seem to have a "scientific" character. The analysis might be regarded also as normative for efforts seeking an underlying unity between scientific and religious knowing.

In discussing these ideas, especially in the latter half of this paper, I will draw upon the ideas of the philosopher, Michael Polanyi. Polanyi's thought has been extensively utilized and cited as a bridge between science and religion, but discussion of his ideas so far has focused mainly on the implications of his post-critical philosophy for Christian theology. I would propose that his ideas are relevant to Eastern and non-mainstream Western religions as well, although Polanyi did not himself address these traditions to any significant extent.

Polanyi's distinction between "verification" and "validation" is useful to introduce the notion of the "inner sciences" by distinguishing between the relationship between modern science and the mainstream traditions as compared to that between modern science and Eastern (and some Western) traditions. Polanyi regarded religion as offering, as does science, a systematic mode of ordering our experience, and considered that a process of a "validation" in religious experience was analogous to the process of "verification" in science.

> "The acceptance of different kinds of articulate systems as mental dwelling places is arrived at by a process of gradual appreciation, and all these acceptances depend to some extent on the content of relevant experiences; but the bearing of natural science on facts is much more specific than that of mathematics, religion, or the various arts. It is justifiable, therefore, to speak of the verification of science by experience in the sense which would not apply to other articulate systems. The process by which other systems than science are tested and finally accepted may be called, by contrast, a process of validation…"

This distinction, between verification and validation seems useful for distinguishing between modern science and Western religion, but for the Eastern traditions, verification seems an appropriate concept, as we shall see, since these traditions can be viewed as sciences in which knowledge is tested in individual experience.

2. The "Inner Sciences"

The starting point for this analysis is the observation that some Eastern and Western spiritual disciplines, such as Zen, Yoga, Sufism, Tibetan, Buddhism, etc., can be regarded as constituting "inner sciences," disciplines in which the experimenter, experimental materials, and apparatus, are all simply the individual him – or herself, and whose aim, at least in the initial stages, is the gaining of self – knowledge.

To be more specific: spiritual disciplines generally include inner experiments and exercises of various kinds. These include, for example, the vocal or silent utterance (and repetition) of sounds (mantras), internal visualizations or meditation upon external visual symbols (mandalas), gestures, postures, and/or movements (mudras, yogic positions, devotional or meditative dance forms), efforts to focus concentration or expand awareness or monitor thoughts, sensations, etc. Exercises may involve ordinary physical

activity, such as manual labor, crafts, etc., and may extend to social behavior, i.e., to interactions which family, friends, coworkers, etc., and to relations with nature.

In so far as the researcher and the subject of research is the same, and thus knowledge is personal both in what it concerns and by whom it is used, these inner sciences differ from the science of psychology, in which the roles of researcher and subject are usually distinct and whose goal, like that of all the sciences, is the production of a publicly available store of a general knowledge and technique, which benefits individuals only indirectly, after a gradual process of societal diffusion, assimilation, and application.

The effective performance of these exercises, like laboratory experiments, requires commitment, skill, and understanding. Conditions for performing these requirements and results obtained may be, as Charles Tart has noted, “state specific,” i.e., they depend on the state of the experimenter’s body, feelings, mind, and consciousness, and his or her degree of moral and spiritual attainment.

Traditional yogic practice, for example, encompassed widespread investigation of internal sensations and the possibility of their manipulation. This entire field of exploration has stimulated investigation by the tools of modern science – the whole field of biofeedback research. While once the possibility of conscious control of autonomic processes was dismissed by science, the yogis long ago knew that this was possible.

More subtle and more difficult is experimentation which focuses on the relation of the individual to his/her external world, to personal and social interactions. The research typically yields both new findings about oneself and the world, and the discovery of the incorrectness of previously held views. It has the taste of scientific activity most vividly in the shock of unanticipated, indeed, often unwelcome results, in the need to repeat experiments, and in the difficulty of dispelling, or even detecting, preconceived biases. The goal of these experiments is, as has been suggested, the acquisition of "personal knowledge," in the sense of Polanyi - and the sense of Socrates.

3. Theory

The doctrines of these traditions often embody sophisticated theories for which the experimental results can provide confirmation. When these theories seem to have some discernable structure, they often seem to be “systems theories,” that is theories which emphasize the similarity of relationships between different phenomena, even between phenomena at different scales. Alchemy (which seems to have received little attention in the new religious movements although the Jungians seem to have taken up its study) illustrates this clearly: there was presumed to be an isomorphism between external chemical and internal psychic phenomena. The Hermetic credo, “As above, so below,” also illustrates this mode of thought. Chinese religious philosophy emphasized “correlative tabulations,” as Needham has noted; these too are systems theories. Many forms of number mysticism also illustrate this approach.

