Structural Viability of Dyadic Systems: A Dynamical Account of Romantic Dissolution

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Abstract

This paper provides a formal dynamical-systems account of romantic dissolution in long-term partnerships. Marriage is modelled as a two-agent cooperative system whose persistence depends on the non-empty and dynamically invariant intersection of the partners' individual viability sets. Drawing on the Unified Structural Theory of Complex Systems (Kriger, 2026a,b,c), we formalise ten mechanisms of interest attrition — viability mismatch (Kriger, 2026j), reward-signal adaptation, Quasi-Westermarck familiarity suppression, constraint–autonomy imbalance (Kriger, 2026k), social contagion of dissolution norms, absence of reproductive-cycle dynamics in friendship, valence switching in perceptual signals (Kriger, 2026l), economic cost–benefit asymmetries, children as viability-set anchors, and media-mediated norm distortion — and show that each can be represented as a special case of a general structural law. The resulting framework reinterprets "loss of love" not as an emotional or moral failure but as a structurally constrained trajectory in the parameter space of a dyadic persistence system — one shaped by deterministic tendencies but subject to irreducible stochastic and agentive variability. The framework identifies control variables through which the system's cooperative attractor can, in principle, be maintained.

Keywords: complex systems, structural viability, dyadic persistence, romantic dissolution, two-agent dynamics, viability sets, reward adaptation, Quasi-Westermarck effect, constraint–autonomy balance, social contagion, economic factors, children, media influence

Contents

1 Introduction

The dissolution of long-term romantic partnerships is among the most consequential social phenomena of the modern era. Current estimates suggest that approximately 40–45% of first marriages in the United States end in divorce (Bramlett and Mosher, 2001; Cherlin, 2010), with comparable or higher rates across much of Western Europe (OECD, 2024). The true rate of relational dissolution is higher still when cohabiting unions are included. Research using the Framingham Heart Study has shown that divorce can spread through social networks like a contagion, with the likelihood of dissolution increasing by 75% if a close friend divorces (McDermott et al., 2013). Despite a voluminous empirical literature in psychology (Gottman, 1994; Amato, 2000; Karney, 2021), sociology (Cherlin, 2010; White, 1990), and evolutionary biology (Fisher, 2004; Buss, 2003), no unified formal theory exists that derives the principal mechanisms of romantic interest attrition from a small set of structural laws.

This paper fills that gap by applying the *Unified Structural Theory of Complex Systems* (Kriger, 2026a) to the specific case of a two-agent cooperative system — the romantic dyad. The Unified Structural Theory establishes that *persistence, not truth, is the primary organising principle of complex systems*, and that truth-seeking, consciousness, social organisation, and scientific inquiry are derivative phenomena — strategies that systems have evolved to maintain structural viability (Kriger, 2026b,c).

The meta-theoretical foundations of the present analysis require explicit acknowledgment. Any investigation of a complex system operates within a formal framework that is necessarily incomplete (Kriger, 2026d), definition-dependent (Kriger, 2026e), and uncertainty-laden (Kriger, 2026f). The formal apparatus we deploy is therefore itself subject to the epistemic constraints it describes — a feature, not a bug, of the theory's recursive self-applicability (Kriger, 2026x).

Scope and relationship to prior formal models

Important formal modelling work on marriage dynamics has been undertaken by Gottman, Murray, and colleagues, whose coupled difference-equation models of marital interaction predict divorce from observed behavioural time-series data with remarkable accuracy (Gottman et al., 2002). The present paper differs from that programme in both aim and level of analysis. Where Gottman–Murray models operate at the *behavioural-interaction* level — modelling the turn-by-turn dynamics of a conversation — the present framework operates at the *structural-parameter* level, asking why the background conditions that shape those interactions change over the lifespan of a relationship. The two approaches are complementary: the behavioural models describe the proximate dynamics of conflict and repair; the structural model describes why the parameter regimes within which those dynamics unfold shift over time toward dissolution.

A further clarification concerns the epistemic status of the formalism. The mathematical apparatus deployed in this paper is best understood as a *formal taxonomy with deductive structure* rather than as a predictive quantitative model. The equations provide a precise language for classifying and relating known empirical phenomena; the structural laws provide the organising principles that connect them. We do not claim to have derived these phenomena from first principles in the way that physics derives planetary motion from gravitational laws. Rather, we claim that the structural-law framework provides a *principled and parsimonious redescription* that reveals connections among disparate phe-

nomena and generates qualitative predictions that are, in principle, empirically testable. Where the framework makes claims that go beyond established evidence — notably, the Quasi-Westermarck extension to adult cohabitation (Section 6) — these are explicitly flagged as hypotheses.

2 Literature Review

2.1 Biochemistry of Romantic Love and Its Decline

The neurobiological foundations of romantic love are now well established. Fisher's influential three-system model distinguishes lust, attraction, and attachment as distinct but interacting neural systems (Fisher, 2004; Fisher et al., 2005, 2016). Functional MRI studies have shown that early-stage romantic love activates dopaminergic reward pathways in the ventral tegmental area and caudate nucleus (Aron et al., 2005; Acevedo et al., 2012), producing neurochemical profiles that overlap significantly with those of addiction (Fisher, 2014; Esch et al., 2025). Oxytocin and vasopressin underpin the transition from attraction to long-term attachment (Seshadri, 2016; Schneiderman et al., 2012; Feldman et al., 2012), with prairie vole studies providing the foundational animal model (Young and Wang, 2004; Lim et al., 2004). Sternberg's triangular theory of love (Sternberg, 1986) and Tobore's quadruple theory (Tobore, 2020) provide complementary psychological frameworks.

Critically for the present analysis, the decline of passion in long-term relationships is well documented. Marazziti et al. showed that the neurochemical profile of early love (elevated cortisol, depressed serotonin) normalises within 12–18 months (Marazziti et al., 2021). The concept of hedonic adaptation — the return of subjective well-being to baseline after positive life changes — has been extensively studied (Lyubomirsky, 2011; Diener et al., 2006; Brickman et al., 1978). Bao and Lyubomirsky applied the Hedonic Adaptation Prevention model specifically to romantic relationships, identifying variety, appreciation, and positive events as key moderators of adaptation rate (Bao and Lyubomirsky, 2013). Sheldon and Lyubomirsky demonstrated that autonomous motivation slows hedonic adaptation (Sheldon and Lyubomirsky, 2012). This literature provides the empirical substrate for the reward-signal adaptation model formalised in Section 5.

2.2 The Westermarck Effect and Familiarity-Induced Suppression

Westermarck's original hypothesis (Westermarck, 1891) — that prolonged childhood coresidence induces sexual aversion — has received support from multiple natural experiments. Shepher's study of Israeli kibbutz children found near-zero rates of intra-cohort marriage among children raised communally (Shepher, 1971). Wolf's research on Taiwanese *shim-pua* marriages showed elevated divorce rates and reduced fertility in marriages arranged between children raised together from infancy (Wolf, 1995). Lieberman, Tooby, and Cosmides provided a cognitive architecture for kin detection based on co-residence duration and maternal perinatal association (Lieberman et al., 2007). Marcinkowska et al. demonstrated sex differences in the Westermarck effect using facial morphing paradigms (Marcinkowska et al., 2013). De Smet et al. extended the evidence using psychophysiological measures, finding that facial disgust responses to imagined

sibling incest correlated with childhood co-residence duration (De Smet et al., 2014). Fessler and Navarrete confirmed third-party moral attitudes consistent with the hypothesis (Fessler and Navarrete, 2004). The present paper extends this mechanism, via the Cyclic Closure Principle (Kriger, 2026i), to the domain of long-term cohabitation between romantic partners.

2.3 Evolutionary Context: Primate Mating Systems and the Adaptive Logic of Serial Monogamy

Any structural account of romantic dissolution must be situated within the broader evolutionary context of human mating systems. Social monogamy is rare among mammals (approximately 3–5% of species) but comparatively common among primates, where it has evolved independently in every major clade, occurring in roughly 25–29% of primate species (Opie et al., 2013; Lukas and Clutton-Brock, 2013). The ancestral primate mating system was polygynandrous (multi-male, multi-female); both harem-polygyny and monogamy are derived states that evolved relatively late in primate phylogeny, with strong transition rates *into* monogamy but zero transition rates *out* of it (Shultz et al., 2011).

Three competing hypotheses have been advanced for the evolution of social monogamy in primates: (i) biparental care, where the cost of offspring rearing necessitates male investment (supported in callitrichids, where females routinely bear twins); (ii) mate guarding, where low female density makes it more profitable for a male to guard one female than to search for others; and (iii) infanticide prevention, where pair-bonded males protect dependent offspring against rival males (Opie et al., 2013; Lukas and Clutton-Brock, 2013). Bayesian phylogenetic analyses by Opie et al. (2013) found that male infanticide was the only factor that consistently preceded evolutionary transitions to social monogamy in primates, suggesting that pair-bonding originated as a paternal protection strategy rather than a romantic one.

Humans occupy a distinctive position in this landscape. Comparative morphological evidence — moderate sexual dimorphism, intermediate testis-to-body-weight ratio (larger than gibbons but smaller than chimpanzees), concealed ovulation, and extended female sexual receptivity — places humans between the strictly monogamous and the promiscuous primates (Dixson, 2009; Chapais, 2013). Ethnographic surveys reveal that while the majority of human societies permit polygyny, the majority of marriages within those societies are monogamous in practice, and serial monogamy is cross-culturally ubiquitous (Murdock, 1967; Marlowe, 2000). This pattern suggests that lifelong pair-bonding is neither the ancestral human condition nor the statistically dominant one; rather, humans appear to be *facultatively monogamous* with a strong tendency toward serial pair-bonding (Fisher et al., 2016).

Fisher (1989); Fisher et al. (2016) proposed that the human pair-bond has a characteristic duration of approximately 3–7 years, corresponding to the period of peak offspring dependency, after which the neurobiological mechanisms sustaining attraction (dopamine, norepinephrine) attenuate and the pair-bond dissolves unless actively renewed. This "four-year itch" hypothesis is supported by cross-cultural divorce data showing modal divorce peaks at 3–4 years of marriage across 58 societies (Fisher, 1989). From an inclusive-fitness perspective, serial monogamy may be adaptive because it (i) increases genetic diversity among a parent's offspring, reducing vulnerability to pathogens and environmental change (Yasui, 1998); (ii) allows both sexes to "trade up" to partners of higher

genetic or phenotypic quality as their own mate value changes with age and status (Buss, 2003); and (iii) enables sex-differentiated reproductive strategies — men can increase reproductive output through additional partnerships, while women can secure paternal investment from successive high-quality males (Jokela et al., 2010).

The comparison with closely related species is instructive. Chimpanzees (*Pan troglodytes*) are promiscuous with no stable pair-bonds; bonobos (*Pan paniscus*) use sexual behaviour as a social bonding mechanism across all dyads; gorillas (*Gorilla gorilla*) form polygynous harems defended by a single silverback; and gibbons (*Hylobates* spp.) are the only apes that approach lifelong social monogamy, though even they show significant extra-pair mating (Palombit, 1994; Reichard, 2003; Fuentes, 2002). Humans, uniquely among the great apes, combine (i) intense but temporally bounded pair-bonding, (ii) biparental care with extensive alloparental support, (iii) high rates of extra-pair mating, and (iv) culturally institutionalised marriage norms that extend the pair-bond beyond its neurobiological "natural" duration. This combination makes humans the paradigmatic serial monogamists of the primate order.

The structural viability framework developed below formalises this evolutionary insight: the dissolution of romantic partnerships is not a pathological deviation from a monogamous norm but a structurally predictable consequence of a mating system designed for time-limited pair-bonds operating within cultural institutions that demand permanence. The tension between the evolved architecture (serial monogamy with a finite neurobiological "shelf life") and the cultural expectation (lifelong commitment) is the fundamental source of the dissolution dynamics analysed in the subsequent sections.

The landmark study by McDermott, Fowler, and Christakis using Framingham Heart Study data demonstrated that divorce spreads through social networks up to two degrees of separation (McDermott et al., 2013). The broader theory of social contagion in health behaviours was developed by Christakis and Fowler across multiple domains, including obesity, smoking, happiness, and loneliness (Christakis and Fowler, 2007, 2013). Divorce contagion operates through multiple mechanisms: normalisation of dissolution as an acceptable outcome, demonstration that post-divorce life can be satisfying, and disruption of shared social networks that previously stabilised marriages (Booth et al., 1991; Bryant and Conger, 1999). Popular people — those with larger, more supportive social networks — are less likely to divorce (McDermott et al., 2013), consistent with the viability-set expansion hypothesis developed below.

2.4 Economic Dimensions of Dissolution

Becker's economic theory of the family (Becker, 1981) framed marriage as a utility-maximising partnership and divorce as occurring when the expected utility of dissolution exceeds that of continuation. This cost–benefit framework has been extensively developed (Weiss, 1997). The economic consequences of divorce are sharply gendered: women experience substantially greater income losses than men, a gap attributed to gender-typed divisions of labour and persistent wage inequality (Smock, 1994; Leopold, 2018; Smock et al., 2024). McManus and DiPrete documented that men are the "losers" and "winners" of divorce in different economic dimensions (McManus and DiPrete, 2001). Macroeconomic conditions modulate divorce rates, with evidence that dissolution is procyclical — couples delay divorce during recessions due to affordability constraints (Hellerstein, 2013). The perceived economic feasibility of independent living thus acts as a critical parameter in the dissolution decision, formalised below as a component of the exit barrier.

2.5 Children as Stabilising and Destabilising Factors

The presence of children has complex effects on marital stability. McDermott et al. found that each child reduces susceptibility to divorce contagion from peers (McDermott et al., 2013). Heaton demonstrated that marital stability increases through the child-rearing years but declines once children leave (Heaton, 1990). However, the effects of divorce on children are severe and well-documented across multiple domains, including academic achievement, psychological adjustment, behavioural problems, and subsequent relationship quality (Amato and Keith, 1991; Amato, 2001; Emery, 2019; Anderson, 2014). Amato and Keith's meta-analyses established that children of divorced parents score significantly lower on measures of well-being across virtually all outcome domains (Amato and Keith, 1991; Amato, 2001). Wallerstein's longitudinal studies documented long-term effects persisting into adulthood (Wallerstein et al., 2000). The intergenerational transmission of divorce risk is also well established (Amato, 1996; Wolfinger, 2005). These findings are formalised below as a constraint on the exit barrier: the anticipated harm to children raises the perceived cost of dissolution.

2.6 Media, Social Media, and Norm Distortion

The role of media — particularly social media — in influencing marital outcomes has become a significant area of research. Valenzuela, Halpern, and Katz found that social networking site use is negatively correlated with marriage quality and positively correlated with thinking about divorce, even after controlling for demographic and psychological variables (Valenzuela et al., 2014). A 20% annual increase in Facebook enrollment was associated with a 2.18% to 4.32% increase in state-level divorce rates (Valenzuela et al., 2014). Clayton, Nagurney, and Smith demonstrated that active Twitter use predicted greater relationship conflict and negative outcomes including cheating, breakup, and divorce (Clayton et al., 2013). Cravens et al. found that social media infidelity-related behaviours, though rare, were significantly associated with lower relationship satisfaction and higher ambivalence (Cravens et al., 2015). Traditional media's portrayal of idealised relationships creates unrealistic expectations (Segrin and Nabi, 2003), while social comparison processes on social media exacerbate dissatisfaction (Vogel et al., 2014). These phenomena are formalised below through the Structural Distortion Principle (Kriger, 2026l) and the deception framework (Kriger, 2026s).

2.7 The Religious Architecture of Marriage and Its Secularisation

Across every major religious tradition, marriage has been constructed not as a private contract between individuals but as a sacred institution embedded in cosmic, communal, and divine order. In Catholic Christianity, marriage was elevated to a formal sacrament (*sacramentum*) at the Council of Trent (1545–1563), understood as an indissoluble bond mirroring the union of Christ and his Church (Ephesians 5:23–32); divorce was condemned and the only permissible dissolution was annulment — a declaration that no valid marriage had existed (Witte, 2012). The Protestant Reformation, beginning with Luther, rejected matrimony as a sacrament while still affirming it as a divinely ordained covenant; crucially, Protestantism permitted divorce in cases of adultery and desertion, introducing a first structural weakening of the permanence norm (Witte, 2012). Eastern

Orthodoxy occupies an intermediate position, permitting remarriage after divorce (up to three times) under the principle of *oikonomia* (pastoral economy), while still regarding marriage as a mystery (*mysterion*) with eschatological significance.

In Judaism, marriage (*kiddushin*) is a contractual covenant (*brit*) formalised in the *ketubah*, which specifies mutual obligations and financial protections. Divorce (*get*) has always been permissible under Jewish law, though historically only at the husband's initiative; the Talmudic schools of Shammai and Hillel debated its permissible grounds, with Hillel permitting divorce for any cause (Satlow, 2001). Islam treats marriage (*nikah*) as both a sacred covenant (*mithaq ghaliza*) and a civil contract requiring mutual consent, witnesses, and a bridal gift (*mahr*). Divorce (*talaq*) is permitted but described in hadith as "the most hated of permissible things to Allah," and Islamic jurisprudence has developed elaborate procedural safeguards including waiting periods (*iddah*) to prevent impulsive dissolution (Esposito, 2001). Hinduism regards marriage (*vivaha*) as one of the essential sacraments (*samskaras*), a sacred duty within the householder stage (*grihastha ashrama*) that is traditionally irrevocable; the *saptapadi* (seven steps around the sacred fire) creates a bond understood to persist across lifetimes. India's divorce rate remains among the lowest in the world (approximately 1%), though this figure reflects stigma and legal barriers as much as marital satisfaction (Dommaraju, 2016). Buddhism, lacking a centralised sacramental theology, treats marriage as a secular institution to be conducted with mindfulness and compassion; divorce is neither prohibited nor encouraged, and Buddhist-majority societies show variable divorce rates depending on local cultural norms.

