

I

Observation

In dealing with human behavior we come up against those instincts ^{human goals} that permit individuals ^{as well as society} to shape and be shaped by their surrounding environment

which suggests

We should look at these instinctive goals
proceeding

Instincts

- Survive, survive on our own terms, & improve our capacity for independent action.

^{in the} Which Suggests that ^{goals are the}

- ~~In attempting to realize these goals if one~~ ^{in a} world of limited resources, individuals and groups will ~~be competing with one another to realize their basic~~ ^{find it difficult to} desires.

In Such a Situation

- ~~To gain access to those scarce resources~~ One may be forced to deprive adversary of his capacity for independent action, or deny him the opportunity to survive on his terms, or make it impossible for him to survive at all.

Point

- In the struggle individuals and groups will form ^{dislike} and reform their cooperative or competitive posture to realize their goal which ^{others} constrains them toward this same goal.

? — Questions — ?

- Can we appeal to and exploit (modern) scientific principles toward improving our fitness ~~eth~~ to cope with an everchanging environment?
- Where do we start?
- How do we go about it?

In this cooperative/competitive struggle

- How do we survive ?
- How do we make it difficult for others to survive ?

To address these questions we must look at the mechanisms by which we survive or make survival possible or make it more difficult for others to survive.

Point

- We know ~~that open systems~~ that living systems are open systems that interact with their environment.
- Closed systems ^{units} cannot interact with their environment hence they cannot be living systems since they are cut-off or isolated from their environment.

I

Interaction and Isolation

14th

} — raises question — ?

~~Where direction lead us ?~~

Why such a title ?

II

Observation

~~as meant to~~
The title suggests that ~~we~~ in some sense
we either ~~interact~~ interact with others or we
become isolated from them.

1 Mar 85

Barry:

Here are some words we've furnished to some industry folk concerning methodology for looking at sensor inputs on SA [Situation Awareness]. Hope this can help.

Shad Dvorchak

Slide #1

MAN IN THE LOOP LESSONS LEARNED

- O IN MULTI-SHIP ENGAGEMENTS, MANNED INTERACTIONS OUTWEIGH WEAPON AND AIRCRAFT INTERACTIONS
 - oo ENGAGEMENTS ARE MEN VERSUS MEN
- O SITUATION AWARENESS IS THE SINGLE MOST IMPORTANT FACTOR IN DETERMINING ENGAGEMENT OUTCOME
 - oo REGARDLESS OF AIRCRAFT, AVIONICS, WEAPON ENVIRONMENT, OR OTHER TEST VARIABLE
- O ANY IMPROVEMENT IN SITUATION AWARENESS SIGNIFICANTLY IMPROVED ALL MOP's [Measures of Performance]
 - oo AIMVAL/ACEVAL, AMRAAM OUE, MULTI-SENSOR INTEGRATION (MSI)

SLIDE #1 (Additional Words):

It is important to remember that lvl engagements in the real world do not stay lvl for any length of time. There are always other people to consider for entry into the fight, and unobserved entry by enemies is detrimental to anyone's health. With modern weapons, distances for unobserved entry can be surprisingly large (although not as large as the missile makers would like us to believe) and from any aspect. Singles die with great rapidity in such an environment, so working together requires more emphasis and skill rather than less (contrary to Boots Blesse's 1978 article in Air Force Magazine). Since we haven't found a way to get machines to work together in a highly dynamic environment, the men inside must become the driving forces in resolving combat outcomes. Machines can provide almost overwhelming advantages, SO LONG AS THE MEN DIRECTING THEM KNOW WHAT IS GOING ON.

That is why SA [Situation Awareness] is so crucial. It is associated with tremendous swings in results, depending on whether it is good or bad at critical times (it's OK to sleep when you're safe). The changes measured in the tests mentioned [see explanatory notes below] are far larger than those due to the mechanical test variables mentioned. They are also consistent [in their effects?], which is more than we could say about some of the test variables of [the] AMRAAM OUE.

We began focusing on people factors during the AIMVAL/ACEVAL tests, going on the intuitive hunch developed during the training periods that missile effectiveness envelopes were wildly distorted by the things people did. The foundation was the set of tactical factors that had been determined by fighter pilots over several decades of actual and mock air combat, and that had been stressed in the FWS [Fighter Weapons School]. Not only were these factors important, the TAC ACEVAL report initially documented the magnitudes associated with changes in these factors as they applied to both sides. The other tests listed were used as further verification and refining steps in applying the technique. In addition, categorizing SA and mutual support factors for the F-15 Conformal Fuel Tank [CTF] OT&E [Operational Test & Evaluation] provided the fundamental understanding of the traps inherent in trying to use a very heavy (fuel) in the CFT F-15 as a fighter. (If Jim Hale would like some more words on that test, I'd be happy to oblige.)

