## 4.4 Contradictory reality and mathematics: A contradiction?

At this point let me try to relate back to the first section of the first chapter on christian and buddhist epistemology. Theories, certainly including theories built around human needs, are formulated in languages. They are expressions of thought about some aspect of reality. And that brings up the whole question of relationship between reality, thought and language, a rather basic problem in philosophy, and certainly a problem about which no philosopher has been able to come up with anything like a final answer (not by that implying that there are final answers to anything at all).

The present effort to explore this trilateral relationship will take as its point of departure that classical effort to keep the three apart, Ogden's triangle[1] (drawn here perhaps in a somewhat unusual way):

FIGURE 1.   Ogden's triangle, separating things-concepts-terms

R E A L I T Y   T H O U G H T

things   concepts
states of affairs   propositions

terms
sentences
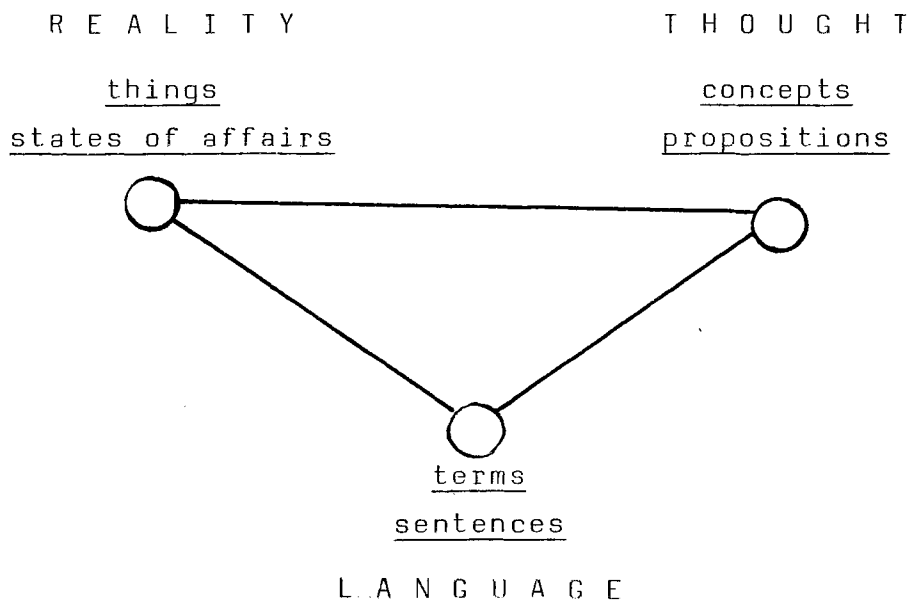
L A N G U A G E

A term in a language has a denotation, the thing it denotes; and a connotation, the concept it represents. At a more complex level a sentence denotes a state of affairs and connotes a proposition. At a still more complex level we get into texts and contexts. A positive, indeed very useful, aspect of Ogden's triangle can now be formulated: it is symmetric, equilateral, can be turned around with any corner up top. There is no built in assumption that any corner is primary, the other two being derivative. That also reflects the agnosticism of the present author on that issue: I do not see sufficient reason to assume that language unambiguously shapes thinking or constructs reality just as little as I would assume that language is the perfect verbalization of man's encounter with reality, first reflected in thoughts. Nor would I assume any basis for thought as a clearing house between reality and language. Rather, I would see mutual influence, impact, even steering, but always filled with ambiguity and latitude, in all relations in the triangle.

Let us now try to cut into this triangle with one basic theme of analysis: contradiction vs. consistency, looking at this theme from the three corners of the triangle.

Reality and contradiction vs. consistency

I am not in a position to say what reality is; all I think I can say something about is how reality is constructed. However, I do not relate those constructions to thought and language as such, but rather to deeper lying assumptions in a civilization,

what is customarily referred to as "religion". Constructions
of reality then become explications of those assumptions.