The empirical relationship between religiosity and marital stability is robust and well-documented. A Harvard prospective cohort study found that weekly religious service attendance was associated with a 47% lower odds of divorce compared with non-attendance, even after adjusting for sociodemographic, health, and lifestyle confounders (VanderWeele, 2016). Analysis of General Social Survey data shows that the divorce-rate gap between religious groups has narrowed substantially over decades — from a range of 12–40% in the 1970s to 37–56% by the 2010s — consistent with the secularisation hypothesis that broader cultural norms are overriding religious specificity (Wright, 2015). Portugal, an 80% Catholic country, now has a divorce-to-marriage ratio exceeding 90%, while the Philippines (also majority Catholic) maintains near-zero legal divorce — illustrating that the religious effect operates primarily through legal and institutional channels rather than through individual belief alone.

The process of secularisation — declining religious authority over public and private life — has thus removed or weakened the most ancient and cross-culturally consistent structural barrier to dissolution. This process is formalised below (Section 14) as a progressive reduction in the exit barrier $E(t)$ and a contraction of the normative component of the viability set.

3 Formal Framework: The Dyadic Viability Model

Before introducing any equations, it is helpful to verbalise the core intuition before introducing formal notation. Every person can tolerate certain conditions in life and cannot tolerate others. For instance, one person may need a minimum level of emotional warmth to function well, while another may need a certain degree of personal freedom. The set of all conditions under which a person can sustain themselves — psychologically, emo-

tionally, financially — is what we call their *viability set*. A marriage works when the conditions that both partners need overlap: there exists a shared "zone" in which both can thrive simultaneously. When that shared zone shrinks or disappears, the marriage becomes unsustainable.

The purpose of the mathematical framework below is to make this intuition precise, so that we can rigorously derive *when* and *why* the shared zone contracts, rather than relying on anecdote or metaphor.

The dynamical core of the Unified Structural Theory rests on the concept of *persistence* as the organising principle of complex systems (Kriger, 2026b). Any system persisting in a changing environment must satisfy the *Persistence Triad*: closure (the system must maintain its internal processes), boundary maintenance (the system must distinguish itself from its environment), and resilience (the system must recover from perturbations) (Kriger, 2026g). Self-sufficient systems are characterised through fixed points and cyclical closure (Kriger, 2026h,i). The four universal laws of self-organisation — Cooperation, Viability, Interference, and Observability — have been proven independent and complete (Kriger, 2026c). We now specialise these abstract results to the specific case of a married couple.

Definition 1 (Two-Agent Cooperative System)**.** *Let A and B be autonomous agents, each characterised by a state vector $\mathbf{x}_A(t) \in \mathcal{X}_A$ and $\mathbf{x}_B(t) \in \mathcal{X}_B$. Each agent possesses an individual* viability set *$V_A \subseteq \mathcal{X}_A$ and $V_B \subseteq \mathcal{X}_B$ (Kriger, 2026b; Aubin, 1991).*

Interpretive gloss. Each partner is described by a "state" — a list of all the relevant variables that characterise their current situation (emotional well-being, financial security, sexual satisfaction, personal autonomy, etc.). We write this as a vector $\mathbf{x}_A(t)$ for partner A and $\mathbf{x}_B(t)$ for partner B, where t denotes time, since these states change over the lifespan of the relationship. The symbol $\mathcal{X}_A$ denotes the full space of all *conceivable* states that partner A could occupy; the *viability set* V_A is the subset of that space where partner A can function sustainably. Think of V_A as a "comfort zone" — not in the colloquial sense, but in the sense of all conditions under which A's life remains viable. Similarly for V_B.

Definition 2 (Dyadic Viability)**.** *The dyadic system (A, B) is* viable *at time t if the joint state lies within the* joint viability set*:*

$$V_{AB} = \big\{(\mathbf{x}_A, \mathbf{x}_B) \in \mathcal{X}_A \times \mathcal{X}_B \;\big|\; \pi_A(\mathbf{x}_A, \mathbf{x}_B) \in V_A \;\wedge\; \pi_B(\mathbf{x}_A, \mathbf{x}_B) \in V_B\big\}. \tag{1}$$

Interpretive gloss. The equation defines the "shared zone" V_{AB} mentioned above. It says: the marriage is viable if and only if, given the current joint situation of both partners, each partner's individual needs are met. The symbol π_A is a *projection operator* — it extracts from the joint situation those aspects that are relevant to partner A's viability. For example, the joint state includes how much time the couple spends together, how finances are divided, who does what housework, and so on. The projection π_A picks out the aspects that matter to A and checks whether they fall within A's viability zone. The symbol $\wedge$ means "and": *both* partners' needs must be simultaneously satisfied. The joint viability set V_{AB} is thus the region of the combined state space where the marriage can sustain itself.

Definition 3 (Dynamic Invariance)**.** *The dyadic system is* persistently viable *if V_{AB} is dynamically invariant under the joint dynamics $\dot{\mathbf{x}} = f(\mathbf{x}_A, \mathbf{x}_B, \boldsymbol{\theta}(t))$, where $\boldsymbol{\theta}(t)$ includes novelty, hormonal state, economic conditions, social norms, and media exposure.*

Interpretive gloss. A marriage is not just about being in the "shared zone" right now — it must *stay* in that zone over time. The dot notation $\dot{\mathbf{x}}$ denotes the rate of change of the couple's joint state: it captures how the relationship evolves from day to day. The function f represents all the forces that drive this evolution — biological changes, external circumstances, the partners' decisions, and so on. The vector $\boldsymbol{\theta}(t)$ collects the slowly changing background parameters: the novelty of shared experiences, hormonal levels (which shift with age and familiarity), economic conditions (income changes, recessions), social norms (is divorce stigmatised or normalised in their community?), and media exposure (social media use, idealised portrayals of other relationships). "Dynamic invariance" means that the natural trajectory of the system stays within V_{AB} — that is, the forces acting on the couple do not push them out of their shared viable zone. When V_{AB} ceases to be dynamically invariant — when the natural trajectory carries the couple outside their shared zone — the marriage dissolves.

Remark 1. *Marriage, in this framework, is a* temporary cooperative attractor *of two autonomous systems. An "attractor" in dynamical systems theory is a state (or set of states) toward which a system tends to evolve. Calling marriage a "cooperative attractor" means it is a stable pattern that the two partners settle into. Calling it "temporary" reflects the empirical reality that this stability depends on conditions (novelty, compatibility, hormonal state) that change over time. Dissolution occurs when the joint trajectory exits V_{AB} — when the couple's evolving situation leaves the region where both partners' needs can be met simultaneously.*

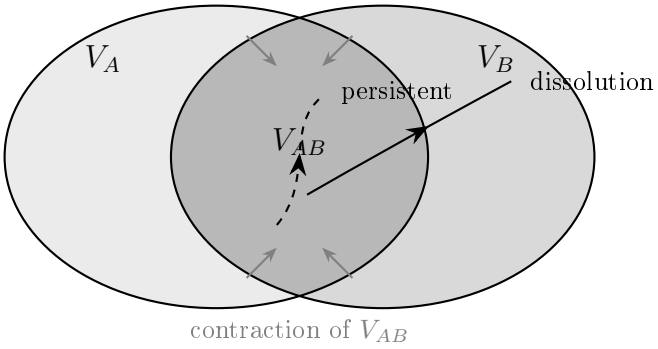

Figure 1: Joint viability set V_{AB} as the intersection of individual viability sets V_A and V_B in a simplified two-dimensional state space. The dyadic system persists only while the joint trajectory (dashed) remains within the dynamically invariant intersection. Contraction of V_{AB} (gray arrows) or trajectory drift (solid line) leads to dissolution.

4 Viability Mismatch and Interest Attrition

The Viability Mismatch Law (Kriger, 2026j) formalises *stress* as demands exceeding the current viability set. In everyday terms, stress occurs when what life (or one's partner) demands exceeds what one can sustain. Applied to the dyadic case, this means that when one partner's needs grow beyond what the relationship can provide, the "shared zone" contracts.

We can express this contraction mathematically. Let $\mu(V_{AB}(t))$ denote the *size* (technically, the Lebesgue measure) of the joint viability set at time t — intuitively, how "large"

the shared zone is. A large shared zone means the couple has many configurations in which both can thrive; a small one means they are walking a tightrope. We posit:

$$\frac{d}{dt}\,\mu\big(V_{AB}(t)\big) \leq 0 \quad \text{in the absence of active renewal.} \tag{2}$$

Status of this inequality. Equation (2) is a *modelling assumption*, not a derived theorem. We postulate it on the basis of converging empirical evidence: longitudinal studies consistently show that marital satisfaction declines, on average, over time in the absence of deliberate intervention (Gottman, 1999; Karney, 2021); hedonic adaptation erodes the reward signal (Section 5); and the predictability index increases monotonically (Section 6). Each of these empirically grounded mechanisms contributes a negative term to $\frac{d}{dt}\mu(V_{AB})$.

However, the assumption is not without qualification. Some couples report *deepening* compatibility over time, as partners learn to accommodate each other's needs and develop more realistic expectations (Gottman, 1999; Acevedo et al., 2012). In the language of our model, such couples are engaging in continuous "active renewal" that offsets or reverses the default contraction. The inequality therefore holds only as a *default tendency in the absence of compensatory effort* — it characterises the unattended trajectory, not an iron law. The structural diagnostic principle (Kriger, 2026y) provides the formal criterion for identifying when the system has crossed into the non-viable regime, but crossing is not inevitable.

Remark 2 (On the assumption's falsifiability)**.** *The inequality would be falsified by a demonstration that randomly selected couples who make no deliberate effort to maintain their relationship nonetheless show, on average, increasing viability overlap over time. Existing longitudinal data (Gottman, 1994; Karney, 2021) are inconsistent with this scenario, but a future study that controlled for maintenance effort and found spontaneous improvement would require revision of the assumption.*

5 Biochemical Adaptation as Reward-Signal Decay

One of the most common experiences in long-term relationships is the fading of the initial "spark" — the euphoria, obsessive thinking, and intense desire that characterise new love. Neuroscience has shown that this experience has a concrete biochemical basis: the early stages of romance are accompanied by elevated dopamine (the "reward" neurotransmitter), reduced serotonin (mirroring obsessive-compulsive states), and elevated cortisol (the stress hormone) (Fisher, 2004; Aron et al., 2005; Marazziti et al., 2021). Over time, these levels normalise, and the feeling of exhilaration diminishes. This section provides a mathematical model of *why* this happens, grounded in the general theory of adaptive systems.

The core idea is simple: the brain is an adaptation machine. When exposed to a constant stimulus — even a pleasurable one — the brain adjusts its sensitivity so that the stimulus produces a progressively weaker response. This is known as *hedonic adaptation* in psychology (Bao and Lyubomirsky, 2013; Lyubomirsky, 2011) and *negative feedback with threshold adaptation* in systems theory. We now formalise this.

Definition 4 (Adaptive Reward Dynamics)**.** *Let $R(t)$ denote the* reward signal amplitude *— the intensity of pleasure or satisfaction that the agent derives from the relationship at*

time t. Let S denote the stimulus level *— the objective features of the relationship that provide stimulation (e.g., the partner's presence, physical contact, shared activities). Let $\tau(t)$ denote the* adaptive sensitivity threshold *— the level of stimulation that the brain currently treats as "normal" and therefore no longer rewarding. The dynamics are:*

$$R(t) = g\big(S - \tau(t)\big), \tag{3}$$

$$\dot{\tau}(t) = \alpha\big(S - \tau_0\big) - \beta\,\big(\tau(t) - \tau_0\big), \tag{4}$$

where $g(\cdot)$ is a monotonically increasing activation function with $g(0) = 0$, τ_0 is the baseline threshold (the sensitivity level before the relationship began), and $\alpha, \beta > 0$ are the adaptation rate and relaxation rate, respectively.

Term-by-term interpretation. The first equation says that the reward $R(t)$ depends on the *gap* between the actual stimulus S and the current threshold $\tau(t)$. When the stimulus exceeds the threshold ($S > \tau$), the agent experiences pleasure; the function g translates this gap into a subjective reward. When the threshold catches up to the stimulus ($\tau \approx S$), the gap closes and $R \approx 0$: no more pleasure, even though the stimulus has not changed. This is exactly what happens when a once-thrilling partner becomes "taken for granted."

The second equation describes how the threshold $\tau(t)$ evolves over time. The dot notation $\dot{\tau}(t)$ means the rate of change of the threshold. The term $\alpha(S-\tau_0)$ says that the threshold rises in proportion to how much the stimulus exceeds baseline — the stronger the initial "hit" of pleasure, the faster the brain adapts. The term $-\beta(\tau(t)-\tau_0)$ represents a restoring force that pulls the threshold back toward baseline when the stimulus is removed (e.g., during periods of separation, the partner becomes exciting again). The constants α and β determine the relative strengths of adaptation and recovery.

Proposition 1. *Under constant stimulation ($S = \text{const}$), the threshold $\tau(t) \to S$ as $t \to \infty$, implying $R(t) \to 0$.*

Substantive implication. If the relationship provides a constant level of stimulation — the same routines, the same conversations, the same patterns of interaction — then the brain's threshold inevitably rises to match that level, and the reward signal drops to zero. *The partner has not become less worthy; the brain has simply stopped responding.* This is not a personal failure but a universal property of adaptive systems: any system that must detect *changes* in its environment will, by design, stop responding to constants.

Proof. Setting $\dot{\tau} = 0$ gives the equilibrium $\tau^* = \tau_0 + \frac{\alpha}{\beta}(S - \tau_0)$. For α/β sufficiently large (strong adaptation), $\tau^* \approx S$, yielding $R^* = g(S - \tau^*) \approx g(0) = 0$. *In words:* the equilibrium threshold (τ^*) is the value at which the threshold stops changing. Solving the equation for this value shows it approaches the stimulus level S when adaptation is strong relative to recovery. At that point, the reward signal is effectively zero. □

This formalises the hedonic adaptation documented by Bao and Lyubomirsky (2013) and Lyubomirsky (2011) as an instance of the Structural Non-Neutrality Principle (Kriger, 2026m): no element in a coherent system is functionally neutral — where there is no new information, the system minimises its response. The predictive processing architecture (Kriger, 2026n) provides the neural substrate: the brain's prediction error signal decreases as the partner becomes more predictable (Acevedo et al., 2012).

The practical implication is clear: to prevent reward decay, the relationship must provide *variable* stimulation. Variety, surprise, and novelty keep the stimulus unpredictable,

preventing the threshold from catching up. This is not a pop-psychology platitude but a direct consequence of the mathematics of adaptive systems.

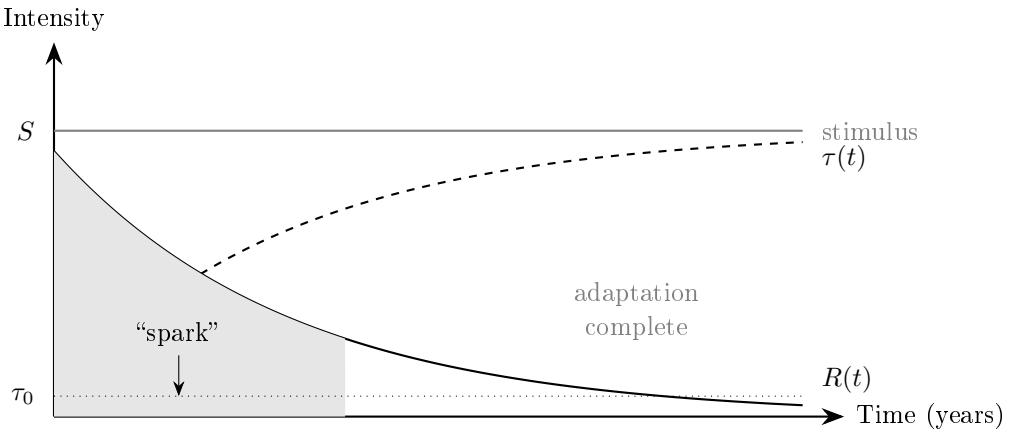

Figure 2: Hedonic adaptation as reward-signal decay under constant stimulation. The adaptive threshold $\tau(t)$ (dashed) rises toward the input stimulus S, while the subjective reward $R(t)$ (solid) decays toward baseline τ_0. The shaded region marks the period of elevated reward (the "spark"). Under constant stimulation, adaptation is inevitable; only variable stimulation can maintain the gap.

6 The Quasi-Westermarck Effect as Familiarity-Induced Suppression

The Westermarck effect (Westermarck, 1891; Shepher, 1971; Wolf, 1995; Lieberman et al., 2007) is the well-documented phenomenon whereby individuals who grow up in close proximity lose sexual interest in each other. Originally identified in siblings and co-raised children, the mechanism is believed to be an evolutionary safeguard against inbreeding. The present paper advances the hypothesis that a structurally analogous process — here termed the *Quasi-Westermarck effect* — may operate in long-term romantic cohabitation: prolonged familiarity gradually reduces the partner's perceived "otherness," eventually triggering suppression dynamics that resemble, but are not identical to, the childhood mechanism.

We stress that this is a *quasi*-effect: it does not rely on the same critical developmental window or maternal perinatal association cues (Lieberman et al., 2007). Instead, it is proposed to emerge from the same underlying design principle — behavioural predictability serving as a kinship-like cue — now operating in the adult attachment system. The hypothesis remains speculative and awaits direct empirical testing.[1]

To formalise this hypothesis, we introduce a *predictability index* — a measure of how well one partner can predict the other's behaviour. We choose a saturating exponential for mathematical convenience; the qualitative conclusions hold for any monotonically increasing, bounded function of cohabitation duration T. The functional form of $P_{A\to B}(t)$

[1] An alternative (and possibly complementary) framing is simply "adult-onset familiarity devaluation" or "predictability-mediated sexual habituation." The Quasi-Westermarck label is retained here because it highlights the proposed evolutionary homology while acknowledging the differences in developmental timing.

is deliberately chosen to mirror the saturating familiarity curves observed in classic Westermarck studies (Shepher, 1971; Wolf, 1995), while remaining agnostic about the exact neural implementation:

$$P_{A\to B}(t) = 1 - e^{-\lambda T}, \qquad \lambda > 0. \tag{5}$$

Semantic unpacking. $P_{A\to B}(t)$ is a number between 0 and 1 that represents how predictable partner B is to partner A at time t. The variable T is the duration of cohabitation, and λ is a rate constant that determines how quickly familiarity accumulates. The expression $e^{-\lambda T}$ is an exponential decay: it starts at 1 (when $T = 0$, i.e., at the beginning of cohabitation) and decreases toward 0 as T grows. Therefore $P = 1 - e^{-\lambda T}$ starts at 0 (complete unpredictability) and rises toward 1 (complete predictability). The shape of this curve means that predictability accumulates rapidly at first (when there is much to learn about each other) and then slows down (when most patterns have been observed). The constant λ varies between couples: a couple who leads a highly routinised life will have a larger λ (faster convergence to predictability) than a couple who regularly introduces new shared experiences.

