Dialectical Layer for Argument Construction

Argument construction is increasingly recognized as a key challenge across computational reasoning approaches (Baumeister et al., 2021; Lehtonen et al. 2023). We propose a declarative dialectical layer (Fig. 1) that generates structured oppositions through apex antitheses and mode-specific sub-antitheses, derives candidate synthesis patterns, and suggests corresponding actions and reflections.

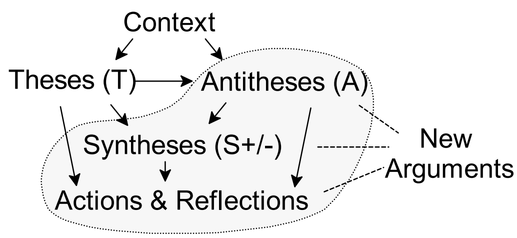


Fig. 1. Argument generation scheme

Conceptually, it is related to Bipolar Argumentation Frameworks (BAFs) (Cayrol & Lagasquie-Schiex, 2005, 2013), which explicitly represent supportive and opposing relations. However, unlike BAFs, it does not introduce new acceptability semantics. Instead, it imposes structured ontological constraints and synthesis conditions at the level of argument construction that are summarized in Table 1.

Table 1. Generative rules for dialectical synthesis prediction

Constraint	**Rule**
Polarity	Every thesis (T) has at least one antithesis (A)
Antithesis selection (simple assertions)	The antithesis is typically a direct negation of the thesis.
Antithesis selection (complex systems)	Multiple antitheses typically exist. Identification of relevant antitheses proceeds iteratively, often revealing counteracting processes that are initially overlooked.
Tetradic	Every T–A interaction yields pairs of complementary upsides (T+, A+) and exaggerations / downsides (T–, A–), such that T+ directly contradicts A- and T- directly contradicts A+

Diagonal Entanglement	Changing any tetrad's component induces change in its contradiction, such that sums of their idealized modalities (M) remain zero: M(T+) + M(A-) = M(T–) + M(A+) = 0
Equal Modalities	Positive synthesis (S+) occurs iff all components have equal absolute modalities (M): M(T+) = –M(T-) = M(A+) = –M(A-).
Empirical Inequalities	Empirical conditions of positive synthesis (S+): K_S(T+) – K_S(T-) ≈ K_S(A+) – K_S(A-) ≥ 0.1, positive poles K_S(T/A+) > 0.4, negative poles K_S(T/A-) < 0.6 (K_S = concept's average complementarity to T and A, (K_T+K_A)/2)
Apex Tetrad	Among several possible tetrads, the best one has: Min [(K_S (T+) – K_S (A+))^2 + (K_S (T-) – K_S (A-))^2] Max [K_S (T+) + K_S (A+) – K_S (T-) – K_S (A-)] Max [K_T (T+)], Max [K_T (A+)]
Control Statements	The following statements must make sense: T+ without A+ yield T-; A+ without T+ yield A-. Conceptual Coherence (CC) must exceed 0.7
Equal Sign Synthesis	Positive synthesis occurs between T+ and A+. Negative synthesis occurs between T- and A-
Different Sign Isolation	No direct interaction is possible between T/A, T+/A-, T-/A+ (because they are direct oppositions or contradictions), T+/T-, A+/A- (because they are different levels of the same phenomena)
Positive Synthesis (S+)	A system exhibits positive synthesis iff it increases dimensionality while preserving stability, distinction, and normative coherence.
Negative Synthesis (S-)	A system exhibits negative synthesis iff it maximizes existing dimensions through dominance or oscillation, resulting in faster formation but finite lifespan
Apex Coherence	The apex synthesis S+/- must lie within the convex hull (or semantic centroid) of its valid sub-syntheses
Circular Causality	S+ occurs iff T- is converted into A+ and A- is converted into T+, both acting in sync

Transitions' definitions	Ac = transition of T into A; Re = Transition of A into T; Ac+ = Transition T- into A+; Re+ = Transition of A- into T+; Ac- = Transition of T+ into A-; Re- = Transition of T- into A+.
Transitions' degradation	Ac+ without simultaneous Re+ eventually becomes Ac-. Re+ without simultaneous Ac+ eventually becomes Re-.
Greimas' Mapping	If Transitions' definitions don't work: Ac and Re correspond to the compatible negations Not-A and Not-T (Greimas), expressing affinity to A or T without instantiating them; Ac^+ and Re^+ are their positive variants, enabling non-coercive transitions toward A^+ and T^+.
Multi-Thesis Oppositions	In a circular ordering of {T1 … Tn}, structurally opposed theses must be positioned at maximal cyclic distance.
Multi-Polarity Separation	In a circular ordering of the 2n elements {T1 … Tn, A1 … An}, each Ti and Ai must occupy diametrically opposite positions.
Transition Coherence	A transition Tr(X,Y) is coherent iff X- is convertible into Y+. If no coherent transition exists for some adjacent pair in σ, the ordering is invalid.

Thesis Selection. A thesis is any statement we rely on for interpreting or acting within a given context. We treat it as correct and as structurally important for the decisions or plans under consideration. Many everyday statements are either uncertain or irrelevant to the problem and therefore are not suitable as theses. In analytical settings, the thesis is often a working causal hypothesis rather than a final claim.

Polarity Constraint. Table 1 states that every thesis *T* has at least one antithesis *A*. This implies that *A* is a necessary counterpart of *T* rather than an optional addition, and that examining *A* can reveal mechanisms and counterforces implicit in *T*. This perspective enables a form of forensic reasoning often absent in conventional analyses. For example, when evaluating a social or engineering system, standard logic typically asks, *"What could go wrong?"* (relying on past experience), whereas dialectical reasoning asks, *"What process is currently complementing or counteracting our apparent success?"* This shift helps uncover systemic interactions that may otherwise remain hidden.

Antithesis Selection. All cases can be subdivided into two broad groups. The first group consists of assertive binary choices, where direct negation or apex antitheses (i.e., general negating reference points) are often sufficient (e.g., True vs. False, Approval vs. Disapproval). The second group consists of exploratory or systemic cases, where concepts have multiple roles and simple negation is insufficient (e.g., Love, Justice, Sugar, Car). In such cases, identifying an antithesis requires examining the function of the thesis within a larger system. Rather than asking "What negates T?", one should ask "What opposes or counteracts the role T plays?" Figure 2 exemplifies this analysis for T1 = Love and T2 = Sugar in Photosynthesis.

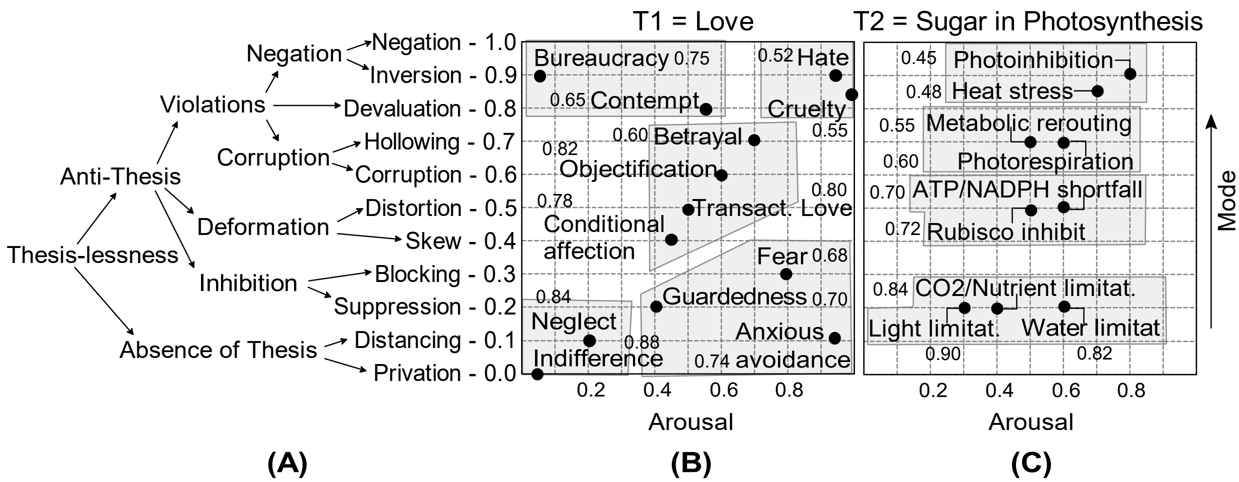


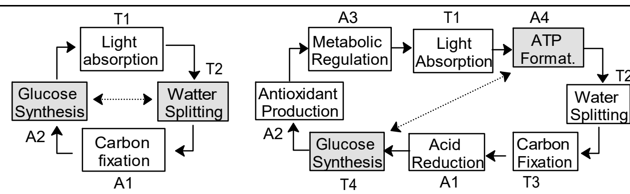
Fig. 2. Taxonomy of antitheses

Scheme (A) shows clustering of antitheses into a universal taxonomy tree. Moving from left to right gradually brings us to particular mechanisms of opposition. These culminate in schemes B and C that plot antitheses along two axes: Mode, representing the interaction mechanism (from its absence, through inhibition and distortion to negation), and Arousal, representing the activation level (from passive/invisible to active/visible).

Apex antithesis ("Thesis-lessness") doesn't always represent a good semantic approximation of sub-antitheses. Numbers near each concept in plots B and C show Heuristic Similarity (HS, analogous to cosine similarity) between apex ("Lovelessness" and "Sugar-lessness") and respective sub-antitheses. We see that HS decreases as we move from the bottom (absence of T) to the top (negation of T).