Let me give two personally experienced examples of ways of
imputing what might even be called basic contradictions to
reality. The first example picks up the buddhist application
of the principle of impermanence anicca to human beings in the
doctrine of anatta, the assumption that human beings do not
possess a permanent Self. On the other hand, buddhism also has
a doctrine of rebirth in the sansara cycle, whereby the vital
forces recohere in another human being.[2]

Learning this in a buddhist community in Southeast Asia
I went to the bhikkhu, the monk and complained: this is a
contradiction. His answer, to my surprise, was neither to deny that
there was a contradiction, nor to resolve the contradiction
through what I expected, reinterpretation of such crucial con-
cepts as "Self", "rebirth"; or the anatta doctrine and the re-
birth doctrine. What he said was this: "yes, there is a
contradiction there, and with that contradiction you can live,
you can work on the contradiction and the contradiction will work
on you".

Leaving aside the implication of that statement for buddhist
philosophy let me point to the general implication; an approach
to contradiction excluding denial and resolution on the one
hand, and passive acceptance of the contradiction on the other.
I shall return to this point, only noting what here on the printed

page might look very naive: the sentence struck me (with some

eight years of university studies in mathematics and consider-

ably more than that of initiation in western civilization) as

a lightening bolt. Let me only add that from the bhikkhu

the sentence came just like that, an everyday statement, as a

matter-of-fact--and it was certainly not pronounced by a person

with university training in philosophy or anything similar.

My second example comes from the same part of the world

but is political rather than religious. What I now quote

summarizes a number of statements I have heard from Chinese

discussing political economy, and I claim that my summary is

fairly typical of Chinese thought. The statement goes approx-

imately as follows:

> "Capitalism is very good because it generates
> economic growth, building on the initiative of
> those who are capable of entrepreneurian activ-
> ity, including taking risks. But capitalism is
> very bad because it generates very rich people
> and very poor people and the rich people tend to
> become too powerful and in addition corrupt, and
> the poor people also become materialistic and
> consumption oriented and often unemployed,
> destitute and prostitute, given to criminal acts
> of various kinds. Consequently, we need socialism,
> which is very good because it is based on planning
> so as to satisfy the basic needs of those in need
> while at the same time putting a lid on the very
> rich people, thereby making for a more egalitar-
> ian society that can be devoted to less material-
> istic goals. However, socialism is very bad be-
> cause it leads to too much concentration of power
> in the hands of the state and consequently becomes
> repressive and in addition static, nondynamic.
> For that reason we need capitalism which is very
> good because-----"

In a simplified form the structure of the argument can be

given as a fourfold table:

FIGURE 2. <u>A double contradiction in political economy</u>

	good	bad
capitalism	dynamic	inequality
socialism	equality	static

It should be noted that the chain of arguments can be started
in any part of the table, and can be run in any direction. How-
ever, the statement above should not be pronounced too slowly.
The more quickly that precious talk on political economy is
pronounced, the better does it reflect what seems to be its
essence: all these qualities obtain at the same point in time
and space, but not with equal strength. Rather than referring
this way of thinking to buddhism it could be referred to daoism
and be seen as an implementation of the generalized <u>yin/yang</u>
scheme in Figure 3:[3]

FIGURE 3. <u>The generalized yin/yang scheme</u>

In any entity there is yin and yang, opposed forces or principles.
However, in yin there is yin and yang and in yang there is yin
and yang so that the yin in yin is dominant and the yang in yin
is recessive (otherwise we would be dealing with yang) and yin
i yang is recessive whereas the yang in yang is dominant
(otherwise we would be dealing with yin). And thus it continues,
as the saying goes with "elephants all the way down". Translated
to the case of Figure 2 one might say that in an entity like a
society capitalism and socialism should not be seen as dominating
the ground alone but as being complementary principles or
opposed forces if one prefers more adversarial language. However,
inside capitalism there are good and bad forces and inside
socialism there are good and bad forces. By adequate transla-
tion some of this may perhaps be brought on a form more
reminiscent of standard interpretations of yin and yang as
female/male, dark/light. But this seems unimportant, epistemolog-
ically uninteresting.

The basic point is the following: a statement about a
society can never be in terms of giving that society one attri-
bute alone unless that attribute should be the term "contra-
dictory". Doing so, however, does not add to our knowledge, it
is a truism within this universe of discourse. What is not a
truism is to spell out the contradictory forces or principles,
for instance in the way it is done in Figure 2.   But it should
be noted that Figure 2 only brings us to Level 2 of exploration. To
this a Level 3 could be added exploring contraditions within all
four cells'of Figure 2. Example: inequality in capitalism is

mainly bad (dominant characteristics) but is also good (re-
cessive characteristics): it stimulates work among those who
want to catch up. This, in turn, is mainly good but it is also
bad: it makes for too much ambitiousness, competiveness,
individualism with lack of solidarity, and so on (the reader
will note that we are right now at Level 4 of analysis).