Explanatory for Notes Slide #1: { In the bullet about "REGARDLESS OF AIRCRAFT, AVIONICS WEAPON ENVIRONMENT..." the word ENVIRONMENT should be understood to include weather, communications-jamming (COMMJAM), ECM, etc. }

AIMVAL/ACEVAL (Air Intercept Missile Evaluation/Air Combat Evaluation): This test was flown in 1977 between BLUE FORCE F-15/14s and RED FORCE F-5s on the Nellis ACMI (an instrumented air combat maneuvering range). AIMVAL tested three different seeker sensitivities and three different off-bore-sight capabilities for prospective IR missile concepts. ACEVAL attempted to determine the effects of numbers on close-in air-to-air combat (1v1, 1v2, 2v1, 2v2, 2v4 and 4v4).

AMRAAM OUE (Advanced Medium Range Air-to-Air Missile Operational Utility Evaluation): This test took place in the McDonnell-Douglas simulator facility in 1981-82. Over 20,000 sorties equivalents were "flown." The simulated sorties involved F-15 and F-16 BLUE FORCE fighters against threat aircraft with varied weapons and avionics. ROE [Rules of Engagement] and environments were varied, and engagements up to 4v8 were "flown."

MSI (Multi-Source Integration): This test was also "flown" in the McAir simulators and was similar to the AMRAAM OUE except that all BLUE sorties were F-15, AMRAAM, TWS [Threat Warning System] versus various threats in CAP. MSI occurred in 1983 and included engagements up to 2v10. The test set was approximately one-third the size of the AMRAAM OUE.

Slide #2

MAN IN THE LOOP LESSONS LEARNED (CON'T)

- O THE MOST IMPORTANT FACTORS IN ORDER
 - oo SITUATION AWARENESS
 - oo MUTUAL SUPPORT
 - oo EXECUTION OF PLAN
 - oo TACTICAL SET
- O EVERYTHING DEPENDS ON THE ABILITY OF THE PILOT TO UNDERSTAND THE PRESENT AND NEAR TERM RELATIONSHIPS OF ALL PLAYERS, ENEMY, UNKNOWN, AND FRIENDLY.

SLIDE #2 (Additional Words):

The first two factors are widely discussed in the fighter world, although talking about them is a lot easier than achieving them. Execution of a plan implies that a plan exists, and the usual practice is to cover a plan in excruciating detail without stepping through alternative actions in its employment. The tactical set refers to a rather broad view of tactics, not only maneuvering and positioning but also how we intend to handle supporting forces/agencies, weapons employment philosophy, and defensive activities while in the employment phase of the mission.

The key phrase in the last bullet is "present and near term relationships." The ability to predict a probable set of spatial and activity relationships, modify them based on the dynamics of the situation, and expand the time frame over which they apply is the crux of SA. If I have a perfectly predictable opponent, I have a lot of time to plan and act to string him out so he is most vulnerable and I have the least risk (note that predictable does not mean immobile or unresponsive).

Explanatory Notes for Slide #2: TACTICAL SET - The total group/set of TACTICS in use by a force. Relationships mean not only the geometrics but also infer intent, i.e., who is going to shoot or dodge.

Very nice; but what does all this depend upon?

Slide #3

SITUATION AWARENESS STUDY

- O SITUATION AWARENESS DEPENDS ON INFORMATION
 - oo SENSOR AVAILABILITY/RELIABILITY
 - oo SENSOR COVERAGE FOR/FOV [FIELD OF REGARD/FIELD OF VIEW]
 - oo DISPLAYS/PRESENTATION
 - oo VOLUME OF DATA
- O INFORMATION MUST BE UNDERSTOOD BY THE PILOT
 - oo DATA FILTERS/PRIORITIES
 - oo TOO MUCH MAY BE AS BAD AS TOO LITTLE

SLIDE #3 (Additional Words):

We (the Dayton office) are presently entering into a contract at WPAFB to study the impact of different kinds of sensor capabilities in terms of their possible effects on situation awareness. The assumption is that situation awareness depends on the capability to provide information into the cockpit. The items which must be considered are first affected by the availability of a particular sensor, set of sensors, or sensor suite (it doesn't need to be radar, although that's what most people think of) and the reliability of each sensor/set/suite in gathering its essential data. Once that is defined, the outer boundaries of each sensor and the total sensor coverage pattern, the field of regard (FOR) can be considered only as it is covered by the subset field of view (FOV) over finite periods of time. Given those steps, we can then examine postulated displays or other methods of presenting data in a clear manner. The sheer volume of data being captured by a multi-sensor, multi-aircraft group with a common mission then leads us to consider the need for integration/processing/filtering so we provide the pilots with what they need, rather than going into a second-to-second dump of whatever has been accumulated.