Proposition 2 (Hypothetical)**.** *If the brain uses behavioural predictability as a kinship cue (as proposed by Lieberman et al. 2007 for childhood co-residence), then when $P_{A\to B}(t)$ exceeds a critical threshold P_{kin}, reproductive motivation toward partner B would be suppressed.*

Cognitive-evolutionary interpretation. The hypothesis rests on the assumption that the brain uses predictability as a proxy for kinship: people whose behaviour we can predict with near-certainty "feel like family." When a romantic partner reaches that level of predictability, the brain's ancient incest-avoidance circuitry may be inadvertently activated, producing a reduction in sexual desire. This is not a conscious process — it operates below awareness, often manifesting as a vague sense of "something missing" or an inexplicable loss of attraction.

This is a special case of the Cyclic Closure Principle (Kriger, 2026i): excessive closure of a subsystem increases internal correlation and diminishes the drive for external engagement. The representational isolation theorem (Kriger, 2026o) adds a crucial nuance: the suppression operates on the agent's *model* of the partner, not on the partner directly. If the partner changes in ways that disrupt the model — by developing new interests, changing appearance, or behaving unpredictably — the predictability index can be reduced, potentially reactivating desire.

7 Constraint–Autonomy Imbalance

Every partnership requires effort — housework, financial management, emotional support, childcare, planning. This effort can be thought of as a set of *structural constraints*: obligations that must be met for the system to function. At the same time, each partner needs a degree of *autonomy* — personal freedom, individual identity, time for one's own interests. The balance between these two needs is critical.

The Constraint–Autonomy Compatibility Law (Kriger, 2026k) establishes a deep result: constraints and autonomy are not opposites but are *co-constitutive* — each requires the other to function. Too much constraint without autonomy produces burnout and

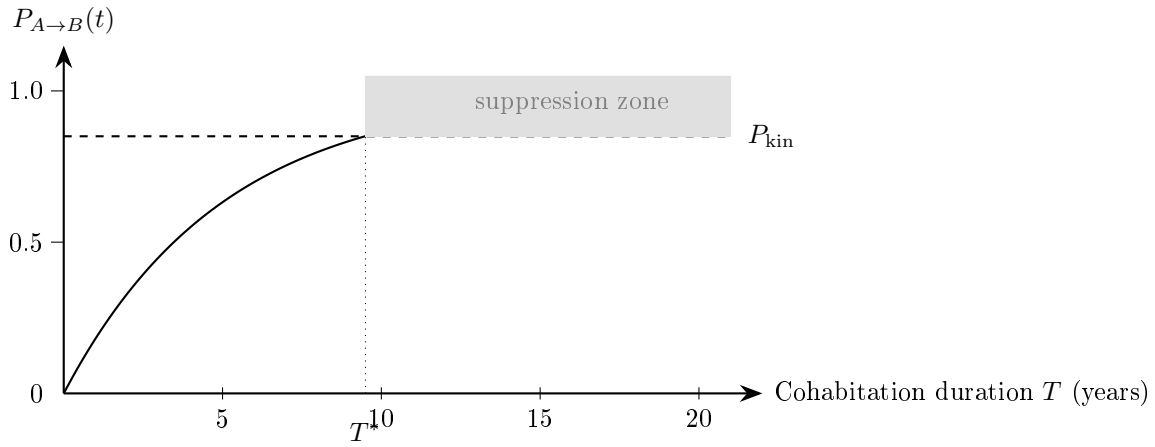

Figure 3: Hypothesised Quasi-Westermarck effect: behavioural predictability $P_{A\to B}(t) = 1 - e^{-\lambda T}$ saturates over cohabitation time (here $\lambda = 0.2$). When the predictability index crosses the critical threshold $P_{\text{kin}} \approx 0.85$ at time T^*, familiarity-induced suppression of reproductive motivation is hypothesised to onset. The shaded region marks the suppression zone. The threshold value and curve shape are illustrative; empirical calibration is an open question.

resentment; too much autonomy without constraint produces chaos and disconnection. A viable system must operate in the balance zone.

To make this precise, we define the *constraint load* and *asymmetry index*:

Let $C_A(t)$ and $C_B(t)$ denote the fraction of the total system constraints borne by partners A and B, respectively. Since all the work must be done by someone, $C_A + C_B = 1$. The asymmetry index is:

$$\Delta C(t) = |C_A(t) - C_B(t)|. \tag{6}$$

Semantic unpacking. ΔC is simply the absolute difference between the two partners' shares of the total constraint load. If both partners share equally ($C_A = C_B = 0.5$), then $\Delta C = 0$ — perfect balance. If one partner bears 80% of the load ($C_A = 0.8$, $C_B = 0.2$), then $\Delta C = 0.6$ — a severe imbalance. The vertical bars $|\cdot|$ ensure that ΔC is always non-negative, regardless of which partner is overburdened.

Proposition 3. *If one agent fails to assume its share of structural constraints (asymmetric constraint avoidance), then ΔC increases, the compensating agent's autonomy is suppressed, and the system exits V_{AB}.*

Dynamical consequence. When one partner systematically avoids responsibility — what might colloquially be called "infantile behaviour," i.e., refusing or neglecting to take on adult obligations — the other must compensate. This compensation reduces the second partner's autonomy (they have less time, energy, and freedom for themselves). As their autonomy shrinks, they approach the boundary of their individual viability set: they are pushed toward conditions they cannot sustain. The "shared zone" V_{AB} contracts because one partner's viability is being violated. Eventually, the overburdened partner exits — either by demanding change (conflict) or by leaving (dissolution).

This connects to the Comparative Asymmetry Principle (Kriger, 2026t), which captures relational disequilibrium in multi-agent systems, and is consistent with Gottman's empirical findings that asymmetric contribution is among the strongest predictors of divorce (Gottman, 1994, 1999).

8 Social Contagion and the Phase Transition of Dissolution Norms

Why do divorces seem to come in waves within friend groups? The answer lies in the concept of *social contagion*: the spread of behaviours and attitudes through social networks, much like the spread of a disease through a population. The conflict-as-phase-transition framework (Kriger, 2026q) establishes that social systems can undergo abrupt qualitative shifts ("phase transitions") when a critical threshold is crossed. We apply this idea to the spread of divorce.

The key concept is the *exit barrier* — the psychological, social, and material "cost" of leaving the marriage. We model it as:

$$E(t) = E_0 - \gamma\, n_d(t), \tag{7}$$

Term-by-term interpretation. $E(t)$ is the exit barrier at time t — a number representing how "hard" it is to leave the marriage. E_0 is the *baseline barrier* — the difficulty of divorce in the absence of any peer influence (determined by cultural norms, legal costs, religious beliefs, fear of loneliness, etc.). The term $n_d(t)$ is the fraction of dissolved dyads in the agent's reference group — i.e., the proportion of one's friends and family who have divorced. The constant $\gamma > 0$ is the *contagion coefficient*: it measures how much each additional divorce in one's social network lowers one's own barrier. The minus sign is crucial: as n_d increases (more friends divorce), E decreases (the barrier drops). The barrier drops because seeing others divorce (a) normalises the decision, (b) demonstrates that post-divorce life can be acceptable, and (c) provides a social network of divorced individuals who can offer practical and emotional support.

Proposition 4. *There exists a critical fraction n_d^* such that for $n_d > n_d^*$, the barrier falls below the level of internal tension, and dissolution becomes the locally optimal decision.*

Physical analogy and mechanism. In physics, a phase transition is a sudden qualitative change (ice melting into water) that occurs when a parameter crosses a threshold. The same logic applies here: as the proportion of divorced friends gradually increases, nothing dramatic seems to happen — until the critical fraction n_d^* is reached, at which point dissolution becomes the "natural" choice for dissatisfied couples. This is why divorce can appear to cascade through social networks: it is not that one divorce causes the next, but that each divorce lowers the barrier for everyone in the network, and once enough barriers are lowered, many dissolutions happen almost simultaneously.

This formalises the empirical findings of McDermott et al. (2013): divorce clusters extend to two degrees of separation, popular people are less likely to divorce, and divorcees are more than twice as likely to remarry other divorcees. A methodological caveat is warranted: the empirical evidence for genuine network contagion of divorce (as opposed to homophily — the tendency for similar people to associate) remains debated (Shalizi and Thomas, 2011). If the observed clustering is driven entirely by selection effects rather than peer influence, then $\gamma \approx 0$ and this mechanism contributes little to dissolution dynamics. The framework's predictions in this domain are therefore conditional on genuine contagion being operative; the falsifiability prediction in Table 3, row 4, is designed precisely to test this condition. The Asymmetry of Totalizing Ideals (Kriger, 2026r) constrains the analysis: "marriage for life" as an absolute ideal paradoxically destabilises the system because sustainable systems must operate in the interior of their viability sets, not at the extreme boundaries.

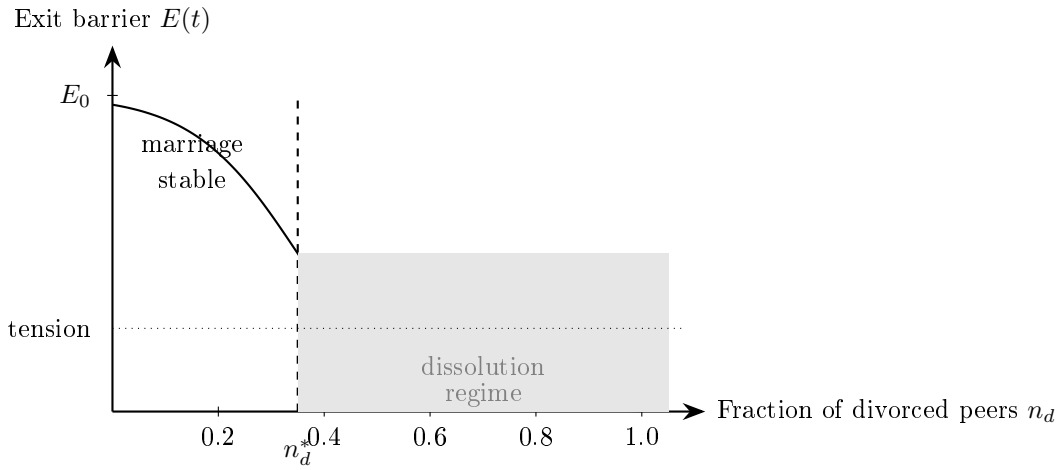

Figure 4: Nonlinear collapse of the dissolution exit barrier $E(t) = E_0 - \gamma n_d(t)$ as a function of the fraction of divorced peers in the reference network. The barrier drops sharply near the critical fraction n_d^*, producing a phase-transition-like shift: below n_d^*, the barrier exceeds internal marital tension and marriage remains the stable outcome; above n_d^*, the barrier falls below the tension level and dissolution becomes the locally favoured choice. The sigmoid shape is illustrative of the nonlinear threshold dynamics.

9 Economic Cost–Benefit Asymmetries

Divorce is not only an emotional decision — it is also an economic one. Whether consciously or not, partners engage in a cost–benefit calculation: "Would my life be better or worse if I left?" This section formalises that calculation.

Following the economic theory of the family (Becker, 1981), we define:

Definition 5 (Economic Dissolution Incentive)**.** *Let $U_{\text{stay}}(t)$ and $U_{\text{exit}}(t)$ denote the expected utility (overall life quality) of remaining in and leaving the dyadic system, respectively. The* economic dissolution incentive *is*

$$\Delta U(t) = U_{\text{exit}}(t) - U_{\text{stay}}(t). \tag{8}$$

Dissolution becomes economically favoured when $\Delta U(t) > 0$ — that is, when the perceived benefit of leaving exceeds the perceived benefit of staying.

Substantive content of the utility terms. The "stay" utility U_{stay} includes companionship, shared housing, economies of scale, emotional support, and the stability of the status quo. The "exit" utility U_{exit} includes perceived financial independence (Smock, 1994; Smock et al., 2024), anticipated alimony and child support (Weiss, 1997), housing availability (Leopold, 2018), remarriage prospects (McManus and DiPrete, 2001), and the anticipated emotional relief of leaving an unhappy situation. The key word is *perceived*: both sides of the equation are filtered through the agent's subjective model of reality, which is subject to systematic distortion (Kriger, 2026l).

The components of U_{exit} include perceived financial independence (Smock, 1994; Smock et al., 2024), anticipated alimony and child support (Weiss, 1997), housing availability (Leopold, 2018), and remarriage prospects (McManus and DiPrete, 2001). Women's increasing economic independence has raised U_{exit} for female agents, consistent with data showing that women file for divorce at substantially higher rates than men in most Western jurisdictions — though the precise figure (often cited as approximately 70%) varies

by country, time period, and how "initiation" is operationalised (legal filing vs. expressed desire to separate) (Brinig and Allen, 2000). Macroeconomic conditions modulate the barrier: during recessions, the affordability constraint lowers U_{exit}, producing procyclical divorce rates (Hellerstein, 2013).

The perceived economic outcome of divorce is itself subject to the Structural Distortion Principle (Kriger, 2026l): agents systematically overestimate post-divorce well-being (influenced by friends' curated narratives) and underestimate the long-term economic costs, particularly for women with children (Smock et al., 2024; Leopold, 2018). This distortion accelerates the crossing of the dissolution threshold.

10 Children as Viability-Set Anchors

Children modify the dyadic viability model in two opposing ways. On one hand, they expand V_{AB} by providing a shared project that renews cooperation (consistent with the Cooperation Law (Kriger, 2026c)): raising children together gives the couple a common goal, shared daily routines, and a reason to coordinate and support each other. On the other hand, they raise the exit barrier by introducing moral and emotional costs of dissolution — the guilt of "breaking up the family," the fear of harming the children, and the practical complications of custody.

We formalise the second effect:

Definition 6 (Child-Modified Exit Barrier)**.**

$$E_c(t) = E(t) + \delta \cdot K(t), \tag{9}$$

where $E(t)$ is the exit barrier from Section 8, $K(t)$ is the number of dependent children, and $\delta > 0$ is the per-child barrier increment.

Interpretive gloss. Each dependent child adds δ units to the exit barrier. The parameter δ captures the combined moral, emotional, and practical cost of divorce per child: the guilt, the anticipated harm to the child, the logistical complexity of custody arrangements, and the financial burden of maintaining two households for children. A couple with three children faces a barrier that is 3δ higher than a childless couple in otherwise identical circumstances.

McDermott et al. (2013) found empirically that each child reduces susceptibility to peer-contagion of divorce. However, children do not prevent the underlying deterioration of V_{AB}; they merely raise the cost of exiting it. The consequences for children are severe across academic, psychological, and social domains (Amato and Keith, 1991; Amato, 2001; Emery, 2019; Anderson, 2014), creating an intergenerational transmission of dissolution risk (Wolfinger, 2005; Amato, 1996). The system thus exhibits a tragic structural feature: delayed dissolution (held in place by child-related barriers) may allow the accumulation of greater conflict, producing worse outcomes for children upon eventual exit (Amato, 2001; Cummings and Davies, 1994).

10.1 Psychological Trauma and Adverse Childhood Experiences

Parental divorce is classified as an Adverse Childhood Experience (ACE) in the landmark CDC–Kaiser Permanente study (Felitti et al., 1998), which surveyed nearly 17,000 adults and identified ten categories of childhood adversity — including parental separation —

that exhibit dose–response relationships with adult morbidity and mortality. Approximately 61% of US adults report at least one ACE, with 14% reporting four or more (Merrick et al., 2018). Within the viability framework, parental divorce functions as an *exogenous shock to the child's own developing viability set*: the foundational assumptions about relational stability, predictability, and safety that underlie the child's model of the social world are suddenly invalidated.

The empirical evidence on child outcomes is extensive and consistent. Amato's meta-analyses (Amato and Keith, 1991; Amato, 2001) established that children of divorce show significantly worse outcomes across virtually every measured domain: academic achievement (0.16 SD deficit), conduct (0.11 SD), psychological adjustment (0.08 SD), self-concept (0.09 SD), and social relations (0.12 SD). These are averaged effects that mask substantial heterogeneity: high-conflict divorces produce worse child outcomes, but children in chronically high-conflict intact families fare worst of all — a finding consistent with the viability framework's prediction that forced residence in non-viable state space accumulates harm monotonically over time.

The psychological mechanisms include loss of the "secure base" (attachment disruption when the primary attachment figure becomes emotionally unavailable due to their own distress), loyalty conflicts (the child is forced to navigate between two competing attachment objects), parentification (the child assumes emotional caregiving responsibilities for a distressed parent), and economic disruption (reduced household income following dissolution, affecting nutrition, housing stability, educational resources, and neighbourhood quality).

10.2 Intergenerational Transmission: The Divorce Cycle

One of the most robust findings in family research is the intergenerational transmission of divorce: children of divorced parents are significantly more likely to experience dissolution of their own partnerships. Wolfinger's analysis of General Social Survey data found that each parental breakup experienced in childhood increases the odds of offspring relationship dissolution by approximately 16% (Wolfinger, 2005, 2011). Amato's longitudinal National Study of Adolescent to Adult Health data confirmed this: 43% of adults from two-parent homes will dissolve a partnership, compared to substantially higher rates among those who experienced multiple family-structure transitions (Amato and Patterson, 2017).

The viability framework formalises three transmission channels:

Interpersonal behaviour deficits. Amato's most important finding is that the largest share of the intergenerational transmission is mediated by *interpersonal behaviour problems* — difficulties in communication, conflict resolution, trust, and emotional regulation that children develop from observing and internalising dysfunctional parental interaction patterns (Amato, 1996). In the framework's terms, children of divorce develop parameter vectors θ with reduced empathic capacity (θ_e) and elevated control-seeking or avoidance (θ_c), producing higher extractive asymmetry in their own adult partnerships.