In the inner sciences, theory is often veiled, or the exercises indirectly related to the doctrine, to counter tendencies towards suggestibility and thus promote genuine

empirical study. Sometimes even, exercises may be given which are actually impossible to accomplish; this promotes the integrity of research and deepens investigation. The objective is the experimental tasting of reality and not its theoretical formulation, and esotericism is one means used to promote this objective. The theory is scaffolding, not the actual building, which is a personal construction and the result of individual work. As an inner scientist, the mystic is an empiricist, and belief is only hypothesis yet untested. In this de-emphasis on, and in some instances, scorn for, intellectualizing and theory-building, the inner sciences differ sharply from conventional science, as well as from Western intellectual traditions which might seem to resemble Eastern thought, such as the phenomenological movement, or "pre-scientific" introspectionist psychology.

4. Sociology

In some traditions, the results of experimentation are discussed with others in, as it were, scientific meetings, at which individuals report their efforts and findings.

Techniques are shared, and experiences confirmed by others, while the exchange energizes the participants, and suggest new ideas for study. Often the group undertakes a common line of investigation.

The relation of disciple to teacher resembles, in a way, the apprenticeship of a graduate student to a faculty researcher. The student independently pursues his or her own “project" with periodic counseling from the advisor, or often a senior assistant, who is engaged in similar study at a more advanced level. This is obviously only partial view of the teacher-student relationship within this kind of religious practice, but it does highlight some features actually present in such relationships, which are not normally associated with the more familiar image of guru and chela, or the Western model of therapist and patient.

In this research mode of spiritual guidance, little use is made of transference; indeed it is assiduously undermined. The identification of the student with the person of the teacher or the founder of the religious movement interferes in the student’s capacity for independent and unbiased investigation. Even the ideas of the teacher finally become a stumbling block to further progress. The aphorism, “*do not follow in the footsteps of the ancients; seek what they sought”* expresses this understanding. Nonetheless, the student is ill advised to undertake independent experimentation before some significant measure of competence and judgment has been achieved. An initial period of apprenticeship is virtually always necessary.

And it is not uncommon for young monks to round out their training by going to other labs.

5. Technology

Implicit in the notion of an inner science is that of a corresponding technology, which supports the scientific endeavor, i.e., provides the tools of experimentation, and also develops as a result of it. (Arica, for example, once explicitly advertised itself as offering

a “spiritual technology.” Transcendental Meditation has something of a similar character.)

But this technology is fundamentally a “tacit” one (Polanyi), and here is a source of one of many differences between the inner and outer or conventional sciences. While it may appear that many spiritual "techniques" are quite specifiable, such as those involving sounds or postures, the efficacy of these methods depend upon an irreducible tacit or unspecifiable component, and as the researcher advances in his or her practice, the domain of the tacit grows. Yet this does not preclude communication between persons having common experiences; it merely requires that communication be subtle and skillful and that a certain intimate relationship exist between participating individuals.

In the inner sciences, too, technology can subvert. The subverting in this domain means the utilization of spiritual techniques for purposes foreign to the spiritual undertaking. For example, there exist techniques and exercises for the development of will; at the service of ego, these not only become obstacles for further development, bur can actually have harmful effects on oneself or others. Gide’s *Lafcadio’s Adventures* can serve to illustrate this point clearly, though it is not at all about a spiritual journey. Actually, one might well regard this as a story of “black magic” (magic not serving the values of a spiritual undertaking). Huxley’s *Grey Eminence* is a more direct example: Father Joseph, the “eminence grise” behind the power of Cardinal Richelieu, was – at least in Huxley’s account – was deeply involved in spiritual discipline, and this involvement gave him added strength and charisma which helped him launch the Thirty Years War, which cost very many lives. (France, Father Joseph was certain, was the instrument of God).

In the Eastern traditions, the worship of technology for its own sake and for the personal benefits to be derived from it is warned against. Siddhis or (magical powers) are supposed to accrue to those who persist in their spiritual practice. Leaving aside completely the question of whether such powers actually exist, and are not metaphors for capacities that would not really challenge the Western scientific world view, we can note that in the all the traditions, the seeker is warned against the search for or the indulgence or fascination in these siddhis.