Optical in house for information being understood by pilot

Slide #4

S I T U A T I O N A W A R E N E S S S T U D Y (C O N ' T)

O REPRESENTATIVE DATA BASES REQUIRED

oo AMRAAM OUE/MSI OVER 1600 TRIALS

oo MAN-IN-THE-LOOP 12 PLAYERS

oo DIFFERENT SCENARIOS

- o MISSIONS
- o AIRCRAFT
- o WEAPONS
- o AVIONICS
- o ENVIRONMENT
- o RULES OF ENGAGEMENT

O DATA BASE MANAGEMENT/ANALYSIS SYSTEM REQUIRED

oo ANALYSIS INFORMATION MANAGEMENT SYSTEM

- o IN PLACE, SEVERAL VARIANTS, TRANSFERABLE

SLIDE #4 (Additional Words):

This simply says we have available an extensive data base involving people acting within a complex, highly dynamic, lethal environment. The AMRAAM OUE and MSI data bases contain the equivalent of approximately 35,000 sorties. To handle this volume of data, a data base management system is required to avoid computer constipation.

Slide #5

SITUATION AWARENESS STUDY (CON'T)

- O SELECT REPRESENTATIVE SET OF TRIALS
 - oo MISSION, ENVIRONMENT, TACTICS, ETC.
- O DETERMINE SENSOR COVERAGE REQUIREMENTS
 - oo RANGE Vs Az, EL
 - oo FOR/FOV
 - oo 4 TT STERIDIAN/RANGE
- O DETERMINE CANDIDATE SENSOR/SENSOR SUITE COVERAGES
 - oo RANGE Vs % OF A/C TYPE COVERED
 - oo EFFECT OF SENSOR MANAGEMENT ALGORITHMS
 - oo EFFECT OF SENSOR ALLOCATION ALGORITHMS
- O DETERMINE CANDIDATE SENSOR SUITE OPPORTUNITIES
 - oo WEAPON LAUNCH OPPORTUNITY EVALUATION
 - oo WEAPON AVOIDANCE OPPORTUNITY EVALUATION

SLIDE #5 (Additional Words):

This is the fundamental approach we intend to take. After selecting sets of trials to examine, we'll know where everybody is (friendlies, too - it's important) in some sort of volume (that's 4π steridian by range) around the aircraft (one or several) being considered. Using customer-approved target selection logic, which could also be a variable, we'll be able to describe what fraction of the people we need to see that we can actually see with the postulated sensor as a function of relative range. From this, an evaluation of different firing doctrines, weapons, or weapons avoidance tactics can be accomplished.

Slide #6

SITUATION AWARENESS STUDY (CON'T)

0 SOFTWARE/MODEL FLEXIBILITY

- oo GENERIC
- oo MODULAR
- oo EASILY MODIFIED
- oo TRANSFERABLE

0 DATA BASE FLEXIBILITY

- oo NEW MAN-IN-THE-LOOP TESTS ADD ON
- oo RERUN SENSOR EVALUATIONS
- oo NEW SENSOR PARAMETRIC EVALUATIONS

0 DATA BASE MANAGEMENT SYSTEM FLEXIBILITY

- oo ADAPTABLE TO ACCEPT NEW TEST/TRIAL DATA
- oo MODULAR/EASILY MODIFIED
- oo TRANSFERABLE

SLIDE #6 (Additional Words):

To wrap it up, this slide shows the characteristics of the tools either currently available or likely to be available in the near future. If we give the software the attributes we desire, and allow it to be used almost anywhere, then every suitable man-in-the-loop test becomes a candidate for checking new capabilities, new sensor characteristics, and new employment methodology. By incorporating a good data base manager, allowing a maximum of flexibility and the opportunity to go "oops" once in a while, there is no reason the USAF can't combine these concepts to lead industry into looking at the dominant term in the equation: MAN.

Explanatory	Sensor Management = Pointing, centroiding, etc.
Notes for	Sensor Allocation = Which sensor to use and where to
Slide #6:	point the sensor manager, or which
	sensor manager to use.