A suitable antithesis must be functionally broad yet operationally precise, so that it satisfies all constraints from Table 2. In particular, it must generate coherent constructive and destructive developments that occupy maximally separated positions in relevant causal loops and yield recognizable synthesis (S+) and pathology (S−).

Table 2. Determining antitheses in complex systems

N	**Constraint**	**Example (T = Sugar in photosynthesis)**
1	A functionally opposes T	A = Reducing net carbohydrate accumulation (photorespiration, respiration, stress-induced catabolism)
2	A+ must contradict T-, A- must contradict T+	A+ = Energy sufficiency *vs.* T- = Resource depletion; A- = Energy dissipation *via* Oxidation *vs.* T+ = Energy storage and Carbon fixation
3	In a cyclic loop, A and T must be placed diagonally to each other	
4	T+ with A+ yield S+	S+ = Biomass production
5	T w/o A+ and A w/o T+ produce pathologies (S-)	(T − A+) = Chlorosis and stunted growth. (A − T+) = Photobleaching and oxidative leaf damage

Similar process-based oppositions occur in engineering and social systems as well. For example, fatigue accumulation opposes structural strength as a gradual degradative process rather than a discrete entity. Recognizing such process-based antitheses is essential for identifying system blind spots and for constructing meaningful dialectical syntheses.

Tetradic Constraints. Tetradic constraints constitute the core structural assumptions of our method and are illustrated in Fig. 3.

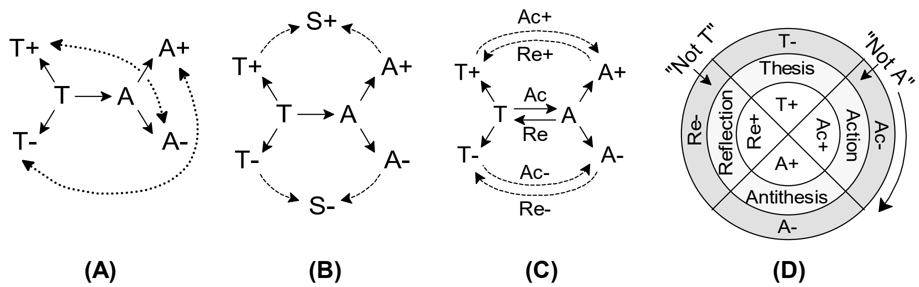


Fig. 3

Scheme A shows that each starting component (T and A) generates two additional components—a positive (+) and a negative (−)—which are bound by the three constraints (see Table 3).

Table 3. Determining T+, T-, A+, A- components

N	Constraint	T = Love, A = Hate	CC*	T = Sugar, A = Energy convers	CC*
1	T+/A+ are constructive, balancing developments that enhance upsides of opposition	Bonding (T+) enhances Autonomy (A+), which is an upside of Hate (A)	0.75	Energy storage (T+) enhances Energy sufficiency (A+), which is an upside of Energy conversion (A)	0.72
		Autonomy (A+) enhances Bonding (T+), which is an upside of Love (T)	0.92	Energy Sufficiency (A+) enhances Energy storage (T+), which is an upside of Sugar formation (T)	0.95
2	T-/A- are overdevelopments or exaggerations of the parent concept, and simultaneously underdevelopments of its opposition	Enmeshment (T-) is overdeveloped Love (T) and underdeveloped Hate (A)	0.70	Resource depletion (T-) is overdeveloped Sugar formation (T) & underdeveloped Energy Conversion (A)	0.85
		Alienation (A-) is overdeveloped Hate (A) and underdeveloped Love (T)	0.88	Energy dissipation (A-) is overdeveloped Energy conversion (A) and underdeveloped Sugar Formation (T)	0.92
3	T+ must directly contradict A-, and T- must directly contradict	Bonding (T+) directly contradicts Alienation (A-)	0.95	Energy storage (T+) directly contradicts Energy dissipation (A-)	0.88

	A+ (shown by dotted arrows in Fig. 3A)	Enmeshment (T-) directly contradicts Autonomy (A+)	0.96	Resource depletion (T-) directly contradicts Energy sufficiency (A+)	0.90

* Conceptual Coherence estimated by GPT 5.2

The primary source of uncertainty lies in selecting the initial component from which to construct the tetrad. Once this choice is made, the remaining components are established using rules 1-3 from Table 3 applied in almost any sequence.

Each component can typically be represented by multiple alternative framings, much like a thesis can have multiple antitheses. However, these alternatives occupy a substantially more restricted semantic space. For example, A- = Alienation can be substituted by related terms with high Mean Heuristic Similarity (MHS = 0.84), such as Estrangement (0.92), Rejection (0.88), Aversion (0.84), Animosity (0.79), Dehumanization (0.72), or Exile/Expulsion (0.76).

Modality Alignment. This constraint provides a rigorous formalization of the diagonal oppositions (implied by the 3rd constraint in Table 3) which is especially important during debates and worldview formation. Each concept possesses an argumentative strength and affective intensity, which we represent as a scalar Modality (M). A balanced system requires symmetry in absolute modality values:

$$M(\text{T+}) = -M(\text{T-}) = M(\text{A+}) = -M(\text{A-}).$$

Imbalanced systems arise when the absolute values of either M(T+) and M(A-) or M(T-) and M(A+) are increased. In the first case, the thesis is framed as sacred or idealized while the antithesis is demonized; in the second case, the opposite framing occurs. Figure 4 illustrates these patterns for T = Love under two different antitheses.

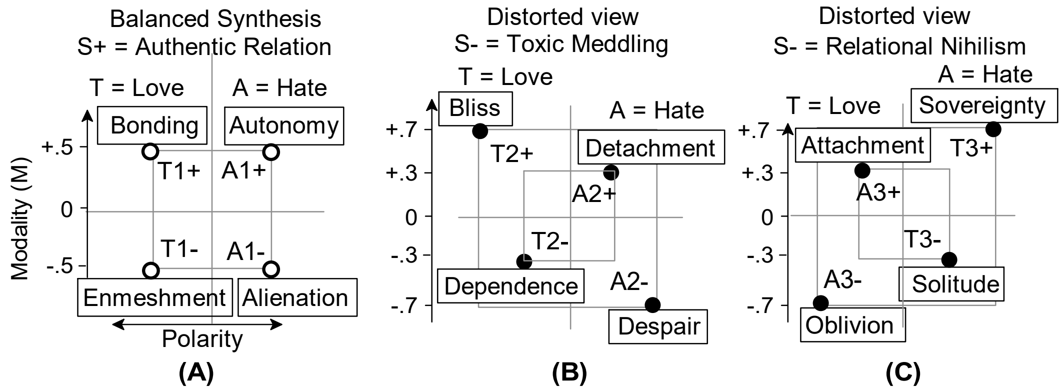


Fig. 4. Modality diagrams for T = Love, A = Hate

Scheme A shows balanced modality configurations, whereas B, C represent distorted views. These distortions are modeled using a zero-sum constraint:

$$M(\text{T+}) + M(\text{A-}) = M(\text{T–}) + M(\text{A+}) = 0$$

This condition can be interpreted as a gauge choice enforcing exhaustiveness and conservation: increases in one pole must be compensated by decreases in its complement. Analogous constraints appear across multiple domains, including logic (where truth and falsity exhaust probability mass) and physics (complementary energies, action–reaction pairs, and Noether's connection between symmetry and conservation laws).

Tetrad Selection. Direct measurement of modality values requires a dedicated AI system trained specifically for this purpose. Alternatively, we can identify empirical correlations between modality and more readily estimable parameters, such as a concept's average complementarity to the Thesis (K_T) and Antithesis (K_A), defined as

$$K_S = (K_T + K_A)/2$$

which varies between 0 and 1. These complementarity values can be readily estimated by AI systems, as illustrated in Table 4.

Table 4. Complementarities (K_T, K_A, K_S) *vs*. Modalities (M)

T = Love, A = Hate

	A = Hate	K_T	K_A	K_S	M
(A)	T1+ = Bonding	0.82	0.12	0.47	+.5
	T1- = Enmeshment	0.32	0.38	0.35	-.5
	A1+ = Autonomy	0.76	0.30	0.53	+.5
	A1- = Alienation	0.10	0.72	0.42	-.5
	Sum	2.00	1.52	1.76	0.0
(B)	T2+ = Bliss	0.58	0.10	0.34	+.7
	T2- = Dependence	0.40	0.40	0.40	-.3
	A2+ = Detachment	0.55	0.55	0.55	+.3
	A2- = Despair	0.14	0.68	0.41	-.7
	Sum	1.67	1.73	1.70	0.0
(C)	T3+ = Attachment	0.46	0.22	0.34	+.3
	T3- = Oblivion	0.04	0.60	0.32	-.7
	A3+ = Sovereignty	0.60	0.44	0.52	+.7
	A3- = Solitude	0.38	0.58	0.48	-.3
	Sum	1.48	1.84	1.66	0.0

T = Sugar formation, A = ATP formation

		K_T	K_A	K_S	M
(D)	T1+ = Carbon fixation	0.95	0.55	0.75	+.5
	T1− = Resource Depletion	0.20	0.25	0.23	-.5
	A1+ = Regulated transduction	0.70	0.90	0.80	+.5
	A1− = Oxidative dissipation	0.15	0.65	0.40	-.5
	Sum	2.00	2.35	2.18	0.0
(E)	T2+ = Enhanced Growth	0.85	0.55	0.70	+.7
	T2− = Resource Depletion	0.20	0.25	0.23	-.3
	A2+ = Energy Efficiency	0.55	0.75	0.65	+.3
	A2− = Energy Deficit	0.25	0.20	0.23	-.7
	Sum	1.85	1.75	1.80	0.0
(F)	T3+ = Resource Conservation	0.60	0.35	0.48	+.3
	T3− = Carbon Starvation	0.10	0.30	0.20	-.7
	A3+ = Strong Energy Capture	0.45	0.90	0.68	+.7
	A3− = Photodamage	0.05	0.70	0.38	-.3
	Sum	1.20	2.25	1.73	0.0

In balanced tetrads (A and D), positive components consistently exhibit higher average complementarity than their negative counterparts:

$$K_S(\text{T+}) > K_S(\text{T-}), \qquad K_S(\text{A+}) > K_S(\text{A-})$$

In distorted tetrads (B, C), this relationship is often violated, as highlighted by the shaded regions in Table 4: K_S(T2+) < K_S(T2-) and K_S(T3+) ≈ K_S(T3-). These violations manifest geometrically in Fig. 5 as skewed, twisted, or compressed trapezoids. By contrast, balanced systems (A and D) produce near-rectangular trapezoids, in which like-signed components occupy comparable K_S levels, while opposite-signed components remain clearly separated.