Internal working models. Drawing on Bowlby's attachment theory, children who experience parental dissolution develop insecure attachment representations — internal working models of relationships as unstable, unreliable, and contingent. These models function as *contracted initial viability sets*: the adult child enters partnerships with

smaller $V_{AB}(0)$ because their threshold for relationship satisfaction is simultaneously higher (compensating for childhood deprivation) and more fragile (easily disrupted by perceived threats). The result is partnerships that begin with less structural resilience.

Attitudinal transmission. Young adults from divorced families are approximately three times more likely to hold favourable attitudes toward divorce than those from intact families (Amato, 2001). This attitudinal shift is equivalent, in the framework's terms, to a reduction in the perceived exit barrier $E(t)$: dissolution is cognitively normalised, lowering the threshold at which viability-set contraction triggers exit.

The dose–response nature of the transmission is critical: it is not a single parental divorce but the *cumulative number of family-structure transitions* that predicts offspring outcomes. Each transition — divorce, repartnering, second divorce — cumulatively degrades the child's relational capacity, creating a compounding effect across generations that the viability framework models as progressive parametric degradation of the initial conditions for successive dyadic systems.

10.3 Maladaptive Behavioural Patterns and Personality Pathology

The ACE literature documents not merely statistical associations but *developmental pathways* from childhood adversity to adult personality formation. Children exposed to high-conflict parental relationships or traumatic dissolution develop characteristic maladaptive patterns that the viability framework can classify by their effect on the agent's parameter vector θ:

Anxious attachment and relationship hypervigilance. Children who experienced unpredictable parental availability develop heightened sensitivity to relational threat cues. As adults, they exhibit jealousy, possessiveness, and demand for reassurance that produces constraint–autonomy imbalance in their partnerships, accelerating viability-set contraction along the autonomy dimension.

Avoidant attachment and emotional withdrawal. Children who learned that emotional dependence is unsafe develop dismissive relational strategies. As adults, they exhibit emotional unavailability, resist intimacy, and withdraw under stress — the stonewalling precursor identified in Gottman's cascade model (Section 23). Their partnerships suffer from *insufficient investment in viability-set maintenance*: the agent withholds the cooperative effort needed to counteract default contraction.

Disorganised attachment and relational chaos. The most severely affected children — those exposed to violence, abuse, or caregiver behaviour that is simultaneously frightening and the source of comfort — develop disorganised attachment strategies characterised by oscillation between approach and avoidance. As adults, their partnerships exhibit the high-amplitude extractive oscillation analysed in Section 13: rapid cycling between intense connection and destructive conflict, with the oscillation amplitude too large for the system's repair capacity.

Externalising pathology. Children of high-conflict divorces show elevated rates of conduct disorder, substance abuse, and antisocial behaviour (Amato, 2001). These externalising symptoms function as *viability-set contraction accelerators* in adult partnerships: substance abuse distorts reward processing (Section 5), conduct problems reduce empathic capacity (θ_e), and antisocial tendencies increase control-seeking (θ_c).

The cumulative effect is that parental dissolution does not merely transmit a statistical propensity for divorce; it transmits a specific pattern of relational dysfunction that the viability framework can characterise as a degraded initial parameter vector. The "divorce cycle" is thus not an abstract statistical regularity but a concrete developmental pathway: parental dissolution → adverse childhood experience → insecure attachment → interpersonal behaviour deficits → contracted initial viability set → accelerated dissolution → adverse childhood experience for the next generation.

10.4 The Child as Strategic Instrument

The preceding sections have treated children as passive recipients of parental dissolution. A harder reality must be confronted: in high-conflict dissolutions, children are not merely affected by the process but are *actively instrumentalised* by one or both parents as strategic weapons.

Parental alienation. One parent systematically denigrates the other to the child, programming hostility and rejection. The child's attachment to the targeted parent is progressively destroyed — an epistemic attack on the child's own relational model, analogous to the sensor degradation analysed in the extractive oscillator framework (Kriger, 2026p). The child is taught that one of their primary attachment figures is dangerous, defective, or unloving — a forced rewriting of the child's internal working model that produces lasting psychological damage regardless of whether the alienation is later recognised and reversed.

The child as informant and spy. Children are deployed to monitor the other parent's household, report on new partners, and convey messages. This instrumentalisation forces the child into a role that violates the fundamental parent–child hierarchy, requiring the child to navigate loyalty conflicts that no child has the developmental capacity to resolve. In the framework's terms, the child is forced to operate as a *sensor in a system whose outputs they cannot control and whose dynamics they cannot understand.*

Emotional extortion. Parents use the implicit or explicit threat of restricting the child's access to the other parent as leverage in financial and custody negotiations. The child's wellbeing — which the viability framework identifies as the binding constraint on the dissolution process — is converted into a bargaining chip in the adversarial game (Section 15). This strategic instrumentalisation produces a doubly perverse outcome: the very stakeholder whose welfare should constrain the process becomes the instrument through which the process is escalated.

The structural conclusion is that children occupy a uniquely vulnerable position in the dissolution process: they are simultaneously the system's most important stakeholders, its most powerful exit barriers, its most severely affected casualties, and — in the worst cases — its most effective weapons. No institutional architecture currently in widespread use adequately resolves these competing functions.

11 Media, Social Media, and Norm Distortion

The pervasive influence of media on romantic expectations and dissolution decisions warrants a dedicated formal treatment within the structural viability framework. This section argues that media — both traditional and social — does not merely reflect relationship norms but actively *reshapes* the parameters of the viability model, often in ways that promote dissolution.

11.1 Social Media as Viability-Set Distortion

Social media operates on the dyadic system through three distinct mechanisms, each of which can be formalised using the Structural Distortion Principle (Kriger, 2026l) and the deception framework (Kriger, 2026s):

1. **Comparison distortion.** Social media presents curated "highlight reels" of others' relationships (Vogel et al., 2014): carefully selected photographs, romantic travel posts, declarations of love that omit the arguments, boredom, and compromises that every relationship involves. This causes agents to perceive their own partnership as inferior to a fictitious norm. In the language of our model, this contracts the *perceived* viability set V_{AB} — the agent concludes that "our relationship is not good enough" — even when the *actual* V_{AB} remains adequate. The agent is comparing their reality to an illusion, and finding reality wanting.

2. **Alternative-partner salience.** Social networking sites dramatically reduce the search cost for alternative partners (Valenzuela et al., 2014; Clayton et al., 2013). Old flames are a message away; new connections are algorithmically curated. In terms of the dissolution incentive (Eq. 8), this increases U_{exit} by making the "outside option" more vivid, concrete, and accessible. The abstract fantasy of "someone better" becomes a specific person with a name and a profile. Cravens et al. (2015) documented that even modest engagement in social media infidelity-related behaviours — such as private messaging or emotionally intimate conversations with non-partners — is significantly associated with lower relationship satisfaction and higher ambivalence.

3. **Norm contagion amplification.** Social media accelerates the social contagion mechanism described in Section 8 by massively increasing the effective network size and the speed of information transmission. In the pre-internet era, divorce normalisation spread through direct personal contact — you had to know the divorcee personally. Today, divorce narratives propagate through weak ties, algorithmic content curation, and viral social media posts. The parameter γ in the exit barrier equation effectively increases, meaning each individual case of divorce has a larger contagion radius.

11.2 Traditional Media and Expectation Inflation

Traditional media (film, television, advertising) contribute to what Segrin and Nabi (2003) termed "idealised expectations" about romantic relationships. Romantic comedies depict conflict as easily resolved in two hours; advertisements associate products with effortlessly blissful couples; television dramas portray affairs and passionate encounters that bear no resemblance to the quiet rhythms of long-term partnership.

These inflated expectations have a precise effect within our framework: they contract the agent's viability set V_A (or V_B) by raising the threshold for "acceptable" relationship quality. In effect, the agent's internal standard for what constitutes a satisfying relationship has been set by fiction, not reality. This is directly predicted by the Structural Non-Neutrality Principle (Kriger, 2026m): exposure to supernormal stimuli — stimuli that exaggerate natural signals (such as the portrayal of perpetual passion) — recalibrates the baseline against which the current partnership is evaluated. The real partner, however excellent, cannot compete with a fictional ideal.

11.3 The Friends–Media–Contagion Nexus

The mechanisms of social contagion (Section 8), media distortion, and peer influence are not independent — they form a *positive feedback loop* that can rapidly accelerate dissolution. Consider the following scenario, common in contemporary life:

A friend divorces and presents an optimistic post-divorce narrative on social media: new apartment, new hobbies, declarations of liberation. This narrative simultaneously (i) reduces the exit barrier via contagion ("if she did it, so can I"), (ii) distorts the perceived U_{exit} upward ("she seems so happy — I would be too"), and (iii) normalises dissolution as a desirable, even admirable outcome. The dissatisfied spouse, exposed to this narrative while scrolling through social media in bed next to their partner, begins to compare and calculate.

The extractive oscillator framework (Kriger, 2026p) captures the addictive quality of this process: social media engagement in the context of marital dissatisfaction exhibits the characteristic escalation dynamics of addiction — the agent seeks validation, comparison information, and emotional stimulation in increasingly compulsive cycles, each cycle further eroding investment in the actual relationship. The Eruptive Manifestation framework (Kriger, 2026ac) models the crisis episodes — discovering a partner's flirtatious messages, or a public relationship conflict played out in social media comments — that can precipitate sudden dissolution decisions from what had been a slowly accumulating mismatch between the agent's model and reality.

Schematic formalisation. The positive feedback structure can be captured by a system of coupled inequalities. Let $n_d(t)$ denote the fraction of divorced peers (contagion variable), $M(t)$ the intensity of media-mediated norm distortion, and $E(t)$ the exit barrier. The three effects amplify each other as follows:

$$\dot{n}_d \;\geq\; \phi\big(n_d(t)\big) + \psi\big(M(t)\big), \tag{10}$$

$$\dot{M} \;\geq\; \sigma\, n_d(t), \tag{11}$$

$$\dot{E} \;\leq\; -\gamma\, \dot{n}_d - \eta\, M(t), \tag{12}$$

where ϕ is the endogenous contagion rate (peer divorce begets further divorce), ψ captures media amplification of divorce salience, σ is the rate at which divorced peers generate optimistic post-divorce media content, and η measures the direct barrier-lowering effect of media exposure. The key structural feature is the *cross-coupling*: Eq. (10) shows that media distortion accelerates the contagion rate beyond what peer effects alone would produce; Eq. (11) shows that each new divorce generates additional media content; and Eq. (12) shows that the exit barrier is eroded by both channels simultaneously. This coupled structure produces super-additive dynamics: the combined effect of contagion and

media distortion on barrier collapse exceeds the sum of their individual effects, justifying the treatment of the nexus as a structurally distinct mechanism rather than merely the conjunction of mechanisms (iv), (vii), and (ix).

12 Digital Sexual Marketplaces, Synthetic Intimacy, and Alternative Arrangements

The preceding sections analyse dissolution mechanisms that have operated, in various forms, throughout human history. The present section addresses a qualitatively new class of perturbations that have emerged in the past two decades and are rapidly intensifying: the digital transformation of human sexual and romantic life.

12.1 High-Fidelity Pornography and Expectation Distortion

The proliferation of free, high-definition, algorithmically curated internet pornography represents an unprecedented perturbation to the dyadic viability model. Longitudinal analysis of nationally representative General Social Survey panel data found that beginning pornography use nearly doubled the probability of divorce (from 6% to 11%), with the effect being particularly pronounced for women (tripling from 6% to 16%) and for those who reported initially happy marriages (Perry and Schleifer, 2017). In a sample of over 20,000 married individuals, those who reported viewing an X-rated film in the past year were 25% more likely to have been previously divorced and 10% more likely to have had an extramarital affair (Doran and Price, 2014). Conversely, discontinuing pornography use was associated with reduced divorce probability, though only for women.

Within the structural viability framework, pornography operates through at least three channels: (i) *reward-threshold inflation* — repeated exposure to supranormal sexual stimuli accelerates the adaptive threshold $\tau(t)$ (Eq. 4), making the partner's real-world sexual stimulus comparatively less rewarding; (ii) *comparison distortion* — curated, high-production sexual content inflates the perceived U_{exit} by making alternatives appear more sexually abundant and accessible than they are; and (iii) *attachment erosion* — solitary consumption redirects the neurochemical reward pathway away from the partner, weakening the pair-bond and contracting V_{AB} along the intimacy axis (Willoughby and Dover, 2024). The modern pornographic ecosystem is qualitatively different from its predecessors: algorithmic personalisation creates an ever-escalating novelty gradient that no real partner can match, making it a paradigmatic instance of the extractive oscillator (Kriger, 2026p).

12.2 AI Companions and Synthetic Intimacy

The emergence of large-language-model-based companion chatbots (Replika, Character.AI, and similar platforms) introduces a further perturbation that has no historical precedent. Preliminary research indicates that AI companions can reduce short-term loneliness on par with human interaction (De Freitas et al., 2024), and users report forming emotionally meaningful attachments characterised by passion, intimacy, and perceived commitment (Pentina et al., 2023). However, emerging evidence also suggests that intense usage is associated with problematic dependence, amplification of loneliness, and withdrawal from real-world relationships (Liu et al., 2024; Muldoon, 2025).

For the dyadic viability framework, AI companions represent a *synthetic alternative attractor*: a low-cost, infinitely patient, algorithmically optimised source of emotional (and, in some cases, sexual) reward that competes directly with the real partner for the agent's attachment resources. The structural effect is to inflate U_{exit} (or, more precisely, $U_{\text{alternative}}$) while simultaneously contracting V_{AB} by redirecting emotional investment away from the dyad. Unlike pornography, which primarily affects the sexual dimension, AI companions can erode the full spectrum of pair-bond functions — emotional support, conversation, validation, and even the experience of being "known" — making them a more comprehensive threat to dyadic viability. The phenomenon is too recent for longitudinal divorce data, but the structural prediction is clear: widespread adoption of high-quality AI companions should accelerate viability contraction in existing relationships, particularly for individuals with insecure attachment or high baseline loneliness.

12.3 Dating Applications and the Perception of Infinite Alternatives

Mobile dating applications (Tinder, Bumble, Hinge, and their successors) have transformed the economics of partner search by dramatically reducing the cost of initiating contact with potential alternatives. For individuals in existing relationships, the structural effect is analogous to media distortion but more direct: the mere *availability* of a perceived infinity of alternatives inflates the perceived U_{exit} and reduces commitment to the current partner. Research on the "paradox of choice" suggests that an abundance of options can reduce satisfaction with any chosen option (Iyengar and Lepper, 2000; Schwartz, 2004), and this effect has been documented specifically in the dating-app context, where users report decreased investment in ongoing relationships and increased "grass is greener" cognition (Coduto et al., 2020).

Within the viability framework, dating apps act as a persistent, low-level inflation of U_{exit} that shifts the dissolution incentive $\Delta U = U_{\text{exit}} - U_{\text{stay}}$ toward positive values even when the current relationship is adequate. This is not a sudden shock (like a friend's divorce) but a chronic background perturbation that slowly lowers the exit barrier $E(t)$ for anyone who maintains an active dating-app profile or even knows that the option exists. The effect is amplified by the gamification of mate selection (swiping, matching, dopaminergic intermittent reinforcement), which itself functions as an extractive oscillator competing with the real relationship for attention and reward.

12.4 Consensual Non-Monogamy and Polyamorous Arrangements

The growing cultural visibility and practice of consensual non-monogamy (CNM) — including polyamory, open relationships, and relationship anarchy — represents a fundamentally different response to the viability contraction problem. Rather than accepting dissolution when V_{AB} contracts below a critical threshold, CNM arrangements attempt to *expand the system's dimensionality* by incorporating additional partners who can satisfy needs that the primary dyad no longer meets. In dynamical systems terms, the state space is enlarged from $\mathcal{X}_A \times \mathcal{X}_B$ to $\mathcal{X}_A \times \mathcal{X}_B \times \mathcal{X}_C \times \ldots$, and the viability set is redefined as the region where *each agent's* needs are met by the *network* of partners rather than by any single partner.

Empirical research on CNM outcomes is limited but growing. Meta-analytic evidence suggests that individuals in consensual non-monogamous relationships report relation-

ship satisfaction comparable to those in monogamous relationships (Rubel and Bogaert, 2015), though the sample populations may not be representative. From the viability framework, CNM can be understood as a structural strategy that trades the simplicity of the two-agent system for the complexity of a multi-agent one, with new failure modes (jealousy, time-allocation conflicts, asymmetric attachment, hierarchical vs. egalitarian tensions) that are themselves amenable to viability analysis. The critical structural question is whether the expanded viability set $V_{ABC\ldots}$ is larger and more robust than V_{AB}, or whether the additional coordination costs and emotional risks produce a net contraction. The empirical answer likely depends on the specific agents and their psychological architecture, consistent with the framework's emphasis on individual variability in viability-set geometry.

12.5 Companion Animals as Partial Attachment Substitutes

An often-overlooked dimension of the contemporary dissolution landscape is the role of companion animals as partial substitutes for human intimate attachment. Pet ownership in Western nations has risen sharply alongside declining marriage rates: in the United States, approximately 66% of households now own a pet, with single-person households disproportionately represented (APPA, 2024). The human–animal bond activates the same oxytocin-mediated attachment system as human pair-bonding (Nagasawa et al., 2015): physical contact with a dog, for example, produces measurable oxytocin increases in both human and animal, mimicking the neurochemical signature of affiliative touch between romantic partners.

From the viability framework, pets function as a *low-cost partial viability-set substitute*: they satisfy the agent's needs along certain dimensions (physical affection, daily companionship, unconditional positive regard, routine structure) while leaving other dimensions unmet (sexual intimacy, intellectual partnership, co-parenting, shared life narrative). A systematic review of 24 studies found that pet ownership was associated with lower social isolation, particularly for individuals living alone, and that the attachment bond with pets partially mediates the relationship between living alone and loneliness (Scoresby et al., 2022). However, the substitution effect is structurally ambivalent. A 2025 study found that pet owners who relied heavily on their animals as substitutes for human relationships reported *higher* loneliness and *lower* psychological well-being, with loneliness fully mediating the negative effect (Li and Wong, 2025). A meta-review of over 100 studies on pet attachment and mental health found that null and negative findings substantially outnumbered positive ones: 48 studies linked stronger pet attachment to worse mental health, while only 27 found positive associations.