Does this not mean that the generalized yin/yang scheme
reduces to a pro et contra scheme? I think there is a differ-
ence: the latter refers to language, the yin/yang scheme to
reality. These forces are real in the sense of operating inde-
pendent of human reflecting upon them. But then there is an-
other difference, and this may perhaps be indicated with a
simpler example.

Classical Chinese thought seems to be hesitant in attribut-
ing to a thief the attribute guilty. In guilt there is
certainly guilt but also an element of nonguilt, and every
person is not only guilty but also nonguilty. A westerner
might reply: that means the person is guilty in some respects,
and nonguilty in others. He might look at the person as a
unit moving in a continuum of time and space, analyzable in
terms of a number n of variables,and as he moves in time and
space certificates might be issued, mapping each time-space
point for each variable on a simple set of two elements, G for
guilty and N for nonguilty. The process of doing this might
be referred to as analysis,and the yin/yang description of the
person as guilty and nonguilty will simply be seen as sloppy

description, crude, to be dissolved into its components when exposed to the prism of adequate analysis.

I think a daoist answer to this might be that the basic point has been lost. There is no denial that upon scrutiny, with a finer grid of analysis, the ratio of guilty to non-guilty may change; indeed, a basic assumption is that it would change along the time axis, it is when deviation from a point of balance is excessive (note that this would mean that the totally nonguilty person is not considered harmonious or ideal, an interesting point to contemplate. Even virtue, in excess, becomes a vice--) that problems arise.

But why is it so important that reality should not be contradictory to this homo occidentalis brought into our text? Probably it has something to do with the image of what the Creator created as consistent, contradiction-free. Of course, aspects of reality may look contradictory to us but that is only because we do not understand them. From the highest vantage point there is a consistent plan underlying the universe but fully understandable only to God himself. That understanding can be approximated, though, but only in humility, only by praying to God for a higher level of consciousness, and even so not necessarily granted.

Thought and contradiction vs. consistency

Cutting across the difference in epistemology as they have been constructed in ch. 1.1 above is the principle of adequatio:

there has to be a basic isomorphism between reality and thought.
If reality is contradiction free thought should also be contra-
diction free, whence the classical Laws of thought:

1.   No contradiction: $\sim$ (p & $\sim$ p)
     (consistency)

2.   Excluded middle: $\sim$ p v p
     (<u>tertium non datur</u>)

3.   Principle of identity: (p) p = p

Applying the Laws of thought to the Laws of thought themselves
the <u>tertium non datur</u> principle coincides with   to the con-
sistency principle and the principle of identity is not signi-
ficant for our purpose. Hence, I am left with the theme of
this exploration, contradiction vs. consistency.

    The principle is important because the negation of the
principle makes unambiguous logical deductions impossible. In
classical analysis the relation of implication,"proposition p
implies proposition q"(p $\longrightarrow$ q) is explicated as follows:

p	q	p $\longrightarrow$ q
true	true	true
true	false	false
false	true	true
false	false	true

Proposition p can be true or false, so can proposition q, giving
us four possibilities. Their relationship, p implies q, holds
in three of them but not in the fourth: it does not hold if p
is true and q is false. If, now, p is true, and p $\longrightarrow$ q, then it

follows that q true (modus ponens). If q is false then it follows that p is also false (modus tollens). If p is false nothing definite follows about q and if q is true nothing definite follows about p.

Terribly elementary and terribly important--in western logic. The moment it is assumed that p or q or both can be both true or false no basis any longer exists for implication, and if this relationship is seen as basic in theory formation then theory formation is also out because deduction is out. Admitting contradictions somewhere in the system opens for contradiction everywhere. But in that case a theory will no longer exclude anything, which means that no statement can be validated or invalidated on logical grounds. And this, in turn, means that theories cannot be used to capture reality, holding it so to speak within the confines of the theory. In other words, reality will no longer have any permanence of any kind, static or dynamic, as reflected in the theory. Reality is neither accounted for, nor accountable to, the theory.