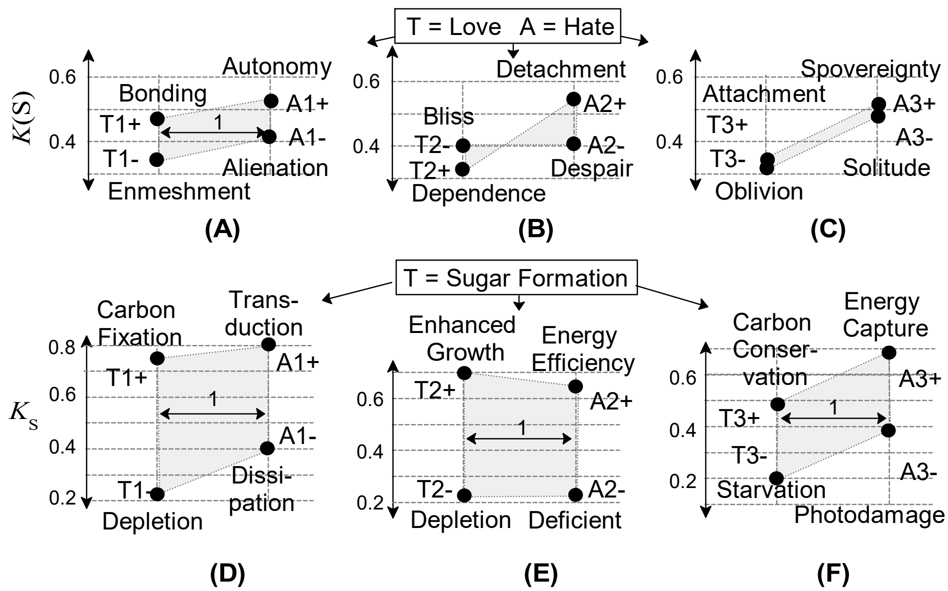


Fig. 5. Complementarity diagrams

These observations motivate the following empirical conditions:

$$K_S(\mathrm{T+}) - K_S(\mathrm{T-}) \approx K_S(\mathrm{A+}) - K_S(\mathrm{A-}) \geq 0.1$$

In addition, positive poles satisfy $K_S(+) > 0.4$, while negative poles satisfy $K_S(-) < 0.6$.

Trapezoids D – F are much more similar to each other than A – C, suggesting two additional conditions:

Maximum rectangularity = min $[(K_\mathrm{S}\,(\mathrm{T+}) - K_\mathrm{S}\,(\mathrm{A+}))^2 + (K_\mathrm{S}\,(\mathrm{T-}) - K_\mathrm{S}\,(\mathrm{A-}))^2]$

Maximum area = max $[K_\mathrm{S}\,(\mathrm{T+}) + K_\mathrm{S}\,(\mathrm{A+}) - K_\mathrm{S}\,(\mathrm{T-}) - K_\mathrm{S}\,(\mathrm{A-})]$

Another empirical criterion is the highest K_T values of positive poles (Max $[K_T\,(\mathrm{T+})]$, Max $[K_T\,(\mathrm{A+})]$) based on the fact that we usually put more weight onto complementarity with thesis (K_T) than with antithesis (K_A).

Control Statements. An additional requirement for a balanced system is that its components generate logically coherent control statements of the following form:

T+ without A+ yields T-, while A+ without T+ yields A-

Table 5 shows examples. Balanced systems produce highest Conceptual Coherence (CC).

Table 5. Control Statements for T = Love, A = Hate

Case	T= Love, A = Hate	CC*	T = Sugar, A = Energy conversion	CC*
(A) Balanced system	Bonding (T_1^+) without Autonomy (A_1^+) yields Enmeshment (T_1^-)	0.92	Carbon fixation (T_1^+) without Regulated transduction (A_1^+) yields Resource depletion (T_1^-)	0.90
	Autonomy (A_1^+) without Bonding (T_1^+) yields Alienation (A_1^-)	0.90	Regulated transduction (A_1^+) without Carbon fixation (T_1^+) yields Oxidative dissipation (A_1^-)	0.93
(B) Biased toward T	Bliss (T_2^+) without Detachment (A_2^+) yields Dependence (T_2^-)	0.82	Enhanced Growth (T_2^+) without Energy Efficiency (A_2^+) yields Resource Depletion (T_2^-)	0.85
	Detachment (A_2^+) without Bliss (T_2^+) yields Despair (A_2^-)	0.78	Energy Efficiency (A_2^+) without Enhanced Growth (T_2^+) yields Energy Deficit (A_2^-)	0.70
(C) Biased toward A	Attachment (T_3^+) without Sovereignty (A_3^+) yields Oblivion (T_3^-)	0.72	Resource Conservation (T_3^+) without Strong Energy Capture (A_3^+) yields Carbon Starvation (T_3^-)	0.87
	Sovereignty (A_3^+) without Attachment (T_3^+) yields Solitude (A_3^-)	0.88	Strong Energy Capture (A_3^+) without Resource Conservation (T_3^+) yields Photodamage (A_3^-)	0.94

* Conceptual Coherence estimated by GPT 5.2

Synthesis Modes

Above we considered how to select the best concepts for the synthesis. Here we consider what types of synthesis can occur. Positive synthesis (S+) creates new quality, while negative synthesis (S−) maximizes certain quantities. Both types are meant to complement each other, yet often negative synthesis imitates positive while actually suppressing it.

The contrast can be illustrated by the following analogy. S^+ resembles growing a living tree from a seed, whereas S^- resembles constructing an artificial imitation of a tree. Organic growth is slow, uncertain, and difficult to predict, but once established it remains stable for long periods with minimal maintenance. By contrast, artificial construction is rapid and controllable, yet requires continuous external support and deteriorates more quickly over time. S^+ prioritizes qualitative coherence over formal correctness, whereas S^- privileges rule compliance and measurable outputs.

Equal Sign Synthesis. Figure 3(B) illustrates that synthesis occurs exclusively between like-signed components. Positive synthesis takes place between T^+ and A^+, while negative synthesis occurs between T^- and A^-.

No direct interaction is possible between undifferentiated or oppositely signed poles—such as T and A, T+ and A-, or T- and A+—because these represent direct oppositions or contradictions (e.g., Love/Hate, Bonding/Alienation, Autonomy/Enmeshment).

Similarly, no direct interaction is possible between T^+ and T^- or between A^+ and A^-, as these correspond to different developmental levels of the same phenomenon rather than complementary counterparts (e.g., Bonding/Enmeshment, Autonomy/Alienation).

Positive Synthesis (S+) Modes. Positive synthesis unfolds slowly through dense networks of mutual complementarity, therefore it often appears unlikely or invisible until it emerges. However, once established, S^+ configurations are difficult to reverse, since they are supported by distributed self-regulation. Table 6 decomposes it into three interrelated modes—processual (Sa^+), structural (Sb^+), and normative (Sc^+)—which may occur sequentially or simultaneously, and culminates in an apex form (S^+) characterized by emergent unity and new quality.

Table 6. Typical modes of Positive Synthesis (S+)

	Sa+ (Process)	**Sb+ (Structure)**	**Sc+ (Normative)**	**S+ (Apex)**
Core Principle	Self-Regulation and Resilience	Bounded Coupling	Invariant Preservation:	Emerging Unity, New Quality
General Schema	Remaining stable under shocks	Preserving distinction while creating new relations	Preserving core values while creating new meanings	Emergent unity that transforms values without erasing prior integrity
Emergence of Love	Remaining stable together	Being close without losing ourselves	Mutual respect and regard	Mature Love
Sugar format. photosynthesis	Energy-balanced growth	Healthy sweetness	Homeostatic allocation	Biomass Production
Emergence of Institutions	Remaining stable	Preserving civil autonomy	Constraining power	Legitimate Governance
Scientific Paradigms	Coherence under anomaly	Integrative Modeling	Truth constrains theory	Scientific Maturity

Negative Synthesis (S-). Negative synthesis differs fundamentally from S^+ in that it seeks to optimize one or a few existing dimensions at the expense of others. Rather than dissipating pressure by expanding dimensionality, S^- consolidates energy within a narrow set of metrics, thereby increasing rigidity, conflict, or fragility. Table 7 identifies three characteristic modes: dominance of either thesis or antithesis, and oscillation between them.