The structural interpretation is that pet companionship reduces the *perceived urgency* of finding or maintaining a human romantic partner by partially satisfying attachment needs, while simultaneously being unable to satisfy the full dimensionality of human intimate needs. For individuals in existing relationships, pets may absorb emotional energy and physical affection that would otherwise flow to the partner — a reallocation that contracts V_{AB} along the intimacy dimension. For single individuals, the partial satisfaction provided by pets may raise the threshold for entering or remaining in a romantic relationship: if the agent's most acute unmet need (daily companionship, physical touch) is already partially met, the expected marginal benefit of a romantic partner decreases, and the agent becomes more selective or less motivated to invest in partnership maintenance. The structural prediction is that rising pet ownership contributes to a population-level

shift in the cost–benefit calculus of romantic partnership, lowering both the entry rate into dyadic systems and the perceived cost of exit from existing ones.

Taken together, these five phenomena — ubiquitous pornography, AI companions, dating apps, CNM, and pet companionship — represent a fundamental restructuring of the environment in which dyadic systems operate. Each can be formalised within the viability framework as a perturbation to one or more of the ten control variables identified in Table 1: pornography and AI companions inflate the adaptive threshold and erode attachment; dating apps lower the exit barrier and inflate perceived alternatives; CNM attempts to circumvent dissolution by expanding the system rather than repairing it; and pet companionship partially satisfies attachment needs, reducing both the perceived necessity and the perceived marginal value of human romantic partnership. The long-term effects on population-level dissolution rates remain an open empirical question, but the structural prediction is that, absent deliberate countermeasures, these perturbations will accelerate the default contraction of V_{AB}.

13 Extractive Oscillator Dynamics as a Continuum in Ordinary Couples

The preceding sections have treated dissolution mechanisms that operate in typical relationships: reward decay, familiarity-induced suppression, constraint–autonomy imbalance, and environmental perturbations. The present section addresses a phenomenon conventionally associated with clinical pathology — quasi-narcissistic relational dynamics — and argues that its underlying structure is present, to varying degrees, in *all* intimate dyads. This argument draws on the extractive oscillator framework (Kriger, 2026p), which formalises a class of dynamical systems characterised by five structural conditions: asymmetric resource extraction, hysteretic oscillation, sensor (epistemic) degradation, sunk-cost trapping, and informational isolation.

13.1 The Narcissism Continuum and the Parameter Space of Ordinary Relationships

The extractive oscillator framework (Kriger, 2026p) defines each agent by a parameter vector $\theta = (\theta_v, \theta_e, \theta_c, \theta_a)$ governing sensitivity to validation, empathic capacity, control-seeking, and empathic attachment. Quasi-narcissistic dynamics emerge not from a categorical diagnosis but from a continuous parameter configuration in which $\theta_v, \theta_c \gg \theta_e, \theta_a$ — high validation need and control-seeking, combined with low empathic capacity and low attachment. The critical ratio $\rho(\theta) = (\theta_e + \theta_a)/(\theta_v + \theta_c)$ indexes the agent's position on this continuum: clinically narcissistic dynamics require $\rho < \rho^*$ for a threshold ρ^* determined by the game structure, but every value of ρ produces *some* degree of extractive dynamics.

The key insight for the viability framework is that no human agent occupies the extreme empathic pole ($\rho = \infty$). Every individual has some nonzero validation need θ_v and some nonzero control-seeking θ_c, meaning that every dyad contains two agents each of whom is, to some quantifiable degree, extracting validation, reassurance, and emotional labour from the other. In ordinary healthy relationships, extraction is approximately symmetric ($\rho_A \approx \rho_B$, both comfortably above ρ^*), and the extractive component is small relative to the cooperative component. But it is never zero.

13.2 Mild Extractive Oscillation in Typical Couples

The abuse cycle — idealisation, devaluation, intermittent reinforcement — is the high-amplitude limit cycle of the extractive oscillator. However, the same dynamical structure produces *low-amplitude* oscillations in ordinary relationships that are recognisable to anyone who has been in one: periods of heightened affection and attention (mini-idealisation) alternating with periods of withdrawal, irritability, and emotional unavailability (mini-devaluation). These oscillations are typically not perceived as abusive because (i) the amplitude is small, (ii) both partners oscillate rather than only one, and (iii) the oscillation frequency is high enough that no single devaluation phase lasts long enough to cause cumulative damage.

Within the extractive oscillator framework, the amplitude of the limit cycle is a continuous function of the agent's parameter configuration: as $\rho \to \rho^*$ from above, the oscillation amplitude increases continuously until the system crosses into the regime where sensor degradation, sunk-cost trapping, and informational isolation become self-reinforcing. There is no discontinuous boundary between normal relationship fluctuation and quasi-narcissistic abuse — only a smooth increase in amplitude, asymmetry, and entrenchment. This continuity has a structural consequence for the viability model: the mild extractive oscillations of ordinary relationships contribute a low-level but persistent perturbation to V_{AB}. Each mini-devaluation temporarily contracts the viability set; each mini-idealisation partially restores it. The cumulative effect depends on whether the restoration fully compensates for the contraction, and this in turn depends on the symmetry of the oscillation between partners.

13.3 Asymmetry as the Critical Variable

The distinction between a healthy relationship with normal fluctuations and a destructive one is not the presence or absence of extractive dynamics but their *degree of asymmetry*. Let ρ_A and ρ_B denote the narcissism-continuum parameters for agents A and B, and define the asymmetry index $\mathcal{A} = |\rho_A - \rho_B|/(\rho_A + \rho_B)$, normalised to $[0, 1)$. Three structural regimes emerge:

Symmetric cooperative ($\mathcal{A} \approx 0$, both ρ high): Both partners are mildly extractive in approximately equal measure. Oscillations are low-amplitude, approximately in-phase (both withdraw and re-engage together), and self-correcting. This is the regime where the viability framework's other mechanisms (reward decay, familiarity suppression) dominate dissolution risk. Most stable long-term relationships operate here.

Moderate asymmetry ($\mathcal{A}$ intermediate): One partner extracts more validation or control than they reciprocate. The higher-ρ partner experiences gradual depletion — not the catastrophic precision erosion of clinical abuse, but a slow accumulation of emotional fatigue, resentment, and the sense that the relationship is "unequal." In the viability framework, this manifests as an asymmetric contraction of V_{AB}: the depleted partner's viability set shrinks faster than the extracting partner's, and the intersection V_{AB} narrows along the depleted partner's critical dimensions. Many relationships that end with one partner "falling out of love" while the other is blindsided occupy this regime.

High asymmetry ($\mathcal{A}$ large, one ρ near or below ρ^*): The full extractive oscillator dynamics manifest: the high-amplitude limit cycle, progressive sensor degradation, sunk-cost entrenchment, and (in the most severe cases) informational isolation. This is the regime clinically described as narcissistic abuse, but the framework insists that it is not a categorically different phenomenon — it is the same dynamical system at higher amplitude and greater asymmetry.

13.4 Sensor Degradation in Everyday Relationships

The most insidious mechanism of the extractive oscillator — epistemic degradation of the victim's internal precision τ_{int} — also operates in attenuated form in non-pathological relationships. Whenever one partner systematically dismisses the other's perceptions ("you're overreacting," "that's not what happened," "you're too sensitive"), the precision of the dismissed partner's internal signal is reduced. This need not be malicious; it can arise from genuine differences in emotional calibration, conflict-avoidant communication styles, or cultural norms about emotional expression.

The phase transition of the extractive oscillator framework (where τ_{int} crosses below τ_{ext} and the agent becomes externally dependent) represents the catastrophic endpoint of this process. In ordinary relationships, the erosion rate ϕ is low enough that τ_{int} never reaches the critical threshold — but the *direction* of change is the same. The viability-set interpretation is that epistemic erosion contracts V_{AB} along the autonomy dimension: an agent whose self-trust is being gradually reduced is an agent whose viability set is shrinking in the direction of "I can independently assess whether this relationship meets my needs." When this dimension contracts sufficiently, the agent loses the capacity to recognise that dissolution is appropriate — a form of viability-set collapse that is invisible to the agent experiencing it.

13.5 Sunk-Cost Dynamics as Universal Relationship Friction

The investment trap — where accumulated relational investment makes exit progressively more costly — is not specific to abusive relationships. Every long-term partnership accumulates shared assets, mutual friends, co-parenting obligations, intertwined identities, and shared narrative history. The extractive oscillator framework formalises this as a monotonically increasing exit cost $\mathcal{C}_{\text{exit}}(t) = \xi I(t) + \psi M_{\text{dep}}(t)$, where the first term captures material and social investment and the second captures epistemic dependency. In healthy relationships, the second term is small (both partners retain autonomous judgment), and the first term is counterbalanced by genuine satisfaction (U_{stay} remains high). In moderately asymmetric relationships, however, the sunk-cost mechanism creates a specific failure mode: the depleted partner remains in a deteriorating relationship not because it meets their needs but because the accumulated investment makes leaving feel like a waste.

This connects directly to the viability framework's exit barrier $E(t)$: sunk-cost accumulation is a mechanism by which $E(t)$ remains artificially elevated even as V_{AB} contracts below the critical threshold. The structural prediction is that relationships in the moderate-asymmetry regime ($\mathcal{A}$ intermediate) should persist longer than their viability warrants — a prediction consistent with the empirical observation that many divorces occur years or decades after the relationship has ceased to meet either partner's needs.

13.6 Integration with the Viability Framework

The extractive oscillator dynamics interact with each of the ten mechanisms identified in the viability model. Mild extractive asymmetry *accelerates* reward decay (the extracted partner's reward is disproportionately consumed by the extracting partner's needs); it *deepens* familiarity-induced suppression (the extracted partner's predictability is increased by their accommodative stance); it *exacerbates* constraint–autonomy imbalance (the extracting partner's control-seeking directly increases ΔC); and it *raises* the effective exit barrier (the sunk-cost and epistemic-dependency mechanisms). In short, even a small degree of extractive asymmetry acts as a *multiplier* on all other dissolution mechanisms, accelerating the default contraction of V_{AB} beyond what the other mechanisms alone would produce.

The coupled inequalities governing viability mismatch (Eqs. 9–11) can be augmented with an extractive asymmetry term: the rate of viability-set contraction $\dot{V}_{AB}$ includes a component proportional to $\mathcal{A}$, so that even small asymmetries contribute a persistent negative drift. This provides a structural explanation for the well-documented finding that perceived inequality in emotional labour, validation, and decision-making power is among the strongest predictors of relationship dissatisfaction and eventual dissolution (Gottman, 1999; Karney, 2021).

The central implication of this analysis is that quasi-narcissistic dynamics are not an exotic pathology that happens to other people's relationships. They are a universal feature of human intimate systems, differing across couples only in degree, amplitude, and symmetry. The extractive oscillator is always present; the question is whether it is operating at a level that is compatible with long-term viability or whether it has crossed into the self-reinforcing regime from which exit becomes structurally improbable. The viability framework, by treating this as a continuous parameter rather than a categorical diagnosis, provides a more accurate and more actionable model than the clinical distinction between "narcissistic" and "normal" relationships.

14 The Sacred Exit Barrier: Religion as Viability-Set Architecture

The religious dimensions of marriage surveyed in Section 2.7 are not merely contextual background; they constitute the historically dominant mechanism by which societies have maintained dyadic viability against the default contraction forces analysed in the preceding sections. This section formalises religion's structural role and analyses the consequences of its withdrawal.

14.1 Three Channels of Religious Stabilisation

Religious marriage operates on the viability framework through three structurally distinct channels, each of which can be formalised independently:

Channel 1: The transcendent exit barrier. Every major religious tradition constructs divorce as a violation not merely of a contract between two persons but of a covenant with the divine. The Catholic sacramental theology makes dissolution literally

impossible (only annulment is permitted); Islamic jurisprudence permits divorce but surrounds it with procedural friction (waiting periods, arbitration, community involvement); Hinduism constructs marriage as a trans-lifetime bond. In all cases, the effect is to inflate the exit barrier $E(t)$ by adding a transcendent cost component E_{sacred} that is independent of material circumstances, social network effects, or individual satisfaction:

$$E_{\text{total}}(t) = E_{\text{material}}(t) + E_{\text{social}}(t) + E_{\text{sacred}}, \tag{13}$$

where E_{sacred} is constant (or near-constant) for a given level of religious commitment, representing the perceived spiritual cost of violating a sacred vow. For a devout Catholic, $E_{\text{sacred}} \to \infty$ (dissolution is theologically impossible); for a secular individual, $E_{\text{sacred}} = 0$.

Channel 2: Normative viability-set expansion. Religious communities provide an external normative framework that *defines* what a viable marriage looks like — typically emphasising permanence, sacrifice, forgiveness, and complementary roles over individual happiness or passion. This has the effect of expanding the viability set V_{AB} by redefining the agent's needs: if the agent believes that a good marriage requires endurance through suffering rather than continuous emotional fulfilment, then the region of state space compatible with "viable relationship" is larger. Formally, the agent's constraint set $\mathcal{X}_i$ is widened: states that a secular individual would classify as "unacceptable" (e.g., loss of passion, routine boredom, asymmetric emotional labour) are reclassified as "normal" or even "spiritually productive" within the religious framework. The viability set V_{AB} is thereby expanded along dimensions that the secular framework contracts.

Channel 3: Community enforcement and social capital. Religious congregations function as dense social networks that (i) provide practical support during marital crises (counselling, retreats, mentorship from elder couples); (ii) create reputational costs for dissolution (divorce carries social stigma within the community); and (iii) reduce exposure to divorce contagion by surrounding the couple with other married couples who share the permanence norm. In the framework's notation, the contagion parameter n_d (fraction of divorced peers) is structurally suppressed by religious community membership, and the exit barrier receives a social reinforcement component that decays only if the individual leaves the community.

14.2 Secularisation as Structural Barrier Removal

The process of secularisation — the declining authority of religious institutions over private life, accelerating in Western societies from the mid-twentieth century — can now be understood as the systematic removal of all three channels simultaneously:

1. $E_{\text{sacred}} \to 0$ as individuals cease to regard marriage as a divine covenant. The transcendent exit barrier vanishes, leaving only material and social costs.

2. The normative viability set contracts to secular dimensions: individual happiness, emotional fulfilment, sexual satisfaction, and personal growth become the operative criteria for a "good" marriage. States previously normalised by religious framing (e.g., seasons of unhappiness, loss of passion, unequal sacrifice) are reclassified as grounds for dissolution.

3. Community enforcement weakens as religious attendance declines and social networks become more heterogeneous with respect to marital norms. The contagion parameter n_d increases as the proportion of divorced individuals in one's network is no longer suppressed by congregational selection effects.

The structural prediction is stark: secularisation removes the single most powerful historically available countermeasure against the default contraction of V_{AB}. The reward decay, familiarity suppression, constraint–autonomy imbalance, and social contagion mechanisms operate identically in religious and secular marriages — but religious marriages have had access to a stabilising architecture (transcendent barrier, expanded normative set, community enforcement) that secular marriages lack. As this architecture erodes, the default dissolution dynamics are unmasked, and divorce rates rise to levels determined by the underlying biological, psychological, and social mechanisms alone.

This analysis explains two otherwise puzzling empirical patterns. First, the Harvard prospective study finding that weekly service attendance approximately halves divorce risk (VanderWeele, 2016) is explained not by religious belief *per se* but by the structural effects of community embedding, normative expansion, and barrier inflation that correlate with attendance. Second, the dramatic divergence between Catholic countries that have secularised (Portugal, Spain — divorce rates exceeding 85%) and those that have not (Philippines — effectively zero legal divorce) is explained by the observation that religious doctrine alone has no structural effect; only institutionally mediated channels (legal prohibition, community enforcement, normative framing) produce the viability-set consequences formalised above.

14.3 The Replacement Problem

Secularisation has not produced a secular replacement for the three religious channels. Romantic love, which functionally replaced religious covenant as the primary justification for marriage in the modern West, is itself subject to the reward-decay and hedonic-adaptation mechanisms analysed in Sections 5–6 — making it a self-undermining foundation for lifelong commitment. The structural situation of modern secular marriage can therefore be characterised as follows: the institution retains the permanence expectation inherited from its religious origins ("till death do us part" persists as a cultural idiom even in civil ceremonies) while having lost the structural architecture that made that permanence achievable. The viability framework predicts that this gap — between the cultural expectation of permanence and the structural reality of time-limited pair-bonding without transcendent stabilisation — is a primary driver of the contemporary dissolution epidemic.

15 The Legal System as Structural Force in Dissolution

The preceding sections have analysed economic costs (Section 9), children as viability-set anchors (Section 10), and religion as exit-barrier architecture (Section 14). A conspicuous gap remains: the legal system itself, which is arguably the most immediate and consequential institutional structure that couples encounter during dissolution. This section formalises the legal process not as a neutral administrative medium through which dissolution occurs, but as an active structural force that distorts the parameters of the

dissolving system and, in its adversarial form, systematically worsens outcomes for all participants — especially children.

15.1 The Adversarial Structure as a Prisoner's Dilemma

In the viability framework, the dissolution trajectory represents the exit of the dyadic state from V_{AB} — a transition from a cooperative attractor to a post-partnership state. The adversarial family-law system, however, does not permit a direct cooperative-to-exit transition. Instead, it interposes an intermediate regime: a *competitive game* in which two agents who have already exited the cooperative attractor are forced into a zero-sum conflict over the distribution of shared assets, custody arrangements, and support obligations.