We are familiar with the ways in which modern technology may be and has actually been abused. This occurs at a micro level, at the level of the person (say the habitual ingestion of powerful chemical agents), and at the macro level at the level of society (e.g., the development of improved techniques for massive mutual annihilation in war). There are perhaps comparable abuses of inner technologies. The undisciplined and unsupervised (or wrongly supervised) seeker can destroy her or her psyche and personality. This is the negative aspect of some “cults” that so concern many of us. But there are societal abuses and societal harm. Koestler’s *The Lotus and The Robot* might be regarded in part as an indictment of the harm brought to Indian culture by the excessive dominance of the philosophy and practice of yoga.

There is still a deep anomaly in the relationship between the inner sciences and the technologies associated with them. The very existence of such a distinction constitutes a

contradiction and a barrier to the seeker. The learning of technique binds the learner to technique and to the striving for results from its application, a striving which is counterproductive. Krishnamurti, despite – or perhaps because of – his Indian heritage, disowns all techniques of meditation, such as mantras, as mind stultifying rather than mind liberating. One way of dealing with this contradiction is to embrace it and work with it; hence, perhaps, the ubiquitous use of paradox in many traditions, e.g., Zen. Still, the contradiction is unavoidable. The beginner needs technique and must be motivated at least in part by egoistic goals; indeed at all stages the seeker is so motivated. Ideally, there should be no separation between method and the spiritual undertaking which it serves, between inner science and inner technology, but one cannot start at this point. The Sufis prescribe this formula: “First quit the world. Then, quit quitting.”

6. Personal Knowledge

In ordinary knowledge, including that gained by scientific research, the “personal,” Polanyi asserts, is other and more than the merely subjective. It is the embodiment of the universal, in so far as it entails a dedication to truth, independent of its advantage or disadvantage to its recipient. As Polanyi notes:

> "... we may distinguish between the personal in us, which actively enters into our commitments, and our subjective states, in which we merely endure our feelings. The distinction establishes the conception of the personal, which is neither subjective nor objective. In so far as the personal submits to requirements acknowledged by itself as independent of itself, it is not subjective; but in so far as it is an action guided by individual passions, it is not objective either. It transcends the disjunction between subjective and objective."

Polanyi here calls attention to the fact that the scientist submits internally to accepted "scientific standards for the appraisal and guidance of his efforts," yet is simultaneously guided by his or her own hopes, expectations, or curiosity. The subjective side affirms an idea or theory; the objective side denies, i.e., imposes constraints of acceptability. Or from another perspective, it is the reverse: the world of science gives the impetus, and defines the problem, and it is the subjective world of the scientist which accepts the challenge and provides the resources. The personal is the synthesis of the two, the ground on which they are joined. In this dialectic is located much of the deep spiritual value in science.

To the extent that the submission referred to earlier is not merely an introjection of the standards of the scientific community and internalization of the requirements of professional survival, to the extent that the acceptance of objective standards is assimilated into the being of the scientist as a respect for, even a love of, the truth, to this degree is science truly ennobled by its aspirations to objectivity. This submission is a real phenomenon. It is a personal accomplishment whose presence or absence is often discernable in the training of young scientists, who differ greatly in the degree to which enthusiasm is successfully blended with a critical faculty. One can detect in many scientists an attitude of genuine impartiality, very close to a spirit of non-attachment.

However, this achievement is not common, and is usually partial, influencing only that part of the scientist's personality engaged in professional or intellectual matters. It is an achievement which is respected within the community, but which is not actually necessary to the success of the scientific enterprise, whose objectivity and hence progressive nature is guaranteed primarily by automatic social mechanisms.

There is a similar relationship between the subjective, the objective, and the personal in the inner sciences, although the situation is more complicated. The subjective is in the seeking of the student and willingness to experiment, in the resources for self-study, and most especially in the subject matter itself. The objective to which the individual must submit, in Buddhist terms, for example, is the Buddha, which may represent the historical person of the original teacher or have a deeper metaphysical meaning, The Dharma, the teachings, and the Sangha, the community of seekers.

It is in the personal that these two worlds are joined, that the mysterious reconciliation of the unique and the universal is accomplished. The personal characteristics of spiritual teachers vary considerably, but the Dharma is one. There is a Hasidic story retold by Buber about a rabbi who was asked by his disciples why he did not follow the practices of this own former teacher. Puzzled, the rabbi asserted that he did indeed follow his teacher, but this did not satisfy his students, who protested that in this or that matter the rabbi departed from earlier practice. Finally, the rabbi settled the matter: "I follow the Master exactly. He did not imitate, and I do not imitate." The universal must be manifested in the personal, via a synthesis which bears the idiosyncratic stamp of an individual who struggled and came to understand. Hence, the aphorism, “beware the guru who does not have his own doctrine”. There is both glory and tragedy in this achievement: The contribution of the subjective is necessary, but much misunderstanding and error flows from it. The paradoxical interdependence of universal and personal knowledge is apparent not only in the figures of the great teachers. Even a beginner on the way has some experience of it.