Table 7. Synthesis violation types

		Positive Synthesis Modes		
		Sa+ (Process)	**Sb+ (Structure)**	**Sc+ (Normative)**
Negative Synthesis Modes	**Sa- (Distortion via dominant T)**	Rigidity (frozen order)	Care becomes control	Moral absolutism, dogmatism
	Sb- (Erosion via dominant A)	Loss of feed-back, burnout	Detachment, alienation	Value hollowing, instrumentalism
	Sc- (Deregulation via T/A oscillation)	Crisis reco-very cycles	Push-pull bonds, cling withdraw	Cynicism, disengagement

In social development, negative synthesis often replaces positive *via* imitating external forms, metrics, or rules that substitute for internal development. Process-wise, S^- is typically regulated through top-down directives, rigid rule enforcement, or oscillation between dominant poles. Complementarity and tolerance of indeterminacy are replaced by binary reasoning and "either–or" logic.

Apex Coherence. To prevent ad-hoc labeling, we impose an apex coherence constraint:

The apex synthesis $S^{\pm}$ *must lie within the convex hull of its valid sub-syntheses in the relevant semantic embedding space and must exhibit high mean cosine / heuristic similarity to those sub-syntheses.*

Here, valid sub-syntheses are those already satisfying sign alignment, modality balance, complementarity (K_S), and control-statement coherence. Figure 7 illustrates this rule for T= Love with 5 major antitheses (A1 = Hate, A2 = Indifference, A3 = Fear, A4 = Contempt, A5 = Objectification).

Plot A (Subjective Transformation vs. Objective Structuring) separates internal regulation from externally imposed stability. S^+ and S^- statements form clearly separated clusters, with the apex statements located near the centers of their respective distributions.

Schemes B and C explain the meanings of labels. Numbers next to concepts denote heuristic similarity (HS) to the corresponding S^+ or S^- apex statement. Both apexes achieve high representativeness (MHS ≈ 0.84), with the lowest HS remaining ≥ 0.75. Generic labels yield substantially lower representativeness, *e.g.*: S^+(Love) ≈ 0.62 ± 0.08, S^-(Love) ≈ 0.58 ± 0.10, S^+(Healthy Love) ≈ 0.76 ± 0.06, S^-(Unhealthy Love) ≈ 0.70 ± 0.08. Thus, the proposed apex statements are more specific and semantically coherent than commonly used alternatives.

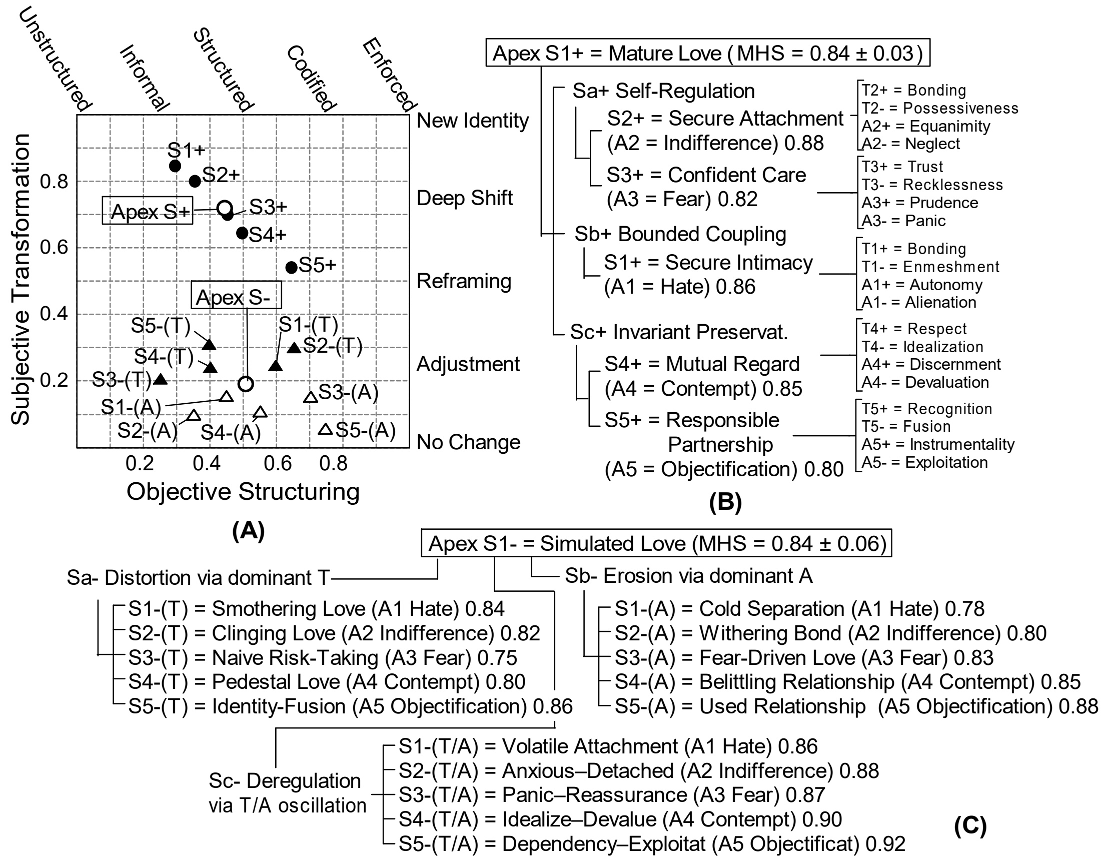
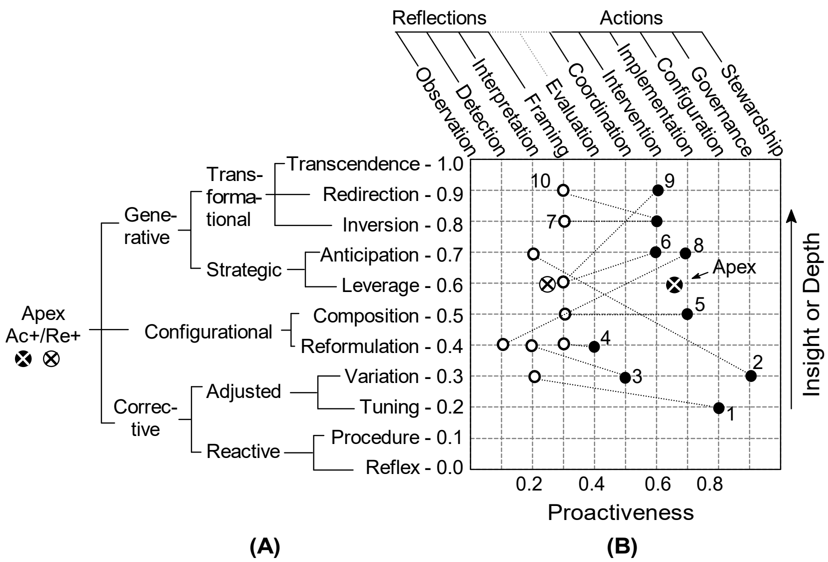


Fig. 7. Distributions of S+ and S- statements for T = Love

Transition Rule (Circular Causality)

Positive synthesis (S+) arises if and only if two complementary transitions occur simultaneously (see Fig. 3 C): an exaggerated thesis component (T-) is transformed into a constructive antithesis component (A+), and an exaggerated antithesis component (A-) is transformed into a constructive thesis component (T+). Together, these paired transitions form a closed loop of circular causality, which constitutes the true source of self-regulation.

Prediction of Ac and Re Components. Ac and Re components can be generated by simple prompts (*e.g.,* for Ac+: “suggest how to transform T- into A+”). The obtained tetrad (Ac+, Ac-, Re+, Re-) must obey all the same symmetry rules that were applied for T/A components in Tables 3 and 5 (*e.g.*, Ac+ must directly contradict to Re-, while Ac- must directly contradict to Re+.). Our main goal however is generation of actionable advice in the form of Ac+ and Re+. Fig. 8 shows that all such advices can be clustered using two general scales.



● Ac+ (Enmeshment → Autonomy)	○ Re+ (Alienation → Bonding)
⊠ Non-automatic interaction by design	⊗ Value carried by meaning, not immediacy
1 Stop interaction to break fusion	Interpret the pause as protection
2 State a personal limit	View boundary as safety
3 Stop compulsive behavior	Stay reachable
4 Introduce mild non-separation	Keep a sense of care during distance
5 Use schedules, roles, to enforce separateness	View distance as safety rather than abandoning
6 Plan separation in advance	Connection as continuity rather than immediacy
7 Make closeness voluntary	Bonding as freely chosen, not obligatory
8 Separate goals and identity	Independence as compatibility, not distance
9 Redirect emotions into a shared third focus	Connection through shared orientation or mission
10 Define limits as acts of care	Separation as preserving closeness

(C)

Fig. 8. Universal taxonomy of Ac/Re+ exemplified for T = Love, A = Hate

Proactiveness scale evolves from passive observation to active stewardship, while Depth scale evolves from reactive reflexes to transformative insights. This evolution can also be aligned with increasing foresight, sophistication, smartness, leverage, or ingenuity. It is not however related to the forcefulness or direct power levels, because Ac+ and Re+ must retain subtle and flexible enough for balancing each other. Becoming too forceful means changing own polarization from positive into negative. Black and white points represent interconnected Ac+ and Re+ components that are not always horizontal, because one pole can carry larger Insight or Depth weight than the other. However, the apex concepts should lay on the same level.

Multi-Thesis Conflict Resolution.

When two or more theses interact — whether cooperating or conflicting — they must be arranged into circular causal configurations (Table 8).