Each partner's legal counsel optimises for their individual client's outcome, not for the dyadic system or the children. Let the post-dissolution payoff to agent i be π_i, and let the strategies available be cooperative (C) and adversarial (A). The game matrix takes the form:

$$\begin{pmatrix} \pi_A^{CC}, \pi_B^{CC} \\ \pi_A^{AC}, \pi_B^{AC} \\ \pi_A^{CA}, \pi_B^{CA} \\ \pi_A^{AA}, \pi_B^{AA} \end{pmatrix} \quad \text{with} \quad \pi_i^{Aj} > \pi_i^{Cj} \;\; \forall j, \quad \text{but} \quad \pi_A^{CC} + \pi_B^{CC} > \pi_A^{AA} + \pi_B^{AA}. \tag{14}$$

That is: each individual does better by playing adversarially regardless of the other's strategy (the dominant-strategy condition), but the joint payoff under mutual cooperation exceeds that under mutual adversarialism. The Nash equilibrium of the adversarial legal game is therefore mutual aggression (A, A), even when mutual cooperation (C, C) would produce a Pareto-superior outcome. The legal system's institutional structure *selects for the worse equilibrium* by providing each agent with an advocate whose professional obligation is to maximise π_i without regard to π_j or to the children's welfare function.

15.2 Temporal Distortion: Forced Residence in Non-Viable State Space

Divorce proceedings in many jurisdictions extend over months or years. During this period, the viability set V_{AB} is already empty — the cooperative attractor has dissolved — but the agents remain legally coupled. This creates a structural anomaly: *forced proximity to a dissolved attractor*, which deepens resentment, escalates conflict, and compounds harm to children who must inhabit the turbulent boundary region.

Let T_{legal} denote the duration of the legal process and T_0 the time at which $V_{AB} \to \emptyset$. For $t \in [T_0, T_0 + T_{\text{legal}}]$, the agents occupy a non-viable region of state space but cannot complete the exit trajectory. The harm accumulated during this forced-residence period can be modelled as:

$$H_{\text{legal}} = \int_{T_0}^{T_0 + T_{\text{legal}}} h\big(\mathbf{x}(t), \mathbf{y}(t)\big)\, dt, \tag{15}$$

where $h(\cdot)$ is the instantaneous harm rate to agents and children, which is monotonically increasing in the duration of forced co-occupation of non-viable state space. The viability framework predicts that jurisdictions with faster dissolution processes will exhibit lower total harm, a prediction supported by the empirical evidence on streamlined divorce procedures in Scandinavian countries (Cherlin, 2009).

15.3 Financial Extraction as Secondary Dissolution

The legal process itself consumes substantial financial resources: attorney fees, forensic accountants, custody evaluators, guardian *ad litem* costs, court-mandated therapy, and litigation expenses. In the United States, contested divorces average $15,000–$30,000 per party, with high-conflict cases exceeding $100,000 (Wilkinson and Fromm, 2016). For middle-income families, these costs can be devastating.

Within the viability framework, legal costs represent a *direct contraction of both agents' post-exit viability sets*. Let W_i^{post} denote agent i's post-dissolution resource base. The legal process reduces this by L_i (legal costs), so that the effective post-exit viability set is computed over $W_i^{\text{post}} - L_i$ rather than W_i^{post}. This creates a perverse structural consequence: the very process designed to facilitate orderly dissolution undermines the conditions for successful post-dissolution functioning. Resources that could support children's stability, housing transitions, and psychological recovery are instead consumed by the adversarial machinery.

The financial extraction is not evenly distributed: the partner with greater liquid assets may use litigation as a strategy of attrition, extending proceedings to exhaust the other party's capacity to contest. This *asymmetric financial warfare* maps directly onto the power asymmetries analysed in the extractive oscillator framework (Section 13), with the legal system providing a new arena for extraction even after the intimate relationship has ended.

15.4 Custody as Weaponisation of the Child Anchor

Section 10 formalised children as viability-set anchors — agents whose welfare function enters the dissolution calculus as a binding constraint. The adversarial legal system, however, converts children from a stabilising shared project into a *contested resource*. Custody battles instrumentalise the very stakeholders whose welfare should be the primary concern, transforming the child's viability set — which should function as the system's binding constraint — into a bargaining chip in the adversarial game.

Let $U_{\text{child}}(c_A, c_B)$ represent the child's welfare as a function of the custody arrangement (c_A, c_B), where c_i denotes the proportion of custodial time allocated to agent i. In a cooperative dissolution, the arrangement would maximise U_{child} subject to feasibility constraints. In the adversarial game, each agent instead maximises a composite objective:

$$\max_{c_i} \; \alpha_i U_{\text{child}}(c_A, c_B) + (1 - \alpha_i)\pi_i(c_i), \tag{16}$$

where $\pi_i(c_i)$ captures the parent's private benefit from custodial allocation (financial support implications, social status, control over the ex-partner's life) and $\alpha_i \in [0, 1]$ is the weight placed on the child's welfare versus private benefit. The adversarial structure systematically *reduces* α_i by framing custody as a win–lose contest: legal counsel advises strategies that maximise π_i even at the expense of U_{child}. The empirical literature on high-conflict custody disputes consistently documents worse child outcomes across every measured dimension — psychological adjustment, academic performance, social functioning, and physical health (Amato, 2001; Emery et al., 2004).

15.5 Jurisdictional Arbitrariness as Exogenous Stochastic Perturbation

A striking feature of the legal dissolution landscape is its radical inconsistency across jurisdictions. The same couple, with identical relational dynamics and identical circumstances, can face fundamentally different outcomes depending on which side of a state or national border they reside on. Community-property versus equitable-distribution states produce different asset divisions; judicial discretion in custody and support varies enormously; local legal culture influences settlement expectations and litigation intensity.

Within the viability framework, this jurisdictional variance is pure *structural noise* — variance unrelated to the dyadic system's actual parameters. It can be modelled as an exogenous stochastic perturbation to the exit process:

$$\boldsymbol{\pi}^{\text{actual}} = \boldsymbol{\pi}^{\text{structural}} + \boldsymbol{\xi}_{\text{jurisdiction}}, \tag{17}$$

where $\boldsymbol{\pi}^{\text{structural}}$ represents the outcome that would follow from the couple's actual circumstances and $\boldsymbol{\xi}_{\text{jurisdiction}}$ is a zero-mean noise term whose variance depends on the jurisdiction. High jurisdictional variance means that the exit process introduces uncertainty unrelated to the agents' choices or circumstances — a source of structural injustice that compounds the already traumatic dissolution process.

15.6 The No-Fault Revolution: Legal Analogue of Secularisation

The shift from fault-based to no-fault divorce, beginning with California's Family Law Act of 1969 and spreading across all US states by 2010, was itself a massive reduction in the legal exit barrier. Under fault-based regimes, dissolution required proof of marital misconduct (adultery, cruelty, desertion, abandonment), creating a substantial evidentiary burden — a legal exit barrier $E_{\text{legal}}^{\text{fault}}$ analogous to the sacred exit barrier E_{sacred} analysed in Section 14.

No-fault divorce reduced E_{legal} from a substantial barrier requiring adversarial litigation to a minimal administrative cost:

$$E_{\text{legal}}^{\text{fault}} \gg E_{\text{legal}}^{\text{no-fault}} \approx E_{\text{administrative}}. \tag{18}$$

The empirical evidence on the causal effect of no-fault divorce on dissolution rates is complex. Wolfers (2006) found an initial spike in divorce rates following adoption, with partial convergence after approximately a decade (Wolfers, 2006). Friedberg (1998) estimated that no-fault laws accounted for roughly 17% of the increase in divorce between 1968 and 1988 (Friedberg, 1998). The viability framework interprets this pattern as the release of a reservoir of non-viable marriages whose dissolution had been suppressed by the legal barrier — analogous to a dam removal producing an initial flood followed by normalisation at a higher flow rate.

The no-fault revolution connects directly to the secularisation analysis: no-fault divorce is the legal analogue of removing the sacred exit barrier. Together, secularisation and legal liberalisation represent the simultaneous dismantling of the two most powerful institutional stabilisation mechanisms — the transcendent and the juridical — within a single generation. The framework predicts that societies in which both processes have occurred will exhibit the highest dissolution rates, a prediction consistent with the cross-national evidence.

15.7 Cooperative Alternatives: Mediation and Collaborative Divorce

Mediation and collaborative divorce represent institutional attempts to replace the adversarial game with a cooperative one — structurally, to maintain some residual cooperative dynamics even as the partnership attractor dissolves. In mediation, a neutral third party facilitates negotiation between the agents; in collaborative divorce, both attorneys contractually commit to non-adversarial negotiation, with a clause requiring both to withdraw if the case proceeds to litigation.

These cooperative alternatives can be modelled as mechanism-design interventions that alter the game structure from Equation 14 to a cooperative bargaining problem. Let S denote the set of feasible dissolution outcomes. In the cooperative framework, agents solve:

$$\max_{s \in S} \big(\pi_A(s) - d_A\big)\big(\pi_B(s) - d_B\big), \tag{19}$$

where d_i is agent i's disagreement payoff (the outcome under adversarial litigation). This Nash bargaining solution maximises the joint surplus relative to the adversarial default, producing outcomes that are Pareto-superior to the (A, A) equilibrium.

The empirical evidence supports this structural prediction: mediated divorces resolve 40–60% faster than litigated ones, cost 40–60% less, produce higher compliance with agreements, and — most importantly — are associated with significantly better child adjustment outcomes (Emery et al., 2004; Sbarra and Emery, 2012). These findings confirm the viability framework's prediction that cooperative exit preserves more of both agents' post-dissolution viability, and that the adversarial legal structure is not a necessary feature of dissolution but a *design choice* with measurable welfare consequences.

The overarching conclusion of this section is that the legal system is not a neutral medium through which dissolution occurs. It is an active structural force that, in its adversarial form, systematically worsens outcomes for all participants. The prisoner's-dilemma structure selects for mutual aggression; temporal distortion compounds harm; financial extraction depletes the resources needed for post-dissolution functioning; custody proceedings weaponise children; jurisdictional arbitrariness introduces structural noise; and the no-fault revolution, while removing an unjust barrier, eliminated a stabilisation mechanism without providing a replacement. Cooperative alternatives demonstrate that better institutional designs are possible, but their adoption remains the exception rather than the rule in most jurisdictions.

16 Same-Sex Dyads: Parameter Variation without Structural Change

The viability framework developed in this paper is structurally agnostic with respect to the gender composition of the dyad: the formal apparatus of viability sets, reward decay, constraint–autonomy imbalance, and exit-barrier dynamics applies identically to any two-agent cooperative system. The question is not whether the model *applies* to same-sex couples, but whether the *empirical parameter values* differ in ways that produce distinguishable dissolution trajectories.

16.1 Empirical Dissolution Rates

The evidence on comparative dissolution rates is complex and evolving. American Community Survey data for 2016–2023 estimated an annual divorce rate of 1.8% for same-sex married couples, compared to 1.5% for different-sex couples (Ketcham and Bennett, 2019). However, this aggregate figure masks a striking gender asymmetry: female–female couples account for approximately two-thirds of same-sex marriages but roughly 70–75% of same-sex divorces (Andersson et al., 2006). Swedish registry data spanning 1995–2012 found that 30% of both male same-sex and heterosexual marriages ended in divorce, whereas the dissolution rate for female same-sex marriages was 40% (Andersson et al., 2006). A longitudinal study of adoptive parents found dissolution rates of 12.3% for lesbian couples, 2.0% for gay male couples, and 8.3% for heterosexual couples over five years (Goldberg and Garcia, 2015).

16.2 Structural Interpretation

Within the viability framework, these patterns are interpretable through several parameter-level differences:

Exit-barrier asymmetry. Kurdek's longitudinal research consistently found that gay and lesbian partners reported *fewer barriers to leaving* than heterosexual married spouses (Kurdek, 1998, 2004). In the model's terms, E_{total} is lower for same-sex couples: the sacred exit barrier (E_{sacred}) is often absent or reduced (many religious traditions do not sanctify same-sex unions); the legal exit barrier was zero until recently and remains structurally thinner; and the social-network enforcement mechanism is weaker (same-sex couples are less likely to be embedded in dense congregational networks that enforce partnership permanence). Lower E_{total} means that dissolution occurs at higher residual values of V_{AB} — couples exit sooner when viability begins contracting, rather than persisting in non-viable states.

Constraint–autonomy dynamics. Gay and lesbian couples report greater egalitarianism in domestic labour division and decision-making than heterosexual couples (Kurdek, 2004). In the framework's terms, the constraint–autonomy imbalance ΔC is typically smaller, as the absence of default gender-role templates forces explicit negotiation of task allocation. This predicts slower viability-set contraction along the autonomy dimension.

The lesbian dissolution premium. The elevated dissolution rate in female–female couples can be interpreted through the reward-decay mechanism: if women on average have higher emotional expectations and relationship-quality standards than men (a finding consistent across heterosexual research, where 69–90% of divorces are initiated by women), then a dyad comprising two agents with high thresholds τ will reach the dissolution boundary sooner than a dyad containing one or more agents with lower τ. Additionally, female–female couples may experience more rapid limerence onset, leading to faster partnership formation before adequate compatibility assessment — effectively starting the viability clock from a less well-matched initial state $(\mathbf{x}_0, \mathbf{y}_0)$.

Gay male stability. Conversely, male–male couples show the lowest formal dissolution rates among all couple types. The framework interprets this through lower average

threshold τ (men on average tolerate greater imperfection before initiating dissolution), combined with higher sexual-agreement flexibility (open or semi-open arrangements that reduce the constraint of sexual exclusivity, thereby expanding the viability set along the sexual-freedom dimension). Kurdek found that gay male couples reported greater autonomy than any other couple type (Kurdek, 1998) — a structural feature that reduces constraint–autonomy imbalance.

Minority stress as exogenous contraction. Same-sex couples face stressors absent from different-sex partnerships: family-of-origin rejection, legal uncertainty in some jurisdictions, workplace discrimination, and internalised stigma. Within the viability framework, minority stress operates as a persistent exogenous force contracting V_{AB} from outside the dyadic system — a structural perturbation analogous to economic hardship or social-network dissolution. Research consistently shows that external social support moderates this effect: couples embedded in affirming communities exhibit dissolution rates indistinguishable from heterosexual couples (Kurdek, 2004).

The central conclusion is that the viability framework requires no structural modification to accommodate same-sex couples. The mechanisms are identical; only the parameter values differ. This parameter-level variation produces predictable differences in dissolution patterns — differences that confirm, rather than challenge, the model's generality.

17 Domestic Violence, Institutional Response, and Strategic Weaponisation

The preceding sections have analysed dissolution as the exit from a cooperative attractor. This section confronts a harder reality: in many relationships, the attractor itself is not cooperative but *coercive*. Domestic violence — encompassing physical, psychological, sexual, and economic abuse — represents the extreme of the extractive oscillator dynamics analysed in Section 13, where one agent's ρ (empathic-capacity-to-control ratio) has fallen far below the critical threshold. This section analyses three interrelated phenomena: genuine violence as a structural feature of the dissolving system, institutional responses that amplify rather than resolve the crisis, and strategic weaponisation of violence allegations as a game-theoretic exploitation of legal asymmetries.

17.1 Genuine Domestic Violence as High-Amplitude Extractive Dynamics

Within the viability framework, intimate partner violence (IPV) is the behavioural expression of an extractive oscillator operating at maximum amplitude. The abuser's parameter vector $\theta = (\theta_v, \theta_e, \theta_c, \theta_a)$ is characterised by extreme control-seeking ($\theta_c \gg 0$), minimal empathic capacity ($\theta_e \approx 0$), and high validation demand ($\theta_v \gg 0$). The resulting dynamics — cycles of tension-building, acute violence, reconciliation ("honeymoon"), and calm — map directly onto the extractive oscillator's limit cycle (Kriger, 2026p).

The critical structural feature is that IPV *prevents dissolution even when the viability set is empty*. The abuser achieves this through three mechanisms that the framework formalises as artificial exit-barrier inflation:

Terror as exit barrier: The threat of lethal violence if the victim leaves creates $E_{\text{terror}} \gg E_{\text{legal}} + E_{\text{social}} + E_{\text{sacred}}$ — an exit barrier that overwhelms all institutional and psychological costs of remaining.

Epistemic degradation: Sustained psychological abuse erodes the victim's capacity to recognise the non-viability of the relationship. The victim's sensor function is degraded to the point where they cannot accurately assess whether their state lies inside or outside V_{AB} — the phase-transition mechanism of the extractive oscillator (Kriger, 2026p).

Resource control: Economic abuse (controlling finances, preventing employment, destroying credit) contracts the victim's post-exit viability set so severely that leaving appears materially impossible. The victim faces a choice between a non-viable relationship and a non-viable post-exit state — a structural trap with no good outcome.

The global scale of this phenomenon is staggering. The World Health Organisation estimates that one in three women worldwide has experienced physical or sexual violence from an intimate partner (WHO, 2021). IPV is the leading cause of homicide among women globally, with the UN estimating 87,000 women killed by intimate partners or family members annually (UNODC, 2019).

17.2 Institutional Response Failure: A Comparative Analysis

The institutional response to domestic violence varies radically across jurisdictions, with consequences that the viability framework can formalise as differences in *protective barrier architecture* — the extent to which the state provides victims with viable exit paths.

Russia: Decriminalisation as barrier removal. In February 2017, the Russian Duma voted 380–3 to decriminalise first-offence domestic battery not causing "serious bodily harm," reducing the penalty to a maximum fine of 30,000 rubles (approximately $500) or 15 days' administrative detention (Human Rights Watch, 2017). The law was passed with explicit support from the Russian Orthodox Church, which framed criminalisation of domestic violence as interference with "traditional family values." The structural consequences were immediate and predictable: domestic violence reports to police dropped by nearly half (from 65,500 recorded victims in 2016 to 36,000 in 2017), while calls to crisis centres increased (Johnson, 2020). Two-thirds of all women murdered in Russia between 2011 and 2019 were killed by partners or relatives. In the framework's terms, Russia removed the legal protective barrier ($E_{\text{legal}}^{\text{protection}} \to 0$) while leaving the terror barrier (E_{terror}) and resource-control barrier intact — a policy that structurally traps victims in non-viable, life-threatening states.

United States: Mandatory arrest and its paradoxes. The US shifted dramatically toward mandatory arrest policies following the Minneapolis Domestic Violence Experiment (Sherman and Berk, 1984), which found that arrest reduced recidivism compared to separation or mediation. However, five replication studies produced complex results: arrest reduced reoffending among employed suspects but *doubled* recidivism among unemployed suspects (Sherman et al., 1992). A 23-year follow-up of the Milwaukee experiment found that victims were 64% more likely to have died of all causes if their partners had

been arrested, with African-American victims showing a 98% increase in mortality (Sherman and Harris, 2015). The viability framework interprets this through the mechanism of *iatrogenic harm*: the institutional intervention, designed to protect, instead destabilises the system by removing economic resources (the arrested partner's income), inflaming retaliatory violence, and creating legal complications that further contract the victim's post-exit viability set.