A sense of consistency/inconsistency, from this angle, now becomes a condition not only for following the Laws of thought but of being capable of doing so. If these laws are seen as in need of no justification, as apodictic categories, then the only possible conclusion would be that he who does not reason according to the Laws of thought is incapable of thinking, in other words deficient. Consistency deficits becomes a mental health deficit, and from there the road to psychiatrization may be opened. To use the two examples above: "I have no soul and I

am going to be reborn" makes sense in a buddhist context but
not in a christian context; "I believe in capitalism and
socialism" makes sense in a Chinese context but considerably
less so in a U.S. context. With a little bit of patience, how-
ever, the ground may be cleared for a fruitful dialogue in
either case.

Language and contradiction vs. consistency

We may now make use of the distinction between hard and soft
languages, following Nalimov. I shall quote him at some length:[4]

A hard language is here seen as a language not permitting
any ambiguity, in other words a consistent or contradiction-free
language. I would then see logic in general and mathematics
in particular as a language the speakers of which have entered
a community, a corpus mysticum by signing a pact: I may choose
the (primitive) terms I want, define the (primary) sentences
(axioms) I want, and then use the Laws of thought; but always in
such a way that I shall never deduce a sentence (theorem) and
its negation. The axioms themselves have to be consistent; in
addition there should be no redundancy in the set of axioms
(they are all necessary) and the set of axioms should be complete
(they are sufficient as a basis for deciding, for every
correctly formulated sentence in that "dialect" of the mathemat-

ical language, whether the sentence is true or false).

understand the famous theorem by Gödel (1930)[5] to say the following: <u>this is not in general possible</u>. Under certain conditions theorems can be formulated that are un-decidable; it cannot be decided whether they are true or false. I do not see that this is tantamount to saying that Gödel proved that mathematics cannot be contradiction free; what he proved was that we cannot prove that certain parts of mathematics are contradiction free, nor that they are contradictory.

Contradictions enter mathematics, however, through paradoxes of the classical Epimenides type, the famous Cretan reputed to have said "All Cretans are liars", and the problem arises the moment it is ascertained that Epimenides himself is a Cretan. Bertrand Russell's theory of types, excluding from set theory all sets that have themselves as members (thereby confusing the level of element and the level, or type, of set) is seen as a solution to the problem of paradoxes by ruling certain sentences out of the language of mathematics as correctly spoken, as certainly also happens in natural languages. In doing so Russell functions, with the consent of his colleagues, much like a language academy, introducing or reenforcing traffic rules in that language community.

I see no reason why speakers of a language should not be permitted to do so, only take note of the obsessive concern with contradictions. That this has been seen as a limitation

is also clear from the effort to develop the language of poly-
valent logic, with more than two truth values. However, if the
Laws of thought used in deriving theorems in polyvalent logic
still are based on bivalent logic then it is hard to see that
any exception has been made to the rules states above: in
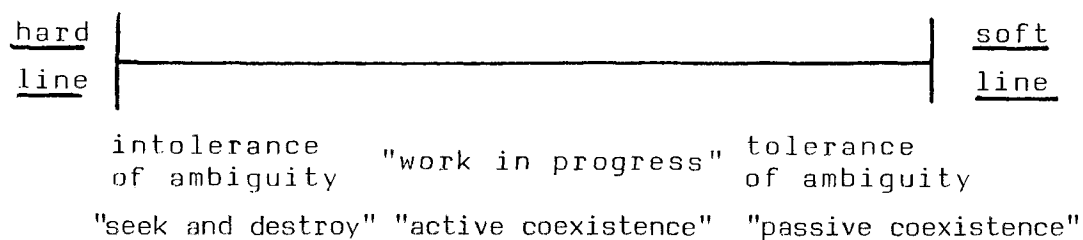mathematics everything is permitted except contradictions.