Table 8. Circular causations involving multiple theses

T-Only Loops	T/A Loops	Chains with Transitions
T	T – A	T – Ac – A – Re –

T1 – T2 – (1 permutation)	T1 – T2 – A1 – A2 –, T1 – A2 – A1 – T2 – (1 x 2 possibilities)	T1 – Tr1 – T2 – Tr2 – A1 – Tr3 – A2 – Tr4 – (Tr1 transforms T1- into T2+, Tr2 – T2- into A1+)
T1 – T2 – T3 –, T1 – T3 – T2 – (2 permutations)	T1 – T2 – A3 – A1 – A2 – T3 –, T1 – A2 – A3 – A1 – T2 – T3 – (2 x 4 possibilities)	T1 – Tr1 – T2 – Tr2 – T3 – Tr3 – A1 – Tr4 – A2 – Tr5 – A3 – Tr6 – (Tr defined as above)
T1 – T2 – T3 –T4 – (6 permutations)	T1 – T2 – T3 – T4 – A1 – A2 – A3 – A4 – (6 x 8 possibilities)	T1 – Tr1 – T2 – Tr2 – T3 – Tr3 – T4 – Tr4 – A1 – Tr5 – A2 – …

First, all relevant statements are considered as independent theses (T1, T2, …) that are arranged into circular causations. N components yield (N – 1)! orderings. Among these, the optimal orderings are the ones in which diagonally placed positions (*e.g.*, for N = 4, the 1^{st}–3^{rd} and 2^{nd}–4^{th}) maximize opposition.

Second, for each thesis T_X we provide an antithesis A_X positioned diagonally from T_X. Each T-only loop yields 2^(N – 1) permutations that can be ranked by their practical feasibility.

Third, between each adjacent pair of components, a transition operator (Tr1, Tr2, …) must be inserted such that the negative mode of the preceding component (e.g., $T1^{-}$) is transformed into the positive mode of the succeeding component (e.g., $T2^{+}$). If no coherent transition exists, alternative permutations must be examined or additional T/A pairs introduced.

Fig. 9 demonstrates how this helps diminishing the conflict between Love and Hate. Scheme A shows conflict resolution *via* apex Ac+ and Re+ transformations, assuming that T = Love, A = Hate (as shown in Fig. 8). Scheme B considers an additional T/A pair (Attention/Distance). Each transition is provided with its coherence / feasibility estimation (TC, in parentheses). The lowest TC rises from 0.55 to 0.60 and can be further improved by adding supplemental theses derived from context (*e.g.*, via BAF analysis) or generated by AI. All Tr components can be regarded as Tr+, while their exaggerated forms (opposing diagonally placed Tr(N/2)+) can be regarded as Tr-.

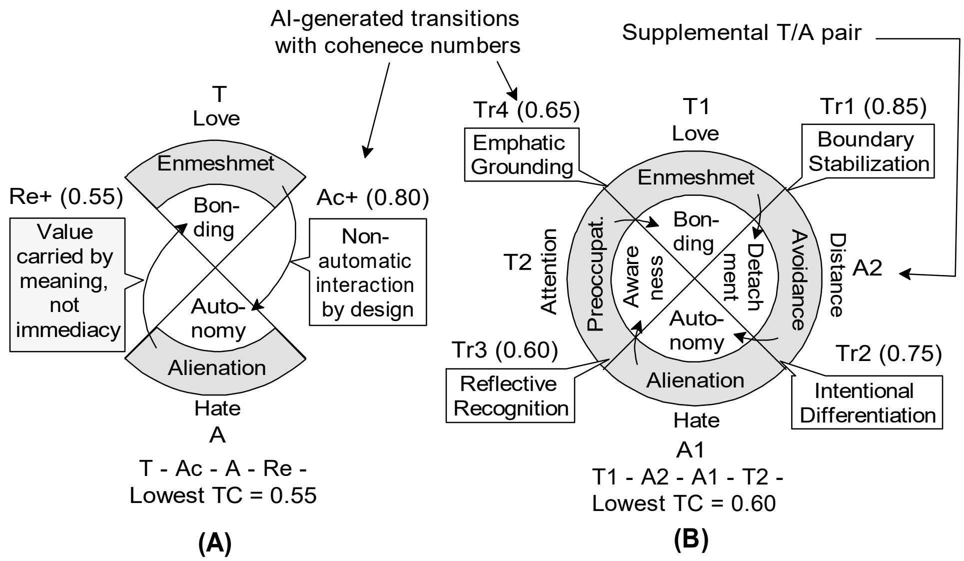


Fig. 9. Dialectical wheels for Love/Hate

Note that addition of Tr components in multi-thesis wheels (T1 → A2 → A1 → T2) does not eliminate the need of the original Ac/Re components in the single-thesis wheels (T1 ↔ A1, A2 ↔ T2). Rather, Tr components simply increase the feasibility of Ac/Re transformations. True synthesis implies simultaneous transformations among all components at once (T1 → A2 → A1 → T2, T1 ↔ A1, A2 ↔ T2) rather than in sequence.

Dialectical Reasoning Workflow

Figure 10 summarizes the proposed dialectical layer.

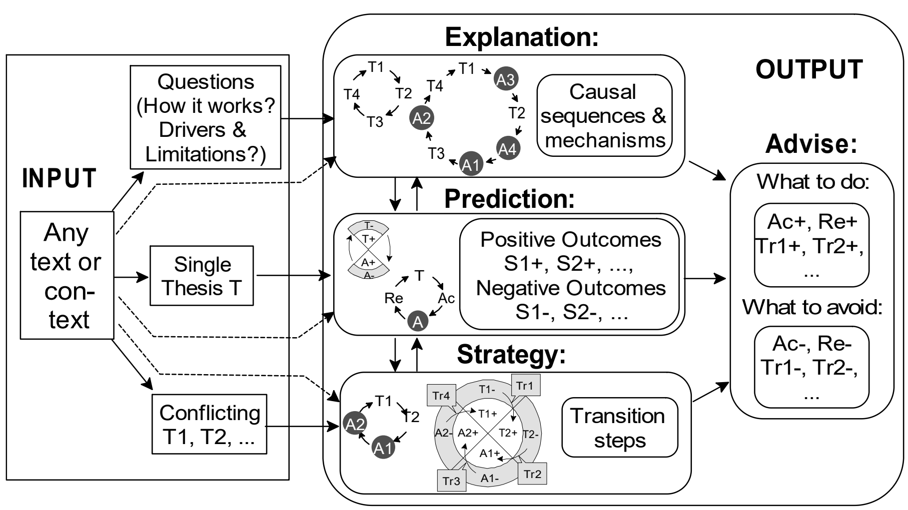


Fig. 10. Dialectical reasoning workflow

From textual input or contextual information, the system generates structured oppositional configurations, explains causal relations, predicts synthesis outcomes, and derives action and reflection components that support informed intervention. The framework thus links argument construction with explanation, prediction, and guidance.

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Additional Material

Algebraic Model

Dialectical causality differs from circular reasoning by its multi-dimensionality. Algebraically, each ± pole pair can be modeled as a distinct coordinate. For example, the Thesis axis evolves from an exaggerated form (T−) toward a constructive form (T+). Positive synthesis is modeled as a state in which all components (T, A, Ac, Re) span mutually orthogonal coordinates, so that transformations preserve their independence.

If transformations between components are viewed as rotations, coherence requires that these rotations occur in a synchronized manner. In four dimensions, such coherence-preserving change corresponds to an SO(4) transformation, which decomposes into two simultaneous rotations in orthogonal 2D planes. From this perspective, innovative thinking consists in discovering compound rotations in this 4D space that resolve tensions through coordinated, lower-dimensional complementarities rather than unilateral change.

Ac and Re components for T = Love, A = Hate

Table 8. AI predictions of Ac+/Re+ for T = Love, A = Hate
(T1+ = Bonding, T1- = Enmeshment, A1+ = Autonomy, A1- = Alienation)

Pair	Ac+ (Enmeshment → Autonomy)	Re+ (Alienation → Bonding)
Apex	Decoupling by Default (Non-automatic interaction by design) X* = 0.65, Y = 0.60, HS = 1.00	Relational Value Relocation (Value carried by meaning, not immediacy) X = 0.25, Y = 0.60, HS = 1.00
1	Emergency Pause (temporarily stop interaction to break fusion) X = 0.8, Y = 0.2, HS = 0.62	Crisis Reframing (interpret the pause as protection, not rejection) X = 0.2, Y = 0.3, HS = 0.70

