCE & TECHNOLOGY