What about natural languages?   Indo-european languages
may be said to be predicative, attributing a predicate to the
substantive, whereas Chinese and Japanese may be said to be
relational, postulating relationships where the two terms (or
four terms in the classical Chinese quartet form o linguistic
presentation) enter symmetrically. One is not an attribute of
the other[6] However, even if this opens for more holistic,
dialectical thinking, placing Chinese and Japanese at higher
levels of abstraction (two place, even four place as opposed
to one place logic) this difference does not provide an escape
from   the   consistency constraint.   That escape, at least
as far as Japanese is concerned, is provided in another way:
through a certain vagueness.[7] Japanese language, when trans-
lated into european languages, tends to be punctuated with a
high number of such qualifiers as "perhaps,""maybe." In other
words, certificates of truth or falsehood in the western
dichotomous sense, one or the other, are not readily issued.
Does "perhaps" stand for a truth value   between true and
false, or for true and false at the same time, or for both of
these, or for neither? I do not think there is any clear
answer to this question either; maybe all three?

But there is a consequence of this observation: a possible
hesitation in the Japanese language community when it comes to
theory formation. This does not mean that Japanese cannot be-
come as good or better mathematicians than anybody else; in
fact, they tend to excel also in this field.[7] What it does mean
might be a hesitation in conceiving of mathematics as an
adequate language in which contradictory or at least contingent
("perhapsy","maybeish") reality can be reflected. Everything
becomes too crude, too clear-cut. And the same would also
apply to the use of natural language: Japanese would tend to
be very concrete, sticking to the grounds so to speak with de-
tailed descriptions and collection of data rather than engaging
in speculations and theory formation. As a matter of fact, I
am not convinced that behind the Japanese economic miracle one
will find many mathematical models, perhaps not even computers.

Three approaches to contradictions

Let us now return to the bhikkhu mentioned above and try to
see his statement in a broader perspective:

FIGURE 4.   Approaches to contradictions

hard   soft
line   line

     intolerance   "work in progress"   tolerance
     of ambiguity   of ambiguity
   "seek and destroy" "active coexistence" "passive coexistence"

Three approaches have been indicated, with the obvious
conclusion that the author stands for the one in the middle,
as one more implication of the in media res principle ("Vernunft
in der Mitte"). Social democracy as opposed to capitalism/socialism.

At one extreme is what is seen as a characteristic of
occidental epistemology: intolerance of ambiguity. Wherever
contradictions are found the appropriate response is "seek
and destroy". In mathematics this takes the form of traffic
rules. In natural languages it takes the form of rules for the
correct use of language, certain things should not be said (like
"I am a liberal, and I am a marxist"), among other reasons be-
cause they may be indicative of deeper confusions at the level
of thought and lead to insanity certificates being issued. In
relations to reality it takes the form of purification of reality,
sorting good from evil which then opens for particular ap-
proaches to politics of all kinds, and so on. The "seek and
destroy" formula is not chosen at random: it stands for
purifying territory, for instance in Vietnam, of enemies, for
instance "communists".

At the other end of the spectrum, then, is perfect tolerance
of ambiguity. A contradiction does not serve as any admonition
to any kind of action, neither on reality, nor in the organiza-
tion of speech, nor in the disciplining of thought. The person
coexists passively with the contradiction, nothing happens;
there is quiescence.

The position in the middle, then, is characterized by
"active coexistence", to stick to this particular political
language. There are tensions, they are recognized. ut two
approaches are studiously avoided: the two extremes of the
continuum. A contradiction serves as the signal for activity
in the direction of overcoming contradiction. However, a far
greater danger than coexistence with the contradiction is
brushing it under the carpet with a glib "solution". The Russell
theory   of   types is probably of this kind; no doubt other
approaches have been found and will be found leading to much
deeper insights. Working for societies that are purely
capitalist or purely socialist is an important occidental
pasttime, and the perfect expression of the hard line approach
to contradictions; but equally perfect examples of efforts to
overcome contradictions too easily, too quickly. On the other
hand, however, the fatalistic quiescence of simply tolerating any
ambiguity there is around is also seen as unsatisfactory.