2	Explicit Boundary Setting (clearly state and enforce a personal limit) X = 0.9, Y = 0.3, HS = 0.70	Non-Threat Interpretation (read the boundary as safety, not hostility) X = 0.2, Y = 0.7, HS = 0.78
3	Internal Behavior Cutoff (stop one's own merging or compulsive behavior) X = 0.5, Y = 0.3, HS = 0.66	Commitment to Connection (maintain inner intent to stay emotionally reachable) X = 0.2, Y = 0.4, HS = 0.74
4	Soft Boundary Creation (introduce mild, non-confrontational separation) X = 0.4, Y = 0.4, HS = 0.72	Holding Bonding Intent (keep a stable internal sense of care during distance) X = 0.3, Y = 0.4, HS = 0.76
5	Autonomy by Structure (use schedules, roles, or space to enforce separateness) X = 0.7, Y = 0.5, HS = 0.82	Distance as Safety (experience separation as stabilizing rather than abandoning) X = 0.3, Y = 0.5, HS = 0.82
6	Pre-Scheduled Distance (plan separation in advance, before tension arises) X = 0.6, Y = 0.7, HS = 0.84	Bonding Over Time (experience connection as continuity rather than immediacy) X = 0.3, Y = 0.6, HS = 0.86
7	Opt-In Closeness Design (make closeness voluntary rather than assumed) X = 0.6, Y = 0.8, HS = 0.90	Presence by Choice (experience bonding as freely chosen, not obligatory) X = 0.3, Y = 0.8, HS = 0.84
8	Visible Independence Signal (overtly express separate goals and identity) X = 0.7, Y = 0.7, HS = 0.76	Reframing Autonomy (interpret independence as compatibility, not distance) X = 0.1, Y = 0.4, HS = 0.72
9	External Anchor Creation (redirect emotional intensity into a shared third focus) X = 0.6, Y = 0.9, HS = 0.78	Indirect Bond Formation (experience connection through shared orientation or mission) X = 0.3, Y = 0.6, HS = 0.83
10	Boundary as Care Action (define limits explicitly as acts of care) X = 0.6, Y = 0.8, HS = 0.80	Distance as Intimacy (experience separation as preserving closeness) X = 0.2, Y = 0.9, HS = 0.90
11	Life-Level Autonomy Design (design life systems where fusion is impossible) X = 0.7, Y = 0.9, HS = 0.92	Secure Relational Meaning (hold bonding as part of identity, not situation-dependent) X = 0.2, Y = 0.9, HS = 0.93
	Mean HS = 0.78 ± 0.1	Mean HS = 0.81 ± 0.04

*X = Proactiveness, Y = Insight or Depth, HS = Heuristic Similarity

All statements from this table are presented as pairs of black and white points in Fig. 9, that are connected by dotted lines. These connections are not always horizontal, suggesting that one pole can carry larger Insight or Depth weight than the other. Such disparity could likely be smoothed by the semantic symmetry rules between Ac and Re poles that were not explicitly applied in this case. The apex concepts (denoted by X shaped points) lay on the same horizontal level, suggesting that ideal Ac/Re pairs should be balanced on "ideation" level too.

Generally increasing Y also increases HS between apex and sub-statement (see Table 8), suggesting that apex concepts are geared toward higher sophistication.

Greimas Mapping Rule

Sometimes direct prompts do not yield good concepts, in which case semiotic Greimas' square (Greimas and Courtés, 1982) becomes useful (Fig. 10).

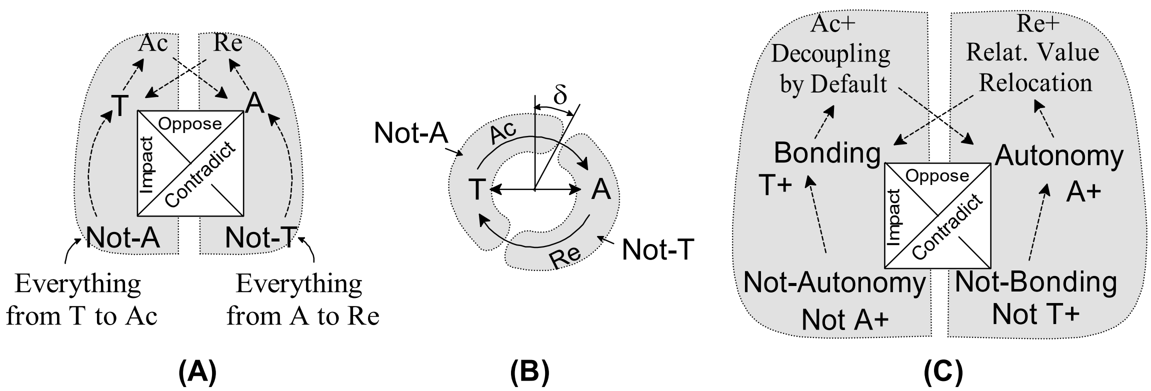

Fig. 10. Relation between Greimas' square and dialectical transitions

Scheme A shows that the "Not-A" space includes "everything from T to Ac", while the "Not-T" space includes "everything from A to Re". Empirically we observe that:

Not-A denotes affinity with A without instantiating it, and *Not-T* denotes affinity with T without instantiating it. Accordingly, Ac operates in Not-A space (leaning toward A while it is not yet affordable), and Re operates in Not-T space (leaning toward T while it is not yet affordable).

This can be explained by asymmetry of Not-A and Not-T spaces, denoted by rotational angle δ in scheme B. If we further restrict these spaces to the concepts of comparable affective and argumentative modalities, they become applicable for identifying Ac+ and Re+ (as shown in scheme C). Negation of A+ enables Ac+, by allowing it to lean toward A+, but not to become A+. In the same way, negation of T+ enables Re+. In the end, Ac^+ / Re^+ must: (1) not restate A^+ or T^+, (2) describe a generative operation rather than result, (3) be valid before A+ or T+ are affordable, (4) explain subtlety, indirectness, and non-force, (5) generalize beyond T/A to other domains.

Versatility

Above we used a single example with T = Love. Table 9 illustrates its applicability it few other domains.

Table 9. Examples of dialectical components

Components	**Mechanics**	**Business**	**Healthcare**
T (Thesis)	Air-Fuel Intake	Sales & Marketing	Vaccination
T+ (Goal)	Efficiency	Sales, Revenue	Specific protection
T- (Risk)	Clogging	Pushy Short-Termism	Lack of Autonomy
A (Antithesis)	Power Stroke	Customer Experience	Non-vaccination
A+ (Obligation, Opposite to T-)	Work	Caring, Deep User Understanding	Natural Immunity
A- (Subseq. Risk, Opposite to T+)	Blowby Jamming	Passivity, Unne-cessary Expense	Specific vulnerability
S+ (Positive Synthesis)	Optimal Combustion	Value co-creation (Apple eco-system)	Endemic adaptation
S- (Negative Synthesis)	Mechanical binding/ seizure	Manipulative selling (Wells Fargo scandal)	Ideological polarization / medical coercion

Many more examples from different areas can be found in these links:

General Systems Optimization	**Ethics and Wisdom**	**Decentralized Decisions**
Dialectical Wheels for Sys-Ops	Dialectical Ethics	Blockchain + AI Protocols
Supplementary Material	Moral Wisdom from Dialectic	Wisdom Mining Protocol
Dialectic Wheels ISSS Poster	Rethinking Regulation	Generalized Tokenization

Identifying Distortions in Established Theories or Beliefs

The framework presented here is especially effective at diagnosing over-optimization, polarity collapse, and false apexes across a wide range of established theories, ideologies, and practices (Table 10). In each case, apparent disagreements or failures are shown to arise not from lack of intelligence or data, but from structurally distorted synthesis: domination of a single dimension, loss of complementary components, or collapse of circular causality.

Table 10. Examples of distortions

Field	Concepts	Distortion
Epistemology & philosophy of science	Naïve reproducibility absolutism	Treating reproducibility (metric stability) as the sole criterion of truth, suppressing discovery, context sensitivity, and emergence
	Reductionist materialism *vs.* panpsychism	Both absolutize one pole (matter or mind) and suppress complementary dimensions.
	Logical positivism	Meaning reduced to verification, excluding normative and emergent dimensions.
Ethics & regulation	Zero-tolerance regulation regimes	Erasing tolerance collapses self-regulation. Loss of Ac+/Re+ subtlety; forcefulness flips polarity
	Moral absolutism	Sacred values without balancing antitheses. Modality imbalance and control-statement failure
Politics & ideology	Pure market fundamentalism	Optimization of efficiency at the expense of resilience, legitimacy, and social trust
	Totalizing collectivism	Suppression of autonomy in the name of cohesion
	Identity absolutism	Sacred T+ with demonized A−, violating modality symmetry
Technology & AI	Metric-only alignment	Treating proxy metrics as values, Sb− and Sc− collapse; lack of invariant preservation
Medicine & health	Vaccines only vs. natural immunity only	Each side maximizes one axis and denies trade-offs
	Symptom suppression w/o systemic healing	Fast, measurable intervention with no long-term integration

These examples demonstrate that dialectical failures are typically architectural rather than moral. When generative rules are violated—through modality imbalance, suppression of Ac^{+}/Re^{+} transitions, or premature fixation on a false apex—systems may stabilize temporarily but lose self-regulation and long-term viability.

In practice, many distortions can be detected and corrected using a small number of principled checks: validating the Thesis–Antithesis pairing, ensuring the presence and proper opposition of all tetradic components, maintaining balanced modalities, and evaluating whether predicted syntheses genuinely increase dimensionality rather than merely intensifying existing axes. In particular, attention to Ac^+ and Re^+ operators provides a practical handle on whether a system can transition non-coercively from negative poles toward positive synthesis.

More broadly, the framework reframes synthesis not as a rhetorical compromise or ideological midpoint, but as a rare, constrained, and generative process that can be distinguished from its imitations. By making the conditions of positive synthesis explicit and testable, the method offers a unified lens for analyzing conceptual disputes, institutional pathologies, and design failures across domains—from philosophy and ethics to science, governance, and AI.

In this sense, the framework does not prescribe particular values or outcomes. Instead, it restores the structural conditions under which values, meanings, and systems can remain balanced, generative, and self-correcting over time.

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Supplementary Material Addendum

Systemic Taxonomy of Balanced Tetrads

Table S-1 presents a systemic taxonomy for grouping tetrads based on functional dimensions emphasized in modern systems and cybernetic perspectives. An apex concept - system viability – emerges from five interrelated capacities: (1) integrity (structural coherence), (2) fidelity (reliable information processing), (3) exchange (sustainable resource flows), (4) flexibility (adaptive responsiveness), and (5) resilience (recovery from perturbations). This taxonomy is intended as a heuristic organizing framework rather than a definitive ontology.