A separate lethal dimension exists: in the US, where firearms are prevalent, the intersection of domestic violence and police response creates catastrophic risks. Victims are at greatest risk for homicide at the point of separation (Campbell et al., 2003), and police welfare-check calls to domestic violence situations have themselves resulted in fatal shootings of both victims and suspects. The structural perversity is extreme: the victim calls for help; the institutional response produces death.

Canada: Mandatory charging and forced separation. Canadian jurisdictions adopted mandatory charging policies in the 1980s, removing prosecutorial discretion from IPV cases. While intended to signal that domestic violence is a serious crime, mandatory charging has produced unintended consequences: victims are sometimes charged alongside their attackers (dual charging), creating criminal records that impede employment, housing, and custody outcomes (WomanACT, 2024). When police respond to domestic disputes in Canada, standard procedure involves separating the parties, often placing the accused in temporary shelter accommodation. While protective in genuine abuse cases, this mandatory separation in low-conflict situations can amplify relational damage: forced physical separation during a resolvable conflict escalates what might have been a manageable disagreement into a structural rupture, with cascading consequences for housing stability, child welfare, and the relationship itself. In the framework's terms, the institutional intervention converts a state near the boundary of V_{AB} into a state definitively outside it.

17.3 Strategic Weaponisation of Violence Allegations

The asymmetric legal consequences of domestic violence allegations create a game-theoretic incentive structure that can be exploited by strategic actors during custody and divorce proceedings. This weaponisation operates through what legal commentators have termed the "Silver Bullet Method": a false or exaggerated allegation of domestic violence that produces immediate, severe, and often irreversible consequences for the accused (Bala et al., 2007).

The structural logic is straightforward. Under mandatory arrest or mandatory charging policies, the first party to call police obtains a decisive *first-mover advantage*: the other party is arrested, removed from the home, subjected to a restraining order, and immediately disadvantaged in subsequent custody proceedings. The game-theoretic incentive is:

$$\pi_{\text{first-mover}} \gg \pi_{\text{second-mover}}, \tag{20}$$

where π denotes the expected payoff in the custody and property division proceedings. Even when allegations are subsequently disproven, the interim damage — loss of custody time, legal costs, reputational harm, psychological distress — is often irreversible.

The empirical evidence on the prevalence of deliberately false allegations is contested and politically charged. Bala et al. (2007) found that in custody disputes, approximately

4% of child abuse allegations were deliberately false, while the majority were either substantiated or made in good faith but unproven (Bala et al., 2007). Meier's (2019) Custody Court Crisis study found a different pattern: when mothers alleged child abuse by fathers, they lost custody 28% of the time, suggesting potential systemic bias in the adjudication of allegations (Meier, 2019). The viability framework does not take sides in this empirical dispute but notes the structural consequence: *regardless* of the true prevalence of false allegations, the existence of the first-mover advantage creates perverse incentives that distort the dissolution process for all couples.

The weaponisation extends beyond allegations to the deployment of institutional resources themselves. Social housing priority, domestic violence shelter access, expedited legal aid, and immigration status protections are all legitimately available to genuine victims — but their availability also creates instrumental incentives for strategic actors. When access to scarce resources (housing, welfare support, sole custody) is conditioned on victim status, the institutional system inadvertently creates a competition in which claiming victimhood becomes a rational strategy even for non-victims. The framework formalises this as a *mechanism-design failure*: the incentive structure intended to protect genuine victims simultaneously rewards strategic exploitation, undermining the credibility of all claims and ultimately harming the very population the system was designed to protect.

17.4 The Dual Crisis: Under-Protection and Over-Intervention

The domestic violence landscape thus exhibits a paradoxical dual crisis. In some jurisdictions (Russia, and many developing nations), victims are *under-protected*: legal barriers to violence are absent or unenforced, exit paths are blocked, and the state either ignores or actively enables abuse. In other jurisdictions (parts of North America, Western Europe), the institutional response has created pockets of *over-intervention*: mandatory arrest, mandatory charging, and zero-tolerance policies that remove agency from both victims and accused, producing iatrogenic harms including victim criminalisation, forced family separation during resolvable conflicts, and the creation of game-theoretic incentives for strategic weaponisation.

The viability framework identifies the common structural failure: in both cases, the institutional system treats the dissolving dyad as a *one-dimensional* problem (violence present/absent) rather than recognising the multi-dimensional parameter space in which genuine abuse, resolvable conflict, asymmetric extraction, and strategic manipulation coexist. A structurally adequate response would require differentiated intervention protocols calibrated to the actual position of the dyadic system in parameter space — a recommendation that the framework's diagnostic hierarchy (Section 23) is designed to support.

The implications are sobering. The approximately 16,000 women murdered annually by intimate partners in the United States and Russia alone represent the most catastrophic failure of the institutional systems that surround dissolving relationships. The strategic weaponisation of allegations, while harming a smaller number of individuals, corrodes the institutional credibility on which genuine victims depend. And the mandatory intervention protocols, while well-intentioned, sometimes convert manageable crises into irreversible ruptures. The viability framework cannot resolve these tensions, but it can name them precisely: the challenge is to construct institutional architectures that maximise the probability of viable exit for genuine victims while minimising iatrogenic

harm to all participants, especially children.

18 Friendship as a Low-Amplitude Stable Attractor

A natural question arises: if romantic relationships are subject to reward decay, familiarity suppression, and hedonic adaptation, why do friendships often endure for decades without the same erosion?

The answer, within our framework, is structural: friendship and romance differ not in degree but in *dynamical kind*. Romance is driven by the reproductive system, which produces intense biochemical surges (dopamine, oxytocin, testosterone) that follow the excitation–adaptation–decline trajectory formalised in Section 5. These surges are inherently temporary, as shown in the Proposition above: under constant stimulation, the reward signal decays to zero. This is the "spark" that fades.

Friendship, by contrast, operates without this biochemical overload. In dynamical systems terms, friendship is a *low-amplitude stable attractor*: a relationship pattern characterised by moderate but consistent positive affect, without the extreme peaks (infatuation) and valleys (habituation, withdrawal) of romance. Because the amplitude is low, there is less to adapt to; because there is no hormonal cycle, there is no crash.

More precisely, the extractive oscillator framework (Kriger, 2026p) classifies the romance cycle as structurally analogous to addiction: an initial high (dopamine surge), followed by tolerance (hedonic adaptation), followed by withdrawal symptoms (loneliness, craving) when the stimulus is removed, followed by escalation (seeking a new partner for a new high). Friendship lacks this oscillatory structure entirely. It is sustained by reciprocity, shared interest, and mutual respect — features that correspond to the Cyclic Closure Principle (Kriger, 2026i) operating in a non-hormonal register.

This structural analysis explains a paradox noted by many relationship therapists: the most stable long-term marriages often resemble deep friendships with a sexual component, rather than sustained romantic passion. Couples who successfully transition from the romantic attractor to the friendship-like attractor avoid the adaptation trap — but only if both partners accept and value the transition (Kriger, 2024a; Gottman, 1999).

19 Perceptual Valence Switching

One of the most striking phenomena in failing relationships is the reversal of perception: a partner's scent, laugh, or habits that were once found endearing become sources of irritation or even disgust. This is not mere "pickiness" — it is a systematic reversal of the hedonic value assigned to stimuli.

The Structural Distortion Principle (Kriger, 2026l) provides the explanation: *perception is not neutral*. The brain does not passively record stimuli; it actively evaluates them in light of its current model of the world. When the agent's internal model of the partner $M(t)$ shifts from "this person is my ally" (affiliative) to "this person is a burden" (dissociative), the same physical stimulus receives the opposite hedonic evaluation. We can write this as:

$$v\big(\mathbf{s},\, M(t_1)\big) > 0 \quad \text{and} \quad v\big(\mathbf{s},\, M(t_2)\big) < 0, \qquad t_2 > t_1, \tag{21}$$

where $v(\mathbf{s}, M(t))$ is the hedonic valence (pleasantness or unpleasantness) of stimulus $\mathbf{s}$ given the current partner-model $M(t)$.

Phenomenological interpretation: the same smell that once signalled "home" and "safety" now signals "trapped" and "stale." The odour has not changed; the brain's interpretation has. The inadequate biological programs identified in Kriger (2026z) — evolutionarily shaped heuristics that misfire in modern environments — provide the mechanistic substrate for this valence reversal. The Reflexive Inference Law (Kriger, 2026aa) explains why the agent typically has no insight into this process: one cannot infer the mechanisms of one's own perceptual system by introspecting on its outputs. The person genuinely *believes* the partner has become disgusting, when in fact their own evaluative system has flipped.

20 Serial Monogamy as Parameter-Renewal Strategy

The analysis of the preceding sections converges on an uncomfortable conclusion: if the cooperative attractor of marriage has a *finite basin lifetime* T^* — a maximum duration beyond which hedonic adaptation, familiarity suppression, and viability contraction make the attractor unsustainable — then what is the "optimal" strategy for an agent who seeks to maximise relationship satisfaction over a lifetime?

In dynamical systems terms, the answer is clear: if one attractor has a finite lifetime, the optimal strategy is to exit it before it collapses and enter a new one. Applied to relationships, this is *serial monogamy*: a sequence of committed partnerships, each of which provides the initial high of novelty and the gradual deepening of attachment, terminated before the decline phase produces sustained unhappiness.

The variable T^* can be estimated from the biochemical evidence. The neurochemical profile of early love (elevated dopamine and cortisol, depressed serotonin) normalises within 12–18 months (Marazziti et al., 2021). Fisher's cross-cultural data on divorce timing shows a peak in divorce rates at approximately 4 years of marriage — consistent with a "pair-bonding window" shaped by the duration of early childhood dependency (Fisher, 2004). These findings suggest that T^* may range from approximately 3 to 7 years for many couples, though this estimate is rough, lacks formal uncertainty bounds, and varies enormously across individuals and cultures. The value of T^* is modifiable through the control variables identified in Table 1, and for some couples may be effectively infinite if renewal strategies are consistently applied.

From the perspective of the Unified Structural Theory, the differentiation principle (Kriger, 2026u) provides the deepest justification for this pattern: serial monogamy restores *differentiation* — the distinctness of the two agents from each other — where habitual cohabitation has eroded it. A new partner is, by definition, maximally differentiated from the self, and therefore maximally stimulating. This is not a moral endorsement of serial monogamy but a structural diagnosis: the pattern emerges as a logical consequence of the system's dynamics.

The practical implication is that couples who wish to *avoid* this outcome must actively work to maintain differentiation within the relationship: separate friendships, individual pursuits, periodic time apart, and deliberate introduction of novelty. These are not luxuries but structural necessities, predicted by the mathematics of the model.

21 Synthesis: The Unified Dynamical Picture

We are now in a position to state the main result of this paper. The preceding sections have each identified a specific mechanism by which romantic partnerships deteriorate. The following theorem unifies them by showing that all ten mechanisms are instances of the same underlying dynamics: the contraction or exit of a joint trajectory from a shared viability set.

Principle 1 (Dyadic Dissolution Principle)**.** *Marriage is modelled as a temporary cooperative attractor of two autonomous agents. On this model, the loss of romantic interest and the eventual dissolution of the partnership can be attributed to one or more of the following structurally classified mechanisms:*

(i) ***Reward-signal adaptation*** *(Section 5): the brain's reward system adapts to constant stimulation, reducing the pleasure derived from the partnership to zero;*

(ii) ***Viability mismatch*** *(Section 4): the partners' individual needs diverge until no joint configuration satisfies both;*

(iii) ***Constraint–autonomy violation*** *(Section 7): one partner's systematic avoidance of shared responsibilities overloads the other;*

(iv) ***Social contagion*** *(Section 8): the normalisation of divorce in one's social network lowers the psychological and social cost of leaving;*

(v) ***Quasi-Westermarck suppression*** *(Section 6): prolonged cohabitation may trigger kinship-like suppression dynamics;*

(vi) ***Valence switching*** *(Section 19): a shift in the internal model of the partner reverses the hedonic evaluation of formerly attractive traits;*

(vii) ***Economic asymmetries*** *(Section 9): the perceived benefit of leaving exceeds the perceived benefit of staying;*

(viii) ***Child-mediated stabilisation erosion*** *(Section 10): as children grow and leave, the barrier that kept the couple together weakens;*

(ix) ***Media-mediated norm distortion*** *(Section 11): exposure to idealised depictions of relationships inflates expectations and contracts the perceived viability set;*

(x) ***Friends–media–contagion positive feedback*** *(Section 11): the three preceding social mechanisms reinforce each other in an escalating loop.*

Logical status. The Dyadic Dissolution Principle is not a theorem in the deductive sense: it does not follow from axioms by a chain of logical steps. Rather, it is an *organising principle* — a claim that the structural-law vocabulary of the Unified Theory provides a parsimonious and internally consistent classification of the known empirical mechanisms of dissolution, and that each mechanism can be *represented* (though not derived *ab initio*) as an instance of a named structural law. The value of this classification lies not in deductive power but in its capacity to reveal structural parallels across mechanisms (Table 2), to identify control variables for intervention (Table 1), and to generate qualitative predictions that are, in principle, empirically testable. What the principle

does not claim is that dissolution is mechanistically determined or that the listed mechanisms exhaust all possible causes — human agency, chance, and unmeasured variables remain irreducible contributors to individual outcomes (Kriger, 2026f).

The extended set of control variables is summarised in Table 1; Figure 5 provides a visual overview of the mapping from dissolution mechanisms to actionable levers.

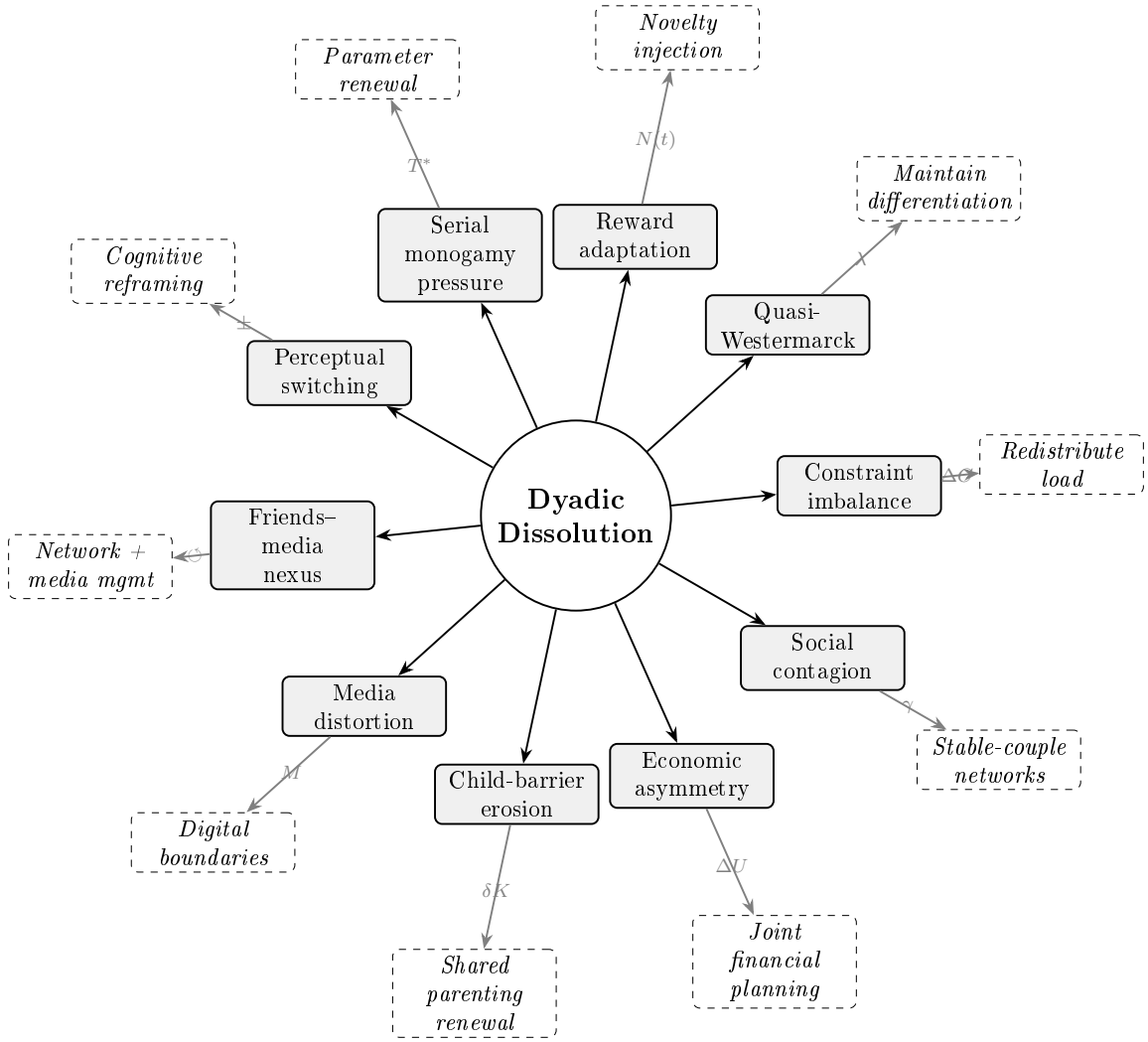

Figure 5: Mapping of the ten dissolution mechanisms (inner ring, solid borders) to actionable control variables (outer ring, dashed borders). Each control lever directly counteracts the structural tendency shown. Arrows from centre to inner ring indicate how background parameter shifts drive dissolution; arrows from inner to outer ring indicate the intervention that modulates each mechanism. Symbols between rings denote the key formal parameter.

Operational interpretation. Each row identifies one "lever" that couples or therapists can manipulate. For example, the first row says: the variable *Novelty* $N(t)$ governs the rate of reward adaptation; the intervention is to introduce new shared experiences, which keeps the reward signal from decaying to zero. The sixth row says: the size of the *viability overlap* $\mu(V_{AB})$ determines whether both partners' needs can be simultaneously met; the intervention is explicit negotiation of shared goals to expand or realign the joint viability set.