Moral or ethical values can be thought of as ^{instructions} ~~constraints~~ ^{plus you} ~~rules placed~~ upon individual freedom of action so that individuals can interact without destroying themselves as individuals or as a group to which these values apply. Points: Moral or ethical values ^{in this sense} represent a survival mechanism, for the individuals and group to survive and grow as an organic whole. Violation of these stated or unstated ~~constraints~~ ^{rules} ~~it makes the values~~ (i.e. rules) destroy the connecting threads of trust/confidence that individuals repose in one another so that they can survive and grow as both individuals and as an organic whole.

Violation of these stated or unstated ^{constraining} rules (that make-up these values) destroy the connecting threads of trust/confidence that individuals repose in one another, so that they can ~~survive~~ ^{and grow} at both individuals and as an organic whole which, in turn, make it difficult for the both individuals and them to survive and grow as ^{both} individuals and as an organic whole.

Moral & ethical values can be thought of as
restriction rules placed upon individual
freedom of action so that ~~we~~ we as
individuals can interact with one another
without destroying ourselves as individuals
or as a group to which we belong. ~~For~~ ^{in this sense,}
Moral & ethical ^{values} serve as a medium for
survival. Point ~~Violation~~ ² of these. Without
~~these~~ such a medium we find it
difficult, if not impossible to ~~operate~~.

Ethical

• Moral Values represent constraints upon individual freedom of action ~~behaviour~~ so that ~~an~~ group can survive and grow. Point: Without code of conduct, rules of behaviour or value systems

Point: Moral & ethical values represent ~~a~~ ^{these} survival mechanism. Violation of ~~these~~ values ~~to~~ ^{that make} ~~the~~ ^{the most effective} ~~the~~ ^{by} ~~the~~ ^{destroy} the connecting threads of trust / confidence that individuals repose in one another so that group can survive as an organic whole

^{can be thought of as}
Moral & ethical values ~~represent~~ ^{are} constraints upon individual freedom of action so that individuals can interact ~~with~~ ^{with} one another without ~~destroying the group~~ ^{destroying the group} ~~Point: Moral & ethical values are survival~~ ^{Point: Moral & ethical values are survival} mechanism for group to survive and grow as an organic whole. ~~Violation of these~~ ^{Violation of these} stated or unstated rules destroy the connecting threads of trust / confidence that individuals repose in one another so that group can survive as an organic whole

~~destroy themselves~~ ^{destroy themselves} ~~or the group~~ ^{or the group} to which these values apply
destroy themselves or individuals as a group to which these values apply

$$1 + \frac{1}{2} + \frac{1}{3} + \frac{1}{4} + \frac{1}{5} + \frac{1}{6} + 000$$

$$1 - \frac{1}{2} + \frac{1}{3} - \frac{1}{4} + \frac{1}{5} - \frac{1}{6} = \frac{2}{4} + \frac{1}{5} + \frac{1}{6}$$

$$1 - \frac{1}{2} + \frac{1}{3} = \frac{1}{2} + \frac{1}{3}$$

$$1 + \frac{1}{2} + \frac{1}{3} + 000 + \frac{1}{10}$$

$$1 - \frac{1}{2} + \frac{1}{3} - \frac{1}{4} + \frac{1}{5} - \frac{1}{6} + \frac{1}{7} - \frac{1}{8} + \frac{1}{9} - \frac{1}{10} = \frac{2}{6} + \frac{1}{7} + \frac{2}{8} + \frac{1}{9} + \frac{2}{10}$$

$$1 - \frac{1}{2} + \frac{1}{3} - \frac{1}{4} + \frac{1}{5} = \frac{1}{3} + \frac{2}{4} + \frac{1}{5}$$

$$1 - \frac{1}{2} = \frac{1}{2}$$

$$1 = 1$$

$$1 + \frac{1}{2} + \frac{1}{3} + 000 + \frac{1}{N} + \frac{1}{N+1} + 000 + \frac{1}{N+N}$$

$$1 + \frac{1}{2} + \frac{1}{3} + 000 + \frac{1}{N/2} + \frac{1}{N/2+1} + 000 + \frac{1}{N}$$

Moral or ethical values can be thought of as
restrictions, ^{rules} placed upon individual freedom of
action so that ^{we as} individuals can interact ^{with} ~~another~~
without destroying ^{ourselves} themselves as individuals
~~or as a~~ group to which ^{we} ~~they~~ belong. Point!