Table S-1. Systemic taxonomy, assuming that each concept implies 5 different aspects:

	Apex	**Branch 1**	**Branch 2**	**Branch 3**	**Branch 4**	**Branch 5**
Domains	**Viability**	**Integrity**	**Fidelity**	**Exchange**	**Flexibility**	**Resilience**
General T	Integration	Cohesion	Modeling	Exchange	Exploration	Recovery
General A	Disintegration	Separation	Error correction	Consumption	Constraint	Disruption

Engineering		assembly	simulation	energy flow	control	tolerance
Ecology		Symbiosis	Sensing	Cyclicity	plasticity	resilience
Institutions		Soc. cohesion	knowledge	economy	innovation	crisis recovery
General T+	Coherence (0.90; 0.20; 1.00)*	Coherence (0.90; 0.20; 1.00)	Accuracy (0.75; 0.25; 0.60)	<u>*Exchange*</u> (0.70; 0.30; 0.45)	<u>*Plasticity*</u> (0.65; 0.40; 0.40)	Recovery (0.75; 0.55; 0.55)
General T-	Rigid fusion (0.35; 0.20; 1.00)	Locking-in (0.40; 0.20; 0.80)	Dogmatism (0.35; 0.25; 0.65)	Dependency (0.45; 0.30; 0.55)	<u>*Chaotic drift*</u> (0.30; 0.50; 0.20)	<u>*Fragility*</u> (0.35; 0.55; 0.40)
General A+	Differentiation (0.85; 0.45; 1.00)	Differentiation (0.85; 0.45; 1.00)	Critical testing (0.80; 0.45; 0.55)	Constraint (0.80; 0.40; 0.75)	Stabilization (0.75; 0.55; 0.60)	Buffering (0.70; 0.60; 0.55)
General A-	Disintegration (0.20; 0.90; 1.00)	Rupture (0.15; 0.55; 0.75)	Denial (0.20; 0.45; 0.40)	Depletion (0.15; 0.60; 0.55)	<u>*Suffocating*</u> (0.25; 0.35; 0.35)	Collapse (0.10; 0.70; 0.85)
T	Love	Bonding	Understanding	Giving	Openness	Repair
A	Hate	Aversion	Adversariality	Withholding	Defensiveness	Rancor
T+	Bonding (0.85; 0.10; 1.00)*	Attachment (0.75; 0.10; 0.90)	Attunement (0.80; 0.15; 0.85)	Reciprocity (0.80; 0.15; 0.85)	Flexibility (0.70; 0.40; 0.55)	Reconciliation (0.75; 0.35; 0.80)
T-	Enmeshment (0.30; 0.15; 1.00)	Enmeshment (0.30; 0.15; 1.00)	Projection (0.20; 0.20; 0.60)	Dependence (0.35; 0.20; 0.70)	Fusion (0.25; 0.15; 0.85)	Clinginess (0.25; 0.15; 0.85)
A+	Autonomy (0.85; 0.75; 1.00)	Boundaries (0.85; 0.70; 0.90)	Differentiation (0.80; 0.80; 0.85)	Independence (0.70; 0.65; 0.85)	Autonomy (0.85; 0.75; 1.00)	Self-possession (0.70; 0.60; 0.80)
A-	Alienation (0.10; 0.25; 1.00)	Alienation (0.10; 0.25; 1.00)	Estrangement (0.10; 0.30; 0.90)	Expulsion (0.05; 0.25; 0.80)	Distancing (0.10; 0.35; 0.75)	Withdrawal (0.10; 0.35; 0.75)
T	Hate					
A	Benevolence					
T+	Protection (0.85; 0.75, 1.00)	Boundary (0.80; 0.80, 0.90)	Discernment (0.75; 0.70; 0.75)	Reciprocity (0.65; 0.80; 0.55)	Caution (0.70; 0.55; 0.70)	Defensive repair (0.70; 0.75; 0.80)
T-	Demonization (0.25; 0.10; 1.00)	Exclusionism (0.30; 0.10; 0.80)	Demonization (0.25; 0.10; 1.00)	Exploitation (0.20; 0.10; 0.55)	Antagonism (0.35; 0.10; 0.75)	Vindictiveness (0.20; 0.05; 0.85)
A+	Compassion (0.70; 0.90; 1.00)	Supportiveness (0.60; 0.85; 0.90)	Empathy (0.65; 0.90; 0.95)	Generosity (0.45; 0.85; 0.75)	Openness (0.55; 0.75; 0.65)	Forgiveness (0.60; 0.85; 0.85)
A-	Indulgence (0.10; 0.25; 1.00)	Overindulgence (0.05; 0.20; 0.95)	Idealization (0.15; 0.25; 0.65)	Overgiving (0.10; 0.20; 0.80)	Naivety (0.10; 0.20; 0.60)	Passive tolerance (0.20; 0.30; 0.75)

* Numbers in parentheses indicate respectively, K_T, K_A, and HS (heuristic semantic similarity to apex) – they will be used in the following sections.

It shows that positive and negative poles can be grouped into a small set of functional categories applicable across diverse domains (including engineering, ecological and institutional systems, and interpersonal contexts). Below we provide an alternative categorization based on a four-element schema.

Literature provides many comparable attempts to classify universal positive and negative effects. These can be grouped into ethical taxonomies of virtues and vices, capability-based approaches to human flourishing, psychological models of moral foundations, and systems-theoretic treatments of viability, feedback, resilience, and failure modes.

Elemental Taxonomy of Balanced Tetrads

Table S-2 presents an alternative taxonomy for grouping tetrads into coherent categories based on a classical elemental framework. Historically, elemental classifications (e.g., fire, air, water, earth) provided a broad integrative scheme for organizing diverse natural, psychological, and social phenomena across many intellectual traditions for centuries, if not millennia. While modern taxonomies often achieve greater precision within specific domains, they may do so at the cost of the integrative breadth and cross-domain coherence characteristic of earlier elemental frameworks. The alternative taxonomy presented here is intended not as a revival of classical doctrine, but as a heuristic illustration of how tetradic relations can be organized within a broadly integrative conceptual structure.

Table S-2. Elemental taxonomy, assuming that each concept implies 4 classical elements

	Apex	**Fire**	**Earth**	**Air**	**Water**
Domains	**Viability**	**Drive**	**Structure**	**Process**	**Adaptation**
T	Integration	Activation	Cohesion	Exchange	Reflection
A	Disintegration	Inhibition	Separation	Consumption	Correction
Engineering		force input	assembly	energy flow	calibration
Ecology		energy input	symbiosis	cyclicity	homeostasis
Institutions		motivation	social cohesion	economy	learning
T+	coherence	motivation	coherence	exchange	plasticity
T-	rigid fusion	impulsivity	locking-in	dependency	fragility
A+	differentiation	regulation	differentiation	constraint	stabilization
A-	disintegration	repression	rupture	depletion	collapse
T = Love	integration	attraction	bonding	giving	openness
A = Hate	negation	aversion	hostility	withholding	defensiveness
T+	bonding	affection	attachment	reciprocity	reconciliation
T-	enmeshment	obsession	fusion	dependence	clinginess
A+	autonomy	restraint	boundaries	independence	self-possession
A-	alienation	rejection	estrangement	expulsion	withdrawal

Complementarity to T/A *vs*. Semantic Similarity of Balanced Tetrads

In Table S-1, each pole (T+, T−, A+, A−) is annotated with 3 numbers in parentheses, denoting respectively K_T, K_A (complementarity toward T and A) and HS (heuristic semantic similarity to apex). Within each row, K_T and K_A vary only modestly, suggesting similar modalities in Fig. 3. However, HS varies in larger ranges, suggesting that similar modalities may be expressed by semantically different concepts.

Fig. S-1 shows the steep dependences of HS on the cumulative absolute deviations between apex and a concept ($|\Delta K_T| + |\Delta K_A|$), suggesting that even small changes in complementarity can cause substantial semantic variations.

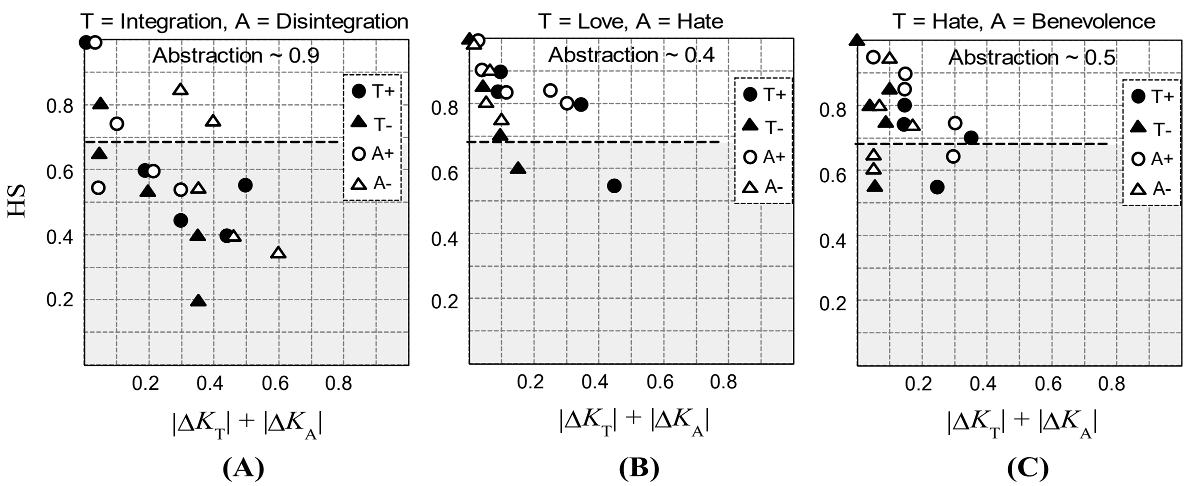

Fig. S-1

Semantic dispersion depends on the abstraction level. Plot A shows the highest variations due to the highest abstraction level. The pair Integration/Disintegration represents apex concepts from Table S-1 describing very wide domains (from natural ecosystems to personal affairs, institutions, and engineering) and involving multiple mechanisms. GPT assigns to it abstraction level of ~0.9 (on the scale from 0 to 1.) Plot B shows the smallest deviations, since the pair Love/Hate is psychologically concrete and socially well-defined (GPT assigned abstraction ~0.4). Plot C shows slightly higher deviations, since Hate/Benevolence is somewhat less defined socially and psychologically (abstraction ~0.5).