A supreme example of one theoretician who opted for this
third approach is, of course, the Danish physicist Niels Bohr.
In his complementarity principle two languages are permitted
at the same time, one emphasizing the continuity of light
phenomena another the discontinuity--also expressed as the wave
and particle approaches respectively.[8] If reality exhibits
contradictory properties then why not use contradictory or
mutually exclusive languages to reflect this state of affairs?
Characteristically Niels Bohr adopted the daoist yin/yang symbol
as his personal coat of arms, and also indicated in one of his

writings that this approach might be particularly valid for

"living organisms and the characteristics of people having

consciousness as well as human cultures themselves".[9] However:

this is hardly the last word to be said in these matters, the

principle of compl mentarity might perhaps rather be seen as an

indication of "work in progress".

And that leads us to a final little point, reconnecting with

section 1.4 above where four epistemological styles, more

general than those analyzed in 1.2 and 1.3, have been explored.

In Table 5 they are related to the distinction between hard line

and soft line approaches to contradictions of Figure 4:

TABLE 5.   Atomism/holism and deductivism/dialectics
            and the problem of contradiction/consistency

	hard line: deductivism	soft line: dialectics
atomism	seek and destroy	micro-dialectics
holism	structure-orientation	process-orientation

So, what do we find?   At the level of atomism an opening

for dialectics within the atom, be that the physical atom or the

individual. Quantum mechanics and freudianism emerge; of course

about at the same time.   But at the level of holism contradictions

become more dramatic as social processes: the case of marxism, in

no way inconsistent with the dialectics of individuals, or atoms--or

larger parts of matter as Prigogine would emphasize.   A move from the

upper left to the lower right--probably excessively so.   The double

dialectic of Table 5 is in itself valuable.

In conclusion, then, let us look at Ogden's triangle again. This time we present it with three corners, R for reality, T for thought, L for language, with an inner inscribed circle and an outer circle.

FIGURE 5.   Ogden's triangle: Scientia & Sappientia

SAPPIENTIA

R   SCIENTIA   T

L
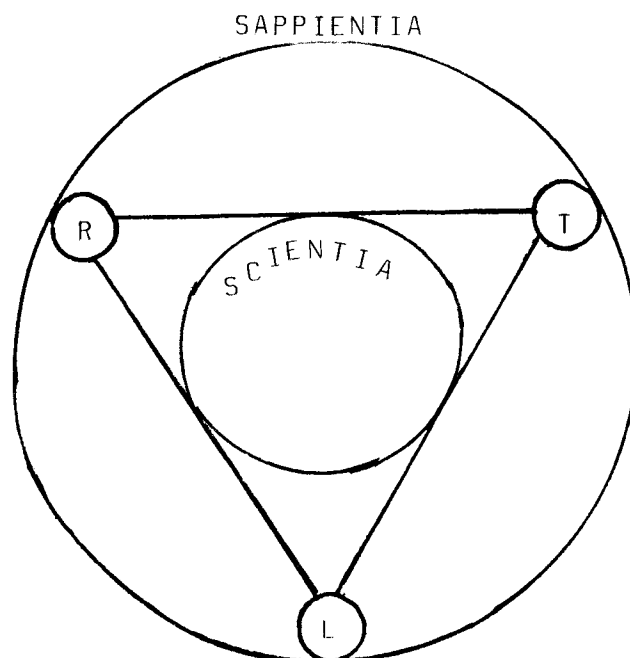
So, we have a narrow and a broad conceptualization of the relation between reality, thought, and language. In the narrow conceptualization reality is thought of as contradiction-free, thoughts are disciplined according to the Laws of thought. Language is consistent and since it is completely possible to be inconsistent in natural languages artificial languages are substituted for them, mathematics, logic and computer languages being examples of languages held to be consistent. The entire exercise is considered scientific, as scientia.

And then there is the outer circle of sappientia[10] of knowledge as   insight in the broader sense. The basic notion of consistency is relaxed, but hardly totally. The world is seen

as more contradictory, thoughts are permitted, perhaps even
encouraged to wander and wonder, languages of all kinds are
fashioned accordingly, including less and less disciplined
languages in the arts of space (painting, sculpture) and time
(literature and music) and both time and space (theater, ballet).

Which reality is real?[11] Reality as captured by the inner
circle or by the outer circle--or perhaps even further out, in
the mist where reality, thought and language are very fleeting
and floating indeed, perhaps to the point that they are no longer
distinguishable--the three corners of Ogden's triangle folding
back on themselves, so to speak? A glance at the presentation
in 1.1 above of christian and buddhist epistemologies may per-
haps to some readers point exactly to that: in buddhist
epistemology there is no discipline at all, no rule of con-
sistency, hence everything is permitted because there are no
borderlines between reality, thought and language and no clear
structure imputed to the three realms Ogden's triangle is con-
structed to keep apart.