~~Moral or ethical values in the sense never~~
~~become a survival mechanism.~~ ^{some as medium effect approval} Violation of
these restrictive rules, whether stated or unstated
destroy the connecting threads of trust/confidence
that ^{these rules respected} individuals repose in one another which
in turn make it difficult for ~~them~~ ^{us} to
survive and grow as both individuals and
as an organic whole.

that created by these rules

~~flairish~~ flourish

In the ~~sense~~ ^{sense} moral values can be thought
of ~~as a~~ ^{as the} ~~medium~~ ^{medium} that ~~permits~~ ^{permits}
the survival and growth of a group and the
individual that ~~make~~ ^{make} up that group.

without these rules we cannot achieve the
trust/confidence ^{as individuals} we repose in one another,
~~in order to survive and~~

As a consequence

11.5
 8.8
 20.3
 5.5
 25.8

11.5
 20.3
 25.8
 57.6
 25.8
 86.4

Observation

- Physical connections in Brain
- G/H/Second Law
- Living Systems
- We are H-M-P beings

GAO

- Due to report Sept I
- Report on WINGLOG & B plus any larger amount
- Did GAO know about excess funds in port
- Asked to make recommendations for future

• Talking to OSD, Service Controller, OMB, and financial experts who have retired from OSD

- Unobligated balances { Funds to go from procurement into R&D or from procurement into O&M }
- Reprogramming and transfers { reprogramming has been done historical funds several \$20 has doubled. RFR number is for accounts }
- Congressional reapplication of funds
- Lapsing balances { budget authority lost statute, now congress reappropriates prior to statute to beat the spending }
- Lower outlay rates vs projections
- Less than anticipated inflation

Implication GAO from FY 80-86 (13 and 10E)

- FY 84 = 11.5
 - FY 85 = 8.8
 - FY 86 = 5.5
- Not expanded and just the procurement account

$$11.5$$

$$11.5 + 8.8$$

$$11.5 + 8.8 + 5.5$$

$$= 11.5$$

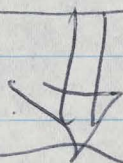
$$= 20.3$$

$$= \frac{25.8}{57.6}$$

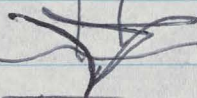
alternative

①

- Science explains network of meaning
- Science explains consciousness and meaning
- Consciousness explains science and its meaning
- After WWII alternative methodologies in science not attractive or thought-useful



My view after WWII and before emphasis on analytical denunciations - even with us today



- ① This is one of two methodologies in our natural sciences today -- rationalism and
- ② Countermethodology emphasizes on what we know as what we interpret!



-- the introduction of subjectivity into schema of things!

In other words
consciousness structure what we observe
or encounter

Integrity question? - Under what
circumstances do positions have
value & usefulness

Is positivism related to determinism?
If so in what way?

Newton to Einstein paradigm
is total discontinuity

Statements ~~are~~ are paradigm dependent

~~Wahne~~ → Weber → Great Synthesis → also
Nash et al

Theme Associated

with

D & C, POC, C & C

is

Interaction and Isolation

? — Prisoner Question — ?

Keeping in mind the snowmobile example;
~~and~~ are there any parts of some essential that
we can use to build a picture of the strategic
game.

I

? What is the Purpose of Thinking ?

an idea thought of us

Specific

- Physical Isolation -- Condition that results from inability of individuals or groups to gain material support from others outside themselves
- Mental Isolation -- Disorientation that flows from inability of individuals or groups to discern, perceive, or make sense out of what's going on around themselves
- Demoralization -- Discouragement or despondence that arises out of the mental and/or physical inability of individuals or groups to keep up with, adjust to, or deal with unfolding and seemingly overwhelming events.
- Moral Isolation -- Alienation that comes from the inability of individuals or groups to abide by a code of conduct or behave in a manner deemed acceptable or essential by others outside themselves.

General

Specific

Oct 84

decrease that flows out of

- Physical Isolation -- Inability of individuals or groups to gain material support from others outside themselves (i.e.; strangulation) (or incultation)
- Mental Isolation¹ -- Inability of individuals or groups to discern, perceive, or make sense out of what's going on around themselves (i.e.; disorientation)
- Moral Isolation -- Inability of individuals or groups to abide by a code of conduct or behave in a manner deemed acceptable or essential by others outside themselves (i.e.; alienation)

General

- Isolation -- {
 - Inability of individuals or groups to interact with their environment
 - in other words
 - Inability of individuals or groups to exchange material, energy, or information outside themselves

? — Paves Question — ?