All in all, these observations suggest that tetrads are better selected based on complementarity (K_T and K_A) rather than purely semantic measures (HS or cosine similarity). Semantic similarity focuses on the meaning of independent statements, whereas complementarity focuses on their potential for mutual enhancement. Semantic similarity is sensitive to variability of complementarity mechanisms, while complementarity itself functions as a higher-level organizing concept for these variations.

Selecting Best Tetrad from Balanced Alternatives

How to identify the best tetrad from many balanced alternatives? Choose the one with the highest K_T values for T+ and A+. This implies a certain asymmetry between K_T and K_A (components' complementarities to T and A) as depicted in Fig. S-2.

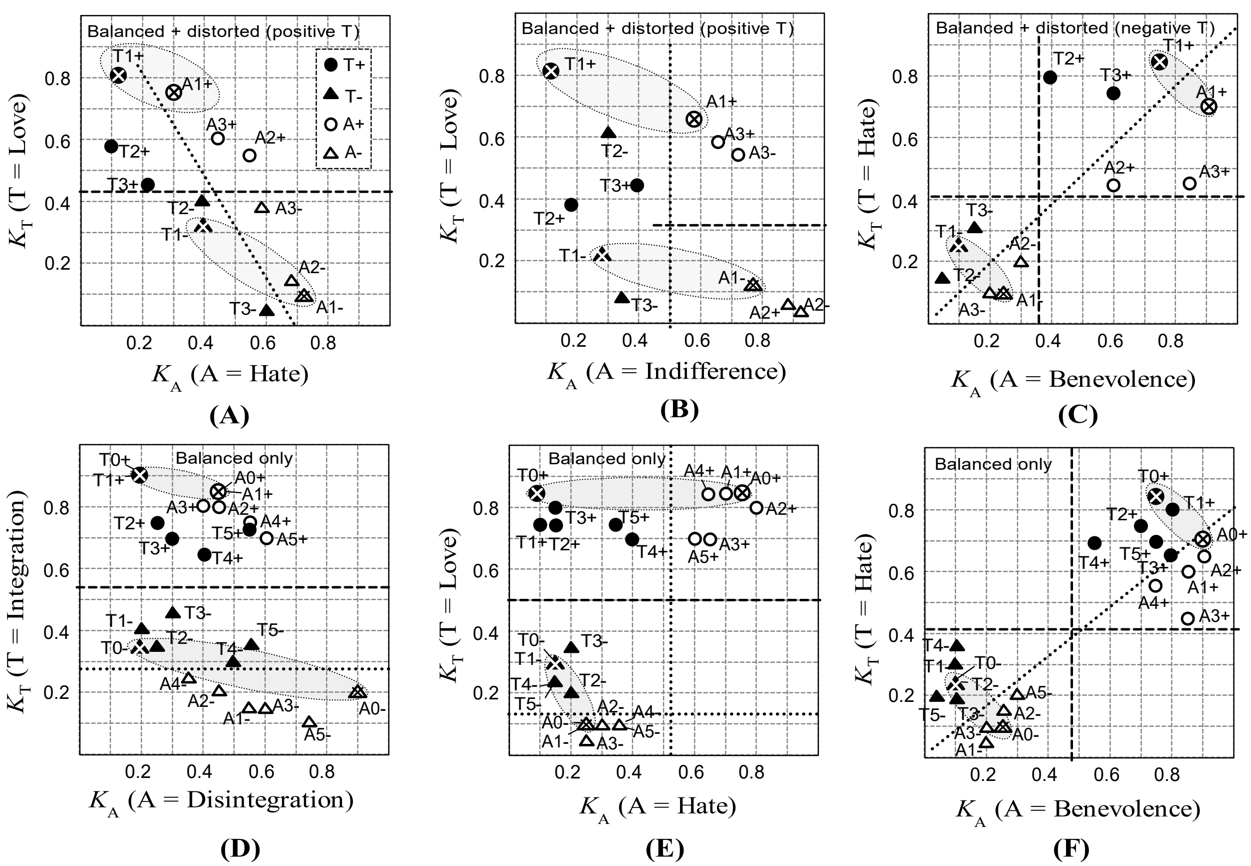

Fig. S-2. All values were obtained with GPT

These plots come from Tables S-1 and S-3.

Table S-3. Comparison of balanced (1±) and distorted (2-3±) tetrads

T = Love, A = Hate	K_T	K_A
T1+ = Bonding	0.82	0.12
T1- = Enmeshment	0.32	0.38
A1+ = Autonomy	0.76	0.30
A1- = Alienation	0.10	0.72
Sum	2.00	1.52
T2+ = Bliss	0.58	0.10
T2- = Dependence	0.40	0.40
A2+ = Detachment	0.55	0.55
A2- = Despair	0.14	0.68
Sum	1.67	1.73
T3+ = Attachment	0.46	0.22
T3- = Oblivion	0.04	0.60
A3+ = Sovereignty	0.60	0.44
A3- = Solitude	0.38	0.58
Sum	1.48	1.84

T = Love, A = Indifference	K_T	K_A
T'1+ = Bonding	0.82	0.12
T'1- = Possessiveness	0.22	0.28
A'1+ = Equanimity	0.66	0.58
A'1- = Neglect	0.12	0.76
Sum	1.82	1.74
T'2+ = Total fusion	0.38	0.18
T'2- = Devotion	0.62	0.30
A'2+ = Heartlessness	0.06	0.88
A'2- = Abandonment	0.04	0.92
Sum	1.10	2.28
T'3+ = Sentimentality	0.44	0.40
T'3- = Chaos	0.08	0.35
A'3+ = Impartiality	0.58	0.66
A'3- = Detachment	0.55	0.72
Sum	1.65	2.13

T = Hate, A = Benevolence	K_T	K_A
T1+ = Protection	0.85	0.75
T1- = Demonization	0.25	0.10
A1+ = Compassion	0.70	0.90
A1- = Indulgence	0.10	0.25
Sum	1.90	2.00
T2+ = Outrage	0.80	0.40
T2- = Hostility	0.15	0.05
A2+ = Tolerance	0.45	0.60
A2- = Numbness	0.20	0.30
Sum	1.60	1.35
T3+ = Autonomy	0.75	0.60
T3- = Repression	0.30	0.15
A3+ = Kindness	0.45	0.85
A3- = Self-sacrifice	0.10	0.20
Sum	1.60	1.80

In Fig. S-1, plots A – C show distributions of balanced and distorted tetrads (Table S-3). Plots D – E show distributions of only balanced tetrads (Table S-1). Dotted ovals show positions of the apex balanced concepts. In all cases positive apex poles show maximum K_T, but far not always maximum K_A. Negative poles show less consistence, although some regularities can be traced as well.

To understand these plots, consider two types effects. First, distorted tetrads in A – C form nearly continuous dependences, since all concepts are interrelated via zero-sum entanglements. Balanced tetrads are not interrelated by such entanglements (which only act within tetrads, but not between them), therefore their concepts form clearer clusters.

Second, each concept belongs to one of 4 clusters that we intuitively identify using bold straight lines. Dashed lines differentiate between constructive and destructive groups (circles vs triangles), whereas dotted lines between "ours" and "theirs" (black and white points denoting derivatives of T and A, respectively). These lines depend on K_T and K_A with unequal weights.

Most dashed lines are horizontal, indicating their higher dependence on K_T. Most likely this is due to our asymmetric perception of theses and antitheses. We perceive our theses as constructive, while antitheses as destructive. Situation changes when we consider negative thesis (like T = Hate). Then both K_T and K_A axes serve as comparable differentiators (see plots C and F). This yields higher level of discrimination between constructive and destructive phenomena, explaining why we must perceive our opponent as our teacher – as otherwise our own optimism becomes our enemy.

Most dotted lines are either diagonal or combine both horizontal and vertical lines, suggesting complex involvement of K_T and K_A. This suggests a potentially new field of typological analysis of how different complementarities produce a synthesis.

These asymmetries invite looking for the finer criteria of the apex conditions beyond their average values (K_S). Table S-4 summarizes such criteria based on Fig. S-1. They should be considered as an illustration of the analytical method rather than as a final discrimination rule.

Table S-4. Empirical criteria for selecting apex tetrad from Fig. S-1

	Positive T				Negative T			
	T+	A+	T–	A–	T+	A+	T–	A–
K_T	Max	Max	–	–	Max	Max	–	–
K_A	Min	–	Min	–	–	Max	–	–

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