A commitment to objectivity is the hallmark of the personal. In the inner sciences, the field of experimentation covers one's entire life and thus objectivity is more difficult, and the ability to be objective cannot be assumed. Indeed it is a goal of training. Objectivity is not only a value; it is actually a spiritual “power”. It is not a faculty of thought, but a context in which thought can be received. It is a capacity which applies as well to emotion and sensation, and does not diminish, but rather intensifies them. Meditation might be regarded as training to be impartial, and the development of an internal “witness” is an important preliminary accomplishment in a number of traditions. The difficulty of being objective about anything is valuable knowledge which spiritual teachings try to make accessible to their followers.

It is perhaps ironic that in the 1970’s countercultural critiques of science should attribute its dehumanizing and alienating effects in our culture to its aspirations towards "objective consciousness," when in fact, objectivity is a value held in common by both modern science and spiritual tradition, and is one basis for a meaningful dialogue between the two. Of course, what writers such as Roszak are attacking is the devaluation of personal

experience which seems so salient a feature of the prevailing ideology of science, and here Polanyi stands with the critics in his rejection of positivism and in his insistence that our conception of science must reflect the fact that knowledge is intrinsically personal.

But in this attempt to fashion a human-centered image of science, Polanyi has prepared the ground for a new and deeper criticism of science, one which I do not assume he would have supported. If knowledge to be meaningful must be personal, we may ask if this condition is sufficient or merely necessary. How meaningful, actually, is this knowledge of the scientist? As the possession of the social collectivity, it is certainly "meaningful"; at least in the sense that it has affected every aspect of human life. But what is its significance to the scientist?

And how does it compare to the knowledge gained in the "inner sciences"? We might ponder the words of Don Juan to Castaneda, after the two have just met, and the latter is condescendingly granting the status of equal to the uneducated Indian with whom he is speaking. Don Juan says to the anthropologist that he is a pimp, because the knowledge he gathers is not for him self, but for others. The quarrel here is not with the pursuit of knowledge to better the human condition. The deep achievement claimed for science is rather that it brings us to a fuller understanding of the universe. Don Juan denies this. Scientific knowledge, while having a personal component does not, by comparison with the knowledge of the yogi (or sorcerer), belong to the scientist. It is knowledge which is only slightly "embodied," and barely tasted, hence (or one reason for) the insatiable appetite for new research fields, new discoveries, as if some new knowledge might finally satisfy. From the point of view of the meditational disciplines, the knowledge of science serves mainly ego, and can be assimilated only by thought, leaving us in fragmented relation with our feelings and sensations.

There are certainly exceptions. I remember being almost startled by the words of a scientist friend and teacher of mine who, in a discussion of "mysticism," said to me (I paraphrase)

> "I do not need it. When I fly on an airplane, I understand how it flies, and when I see a blade of grass, I understand also something of its function. So I feel in relation to the world, and not apart from it."

But for the majority of scientists, the personal element of scientific knowledge does not penetrate widely into other spheres of individual experience, or deeply into being, and so remains unrelated to the whole, and therefore alienated.

While personal knowledge is necessary for scientific creativity and is the embodiment of scientific understanding, it is not, as in the inner sciences, intrinsically valued as a source of personal development. That a scientific career might contribute to the unfolding of wisdom and the purification of character is an unfamiliar proposition. Certainly, the organization of scientific activity is not directed at such aims. But could it be? Could one imagine science as a sadhanna, or spiritual path? Can one conceive of science returning, as Roszak urges, to "gnosis" as its framework and purpose?

These are questions raised by a consideration of the personal element in science, and by an interpretation of the spiritual disciplines as inner sciences. From this juxtaposition, we can derive a critique of science and a new conception of its possibilities. We also find the basis for a dialogue between science and religion, of a kind different from the interaction to which we have become accustomed, and perhaps also an entrée into Eastern tradition congenial to temperaments molded by a science-dominated culture. Indeed, it may well be the scientistic aspects of some of the “new religions” which has made them so attractive to westerners.

But on this last suggestion, and before concluding this essay, a cautionary note, perhaps even a disclaimer, must be repeated. The conception of spiritual disciplines as sciences is a limited perspective, which illuminates some aspects of these traditions, and might even contribute to a strengthening and purification of religious practice. But there are many more major differences between the "inner" and "outer" sciences than have here been noted. The metaphor is limited, and if taken too literally, it will assuredly obscure more than it illuminates. It is a conception which should probably be discarded as soon as it is grasped.