In a strategic sense, where does
all this lead?

The Strategic Game or Strategic Implications

Comprehensiv Whale

Naggy Thought or Focus

Strategic Insight

In some way we must be able to -
diminish adversary's ability to communicate
or interact with his environment while
sustaining or improving ours,

? — Raises Question — ?

How do we do this ?

Three ways come to mind:

- ~~Moral~~
- ~~Mental~~

- Moral
- Mental
- Physical

Proby Deep

• Physical ~~space~~ is the framework within which we apply our mental power and moral principles so that we might survive and grow.

• Mental ~~is the repository of~~ can be thought of as the repository of our genetic ~~by~~ or the ~~to~~ that ~~order of~~ flow out of our genetic heritage, cultural tradition and previous experiences that point us ~~to~~ ~~deeper~~ with the ~~kind~~ in ~~line~~ ~~it~~

• Moral can be thought of ~~a~~ ~~survival~~ ~~group~~ survival mechanism ~~by~~ ~~and~~

? — Career Questions — ?

If we are going

Physical — — on time-space world of matter, energy and information

Mental — — an emotional/intellectual orientation that that we use to interact with our physical world

Moral — — ~~the constraints of~~ cultural constraints codes of conduct or standards of behavior that constrain or emotional/intellectual responses

More Precisely

? — Fine! But what ~~are~~ all this mean — ?

• Physical

a codeword for representing the time-space world of matter-energy-information that we are a part of, live in, and depend upon for our vitality and growth.

• Mental

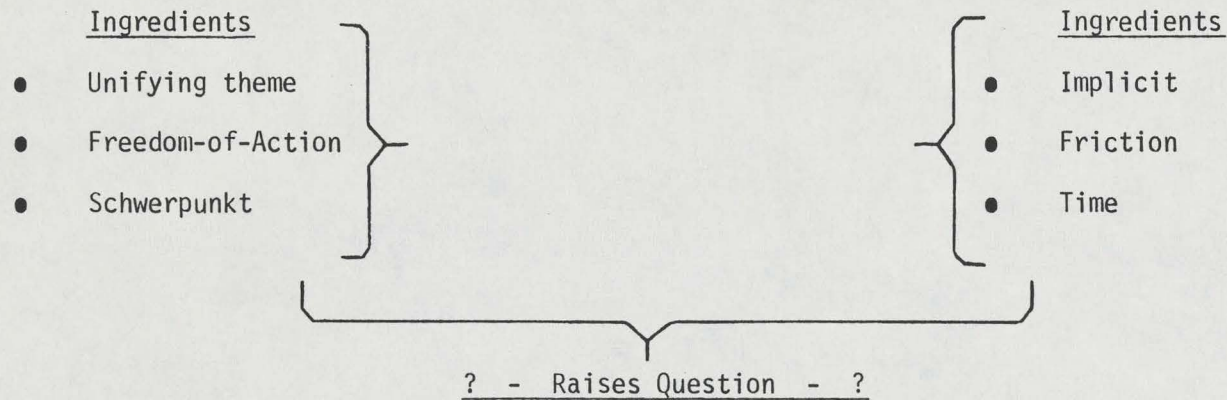
a codeword for representing our emotional/intellectual ability to discern, perceive or make sense out of what's going on around ourselves.

• Moral

a codeword for representing our ability to abide by codes of conduct or standards of behavior in a manner deemed acceptable or essential by others outside ourselves.

Emphasis

CROSS-CORRELATION



Without a unifying theme how does one have freedom-of-action yet maintain coherency of whole?

? - Raises Additional Question - ?

Without implicit connections or bonds does a unifying theme even exist?

IV

Background

- In laying-out and discussing conflict we have stressed the importance of two ideal chains:
 - unifying theme / freedom-of-action / focus and direction
 - implicit / friction / timefor shaping and adapting to circumstances

? — why — ?

- Without a unifying theme one cannot have freedom-of-action yet maintain coherence of whole
- without implicit connections or bonds, a unifying theme does not even exist,

? Where does this lead us ?

IMPLICATIONS

- Implicit connections/bonds make possible a unifying theme which, in turn, makes possible freedom-of-action that can be focused and directed (a la schwerpunkt) thereby diminishing friction and time.

or contrarywise

- Destruction of implicit connections/bonds destroys a unifying theme and freedom-of-action within that theme which, in turn, impedes focus and direction (schwerpunkt) thereby increasing friction and time.