In line with 1.4 above my own position on the questions
stated would be eclectic: both-and. Why should we not permit
ourselves to cast reality and our thoughts in a strait-jacket of
consistency, and express our thoughts in languages constructed
according to the rule of consistency? What we think of as
"science" does exactly that, and the activity, like all other
activities, should also be tested in terms of its consequences.
The activity has given us brain surgery and atomic weapons.

Correspondingly, we could ask: why should we not permit our-
selves to let everything go, to blur in the distinction between
ourselves and a tree outside our window even to the point of
asserting; like schizophrenic patients in a mental hospital located
in some forest might say: "I am that tree, the tree is me". And
we are in the sphere which has given us myths and fantasies,
undisciplined art and speculation.

So again, which reality is more real? Who are we to judge?
Majority vote? In a "competence group"? In what tradition has
that competence group been socialized, within what civilization,
what sub-civilization?

Can there be any other answer to that question then to
open the field between the two circles in the figure and not only
permit, even encourage people to oscillate between them, using
one as a source of inspiration for the other?

The key corner to discuss in this connection seems to be
language, as reality and thought are so inextricably interlinked
in an an/sich/für mich dialectic. We are not in a position to
impose or relax restrictions on reality. We may be more in a
position to exercise thought control, but hardly able to con-
trol everybody all the time. So what we have succeeded in doing
in the effort to create the edifice of science is the realm of
language control, by imposing rules of consistency, creating
"artificial" languages and then getting back at reality by the
stipulation that reality is only understood "scientifically"
when our thoughts about reality are expressed in contradiction-

free languages. The assumption has been that there is a direct

link between rigor in language and rigor in thought, probably a

terrible proposition, and rigor in both of these on the one hand

and a rigorous presumably meaning valid, understanding of reality--

possibly an untenable proposition. One may then legitimately

ask: what is more important, to exercise and demonstrate a

particular skill in disciplined use of a consistent, rigorous

language or to exercise, even demonstrate ability to say something

meaningful about reality? Assuming that it is not obvious that

one of these virtues implies the other?

Whatever one's stand on this issue it should become clear

that contradiction-free mathematics is only a conspiracy, and

more particularly an occidental one, to the extent that language

is canonized as the most legitimate language for valid insights

in reality, not as a language per se, with its undeniable

esthetic charms and intellectual challenges![2] The problem seems,

however, mainly to arise insofar as mathematical theorems, not

only terms are used. One could imagine a soft use of mathematics

as a form of presentation, with matrices, graphs and what not. There

may be   some simple theorems[3] but without the full develop-

ment of a mathematical apparatus because of the ever present

possibility that this becomes a strait-jacket that may very well

capture "reality", but only in a twisted and forted form, de-

prived of its richness in the form of inner contradictions,

relating to a more real reality like the specimens exhibited in

a natural museum for zoology, botany and geology relate to the

animal, plant and mineral "kingdoms" in real nature. Nobody

will deny that much can be learned from such museums, particu-

larly as long as one keeps the difference between museum reality
and natural reality in mind.

Language, or form of presentation, then becomes a key issue.
How do we discuss this issue? Which would be some of the key
variables among forms of presentation, how do we select? To
this we now turn, as the subject of the final chapter in this
book, before the attempt to tie it all together in the epilogue.
But one point can already be indicated from the epilogue: the
need for some type of bridge building between scientia and
sappientia which is relatively similar to the needs for some
kind of bridge building between the famous two cultures by
C. P. Snow.[14] And one such bridge can be understood in terms of
the hard and soft approaches to contradiction, being anchored
in the inner circle in a total respect for consistency, reaching
out to the outer circle as a mid-way position of accepting
the dialectic between consistency and contradiction as ever-
lasting, and then further out in the mist of total disrespect
for consistency, even at the point of seeking contradiction for
its own sake, not only coexisting passively with it. I am sure
there are other bridges, but this was the bridge of concern for

this little exercise.