The principle of optimal coherence (Kriger, 2026v) constrains intervention: the goal

Table 1: Extended control variables for dyadic persistence. Each row identifies a variable whose manipulation can slow or reverse a specific dissolution mechanism. The "Intervention" column translates the mathematical insight into a concrete action.

Variable	**Mechanism**	**Intervention**
Novelty $N(t)$	Reward adaptation	New shared experiences
Correlation $P(t)$	Quasi-Westermarck suppression	Maintain individuality
Adaptation rate α	Biochemical decay	Stimulus diversity
Exit barrier $E(t)$	Social contagion	Normative commitment
Constraint load ΔC	Constraint avoidance	Redistribute responsibilities
Viability overlap $\mu(V_{AB})$	Viability mismatch	Negotiate shared goals
Economic incentive ΔU	Cost–benefit asymmetry	Joint financial planning
Child anchoring δK	Stabilisation erosion	Shared parenting investment
Media exposure M_{ext}	Norm distortion	Digital boundaries
Network health n_d	Contagion	Cultivate stable-couple networks

is not maximal novelty (which would produce chaos and instability) but the *optimal balance* between differentiation (maintaining individual identity and unpredictability) and integration (deepening shared commitment and mutual understanding) (Kriger, 2026u,v). Too much of either is destabilising; the stable marriage operates in the dynamic equilibrium between them.

22 Cross-Domain Structural Correspondences

One of the most powerful claims of the Unified Structural Theory is that the same abstract structural principles manifest in radically different domains — biology, cognition, and social organisation — because they are properties of *persistence itself*, not of any particular substrate (Kriger, 2026ab,a). Table 2 maps this correspondence for the principles most relevant to dyadic dissolution.

Illustrative cross-domain reading. Consider the row "Viability Mismatch." In biology, when the demands placed on an organism exceed its capacity to cope, the result is disease. In cognition, when the demands on a mental model exceed its representational capacity, the result is disintegration (confusion, breakdown). In a marriage, when the demands of the relationship exceed what the shared viability zone can sustain, the result is interest attrition and eventual dissolution. The same abstract principle — that a system fails when demands exceed its viability set — produces different observable phenomena in different domains, but the underlying dynamics are identical.

Similarly, the "Extractive Oscillator" row captures a pattern in which a subsystem extracts resources from a host in an oscillatory fashion. In biology, this is parasitism (the parasite feeds, the host weakens, the parasite feeds more). In cognition, this is addiction (the substance provides reward, tolerance develops, more substance is needed). In a

Table 2: Cross-domain correspondences for structural principles. Each row shows how a single abstract principle manifests in three different domains, illustrating the substrate-independence of the structural laws.

Principle	**Biological**	**Cognitive**	**Social / Dyadic**
Closure	Homeostasis	Attractors	Shared routines
Boundary	Membrane	Rep. isolation	Couple identity
Resilience	Immune system	Error correction	Crisis recovery
Cycl. Closure	Metabolism	Prediction loop	Reciprocity
Viab. Mismatch	Disease	Disintegration	Interest attrition
Extr. Oscillator	Parasitism	Addiction	Passion–withdrawal
Pre-Int. Rejection	Antigen screening	Belief filter	Partner selection
Distortion	Sensory adaptation	Cognitive bias	Valence switching

romantic dyad, this is the passion–withdrawal cycle: the initial hormonal surge provides intense pleasure, adaptation erodes it, and the agent may either seek escalation (affairs, dramatic gestures) or withdraw (emotional distancing), producing oscillations of intensity and neglect.

The "Boundary" row illustrates another aspect: in biology, the cell membrane separates the cell's interior from the environment; in cognition, representational isolation (Kriger, 2026o) separates one agent's model of the world from another's; in a couple, the shared identity ("we are a unit") creates a social boundary that separates the couple from the outside world. When this boundary weakens — when one partner begins to identify more strongly with friends, family, or online contacts than with the spouse — the dyadic system loses its structural integrity.

These correspondences are proposed as instances of shared structural pattern rather than loose metaphors, though we acknowledge that demonstrating strict mathematical isomorphism (identical governing equations across domains) would require domain-specific derivations beyond the scope of this paper. The claim is grounded in the argument that the structural laws are substrate-independent (Kriger, 2026a), but the correspondences in Table 2 should be understood as *structurally motivated analogies* whose formal status ranges from suggestive ("shared routines" as closure) to well-established ("addiction" as extractive oscillation).

23 Precursors of Dissolution: The Cascade Model and Its Structural Interpretation

The viability framework developed in this paper describes the *structural mechanisms* that drive dissolution. A complementary question is whether there exist observable *precursors* — early warning signals that a specific relationship is approaching the dissolution threshold. This section integrates the extensive empirical literature on divorce prediction with the viability framework, showing that the known precursors can be systematically mapped onto the model's variables.

23.1 Gottman's Cascade Model

The most influential empirical programme on divorce prediction is the 40-year research programme of Gottman and colleagues, which identified a characteristic "cascade" of behavioural precursors that precedes dissolution (Gottman and Levenson, 1992; Gottman, 1994, 1999). The cascade progresses through four stages, known as the "Four Horsemen of the Apocalypse":

Criticism: Attacking the partner's character rather than addressing specific behaviours. Structurally, criticism signals that the agent has begun to perceive the partner as a source of constraint rather than of reward — the beginning of viability-set contraction along the tolerance dimension.

Contempt: Expressions of disgust, mockery, eye-rolling, and moral superiority directed at the partner. Contempt is the single strongest predictor of divorce, with Gottman's data showing 93% prediction accuracy when contempt is chronically present (Gottman, 1994). Within the viability framework, contempt corresponds to a *valence inversion*: the partner's characteristics, previously coded as attractive, are now coded as repulsive — the signal-switching mechanism analysed in the Structural Distortion Principle (Kriger, 2026l). Contempt also functions as low-grade epistemic degradation ("you are fundamentally defective"), eroding the target partner's self-trust.

Defensiveness: Self-protective counter-attack in response to perceived criticism. Defensiveness blocks the repair attempts that could arrest viability-set contraction, creating a positive feedback loop: criticism → defensiveness → escalation → more criticism.

Stonewalling: Emotional withdrawal and disengagement from interaction. Stonewalling is the behavioural signature of a partner whose viability set has contracted to the point where engagement with the relationship produces more pain than disengagement. In the dynamical model, stonewalling corresponds to the agent approaching the boundary of V_{AB}, where continued participation requires more adaptive effort than the agent can sustain.

Gottman's longitudinal data further identified that 96% of conflict conversations could be predicted from their first three minutes (the "harsh startup" phenomenon), and that the ratio of positive to negative interactions during conflict was a powerful discriminator: stable couples maintained approximately a 5:1 ratio, while couples heading for divorce fell below 0.8:1 (Gottman, 1994).

23.2 Additional Empirical Precursors

Beyond the Four Horsemen, the longitudinal literature has identified several additional precursors:

Physiological flooding. During conflict discussions, partners in dissolving marriages show elevated heart rates (exceeding 100 bpm), increased cortisol, and adrenaline secretion (Gottman and Levenson, 1992). This physiological arousal makes productive conflict resolution neurologically impossible, as prefrontal executive function is suppressed by amygdala activation. Within the viability framework, flooding represents a *biological*

constraint on repair: even when both agents intellectually wish to restore V_{AB}, their physiological state prevents the cooperative behaviour required.

Failed repair attempts. Gottman's research demonstrated that the difference between stable and unstable couples is not the *presence* of conflict but the *success rate of repair attempts* — bids for de-escalation, humour, affection, or acknowledgment during or after conflict. In dissolving marriages, repair attempts are either not made or are rejected by the receiving partner. Within the viability framework, failed repair corresponds to the breakdown of the cooperative dynamic that maintains V_{AB}: the agents can no longer jointly navigate toward the viability-set interior.

Negative narrative rewriting. Couples heading for dissolution progressively rewrite the history of their relationship in negative terms: initial meetings are recalled with cynicism rather than fondness, early struggles are framed as warning signs rather than shared achievements, and the partner's character is reinterpreted through a lens of fundamental deficiency (Buehlman et al., 1992). This "negative sentiment override" corresponds, in the viability framework, to a retrospective contraction of the perceived viability set: the agent retroactively concludes that V_{AB} was never large enough to sustain the relationship, even during periods when it demonstrably was.

Parental disagreement about child-rearing. A landmark longitudinal study by Block, Block, and Gjerde found that parental disagreement about child-rearing practices when the child was 3.5 years old significantly predicted divorce 10 years later (Block et al., 1988). Within the viability framework, this reflects constraint–autonomy imbalance (ΔC) manifesting specifically along the parenting dimension — one of the most consequential axes of the viability set.

Erosion of fondness and admiration. Gottman's Oral History Interview found that couples' current characterisation of their shared past predicted dissolution with 81–87% accuracy: couples who spoke of their early relationship with warmth, humour, and positive affect were likely to remain together, while those who expressed disappointment, disillusionment, or negativity about their origins were on the dissolution trajectory (Buehlman et al., 1992). This maps directly to the viability framework's reward-decay mechanism: the progressive devaluation of shared positive memories is a cognitive expression of the neurobiological reward-signal decline.

23.3 Structural Integration: A Two-Factor Model of Dissolution Timing

Gottman and Levenson proposed a two-factor model of dissolution timing that maps elegantly onto the viability framework (Gottman et al., 2002). The first factor — *unregulated volatile affect* (high-amplitude positive and negative emotional oscillation) — predicts *early divorce* (within the first 7 years). Within the viability framework, this corresponds to high-amplitude extractive oscillation (Section 13): couples with large $\mathcal{A}$ (asymmetry index) and low ρ (narcissism-continuum parameter) experience rapid viability-set contraction because the oscillation amplitude exceeds the system's repair capacity.

The second factor — *neutral affective style* (absence of positive affect, emotional disengagement, low-level chronic dissatisfaction) — predicts *late divorce* (after 10–16 years). This corresponds to the slow, cumulative viability-set contraction driven by reward decay (Section 5), familiarity-induced suppression (Section 6), and the gradual erosion of the intersection V_{AB} along multiple dimensions simultaneously. These couples do not experience dramatic conflict; they experience the quiet disappearance of reasons to remain together — what the viability framework formalises as $V_{AB} \to \emptyset$ through monotonic contraction rather than sudden collapse.

23.4 The Precursor Hierarchy as a Diagnostic Tool

The integration of Gottman's empirical precursors with the viability framework yields a structured diagnostic hierarchy for clinicians and researchers:

1. **Reward-signal status:** Is the 5:1 positive-to-negative ratio maintained? If not, reward decay and/or valence inversion are operative.
2. **Horseman presence:** Which of the Four Horsemen are present? Their specific combination indicates which viability-set dimensions are contracting (criticism $\to$ tolerance; contempt $\to$ respect/attraction; defensiveness $\to$ cooperative repair; stonewalling $\to$ engagement capacity).
3. **Repair success rate:** Are repair attempts being made and accepted? Failed repair indicates that the cooperative mechanism maintaining V_{AB} has broken down.
4. **Narrative valence:** Is the shared history recalled positively or negatively? Negative rewriting indicates retrospective viability-set collapse.
5. **Physiological arousal:** Is flooding occurring during conflict? If so, biological constraints on repair are active.
6. **Extractive asymmetry:** Is one partner consistently extracting more validation, control, or emotional labour than they reciprocate? If so, the moderate-asymmetry regime (Section 13) may be operative.
7. **External perturbation load:** Are environmental factors (pornography use, dating-app engagement, AI companion reliance, social network dissolution, pet substitution) contributing to viability-set contraction?

This hierarchy provides a systematic, theory-grounded protocol for assessing where a specific relationship sits on the dissolution trajectory and which intervention (Table 1) is most likely to be effective.

24 The Normative Question: Must Marriages Be Saved, or Is Dissolution the New Equilibrium?

The preceding analysis has been deliberately descriptive: it has identified mechanisms, formalised dynamics, and generated predictions without taking a position on whether the dissolution trends it documents are *problems to be solved* or *adaptations to be accepted*. This section confronts the normative question directly and then projects the structural implications of current trends into the near and medium-term future.

24.1 The Case for Intervention: Marriage as Public Good

A substantial body of evidence supports the view that stable marriages generate positive externalities that extend well beyond the dyad itself. Children raised by continuously married biological parents show significantly better outcomes across virtually every measurable dimension — academic achievement, psychological adjustment, physical health, economic attainment, and subsequent relationship quality — compared to children of divorced parents (Amato, 2001; Emery, 2019; Anderson, 2014). The intergenerational transmission of divorce risk (Wolfinger, 2005) means that each dissolution event propagates instability forward in time. At the population level, declining marriage rates are associated with reduced fertility, weakened social cohesion, increased demand for state welfare services, and the erosion of intergenerational wealth transfer (Cherlin, 2010). From this perspective, marriage is a *public good* whose collapse generates costs borne disproportionately by children and by the economically vulnerable, and intervention is therefore justified on welfarist grounds.

Within the viability framework, the interventionist position corresponds to the claim that the default contraction of V_{AB} is a *design flaw* that can be corrected by deliberate manipulation of control variables: novelty injection to counteract reward decay, differentiation to reduce predictability, constraint redistribution, network cultivation, and — most controversially — the restoration or functional replacement of the religious exit barrier E_{sacred} (Eq. 13).

24.2 The Case for Acceptance: Serial Monogamy as the Natural Human Pattern

The evolutionary analysis of Section 2.3 provides a counterargument. If the human mating system is facultatively monogamous with a characteristic pair-bond duration of 3–7 years (Fisher, 1989; Fisher et al., 2016), then lifelong marriage is not the biological default but a cultural overlay imposed by religious institutions for approximately two millennia. The secularisation analysed in Section 14 is, on this view, not a catastrophe but a *correction*: the removal of an artificial constraint that forced human pair-bonding into an evolutionarily mismatched template. The rising divorce rate is not pathological but *normative* — a return to the serial-monogamy pattern that characterised human mating for most of our evolutionary history.

From this perspective, the costs documented in the interventionist literature — harm to children, economic disruption, psychological distress — are transitional: artefacts of a society designed around the assumption of lifelong marriage that has not yet restructured its institutions (legal, economic, educational, residential) to accommodate the reality of serial partnership. If society were redesigned to support smooth transitions between partnerships — shared parenting norms, portable economic arrangements, residential flexibility, childhood stability mechanisms independent of parental partnership status — the costs of dissolution could be substantially reduced without requiring the maintenance of a biologically mismatched institution.

Within the viability framework, the acceptance position corresponds to the claim that viability-set contraction is not a flaw but a *feature*: the system is designed to dissolve after its reproductive and early-childrearing function is complete, and attempting to extend it beyond its natural duration generates the constraint–autonomy imbalances, stagnation, and quiet desperation that characterise many long-duration marriages that persist only

because the exit barrier is sufficiently high.

24.3 A Structural Synthesis: Neither Salvation Nor Surrender

The viability framework itself is agnostic between these positions, but it does illuminate the structural constraints on each. The interventionist position must confront the fact that every stabilising mechanism it proposes — novelty injection, constraint redistribution, community support — requires *continuous active effort* against the thermodynamic default of contraction. The analogy is precise: maintaining a room above ambient temperature requires continuous energy input (the heater must stay on). There is no equilibrium state in which a marriage maintains itself without ongoing investment. The question is whether the investment is worth the return, and this is an individual calculation that the framework cannot make on behalf of the agents.

The acceptance position must confront the evidence on child welfare: the costs of dissolution fall disproportionately on the most vulnerable participants in the system, who had no say in its formation. A society that accepts serial monogamy as the norm but fails to redesign its institutions to protect children is not progressive; it is negligent. The viability framework's prediction is that acceptance without institutional redesign will produce a generation of children whose own viability-set geometry is distorted by parental instability — perpetuating the intergenerational transmission documented by Wolfinger (2005).

The structural synthesis, then, is neither "all marriages must be saved" nor "dissolution is fine." It is: *the decision to maintain or dissolve a specific partnership should be made with full structural awareness of the mechanisms at work, the costs to all stakeholders, and the availability of genuine alternatives.* The viability framework provides the diagnostic tools for this assessment; it does not prescribe the outcome.

24.4 Projections: The Future of Intimate Partnership

The structural trends analysed in this paper converge on a set of projections for the medium-term future (next 2–5 decades) of intimate partnership in industrialised societies. These are not predictions in the strong sense but *structural extrapolations* — outcomes that follow from the continuation of documented trends, subject to the caveat that cultural, technological, or political disruptions could alter any of them.

1. Declining marriage rates, stable partnership rates. The formal institution of marriage will continue to decline as its religious and legal rationale erodes. However, humans are pair-bonding animals with deep evolutionary roots in dyadic attachment. The structural prediction is that the *form* of partnership will change (shorter average duration, more sequential partnerships, less legal formalisation) while the *need* for partnership remains constant. Cohabitation, "living apart together" arrangements, and other non-marital partnership forms will absorb much of the volume previously channelled through marriage.

2. Bifurcation into committed and transactional partnerships. The population will increasingly stratify into two groups: (i) a minority who invest heavily in long-term partnership maintenance (disproportionately religious, educated, or culturally conservative) and achieve the stable-attractor trajectory, and (ii) a majority who cycle through

serial partnerships of 3–10 years, consistent with the evolutionary default. The viability framework predicts that the first group will have substantially better outcomes on most welfare measures, creating a "marriage premium" that compounds across generations — a structural driver of inequality.

3. Competition from synthetic intimacy. AI companions, high-fidelity virtual reality, and personalised pornographic content will compete increasingly effectively with human partners along specific dimensions of the viability set. The structural prediction is that a growing fraction of the population — particularly those with high baseline loneliness, social anxiety, or insecure attachment — will partially or fully substitute synthetic intimacy for human partnership. This will not eliminate the need for human connection (pets and AI companions leave dimensions of the viability set unsatisfied) but will raise the threshold for entering and maintaining human partnerships, further depressing partnership formation rates.

4. Institutional adaptation. Legal, economic, and social institutions designed for lifelong marriage will progressively adapt to serial partnership: portable pensions, streamlined dissolution processes, shared-parenting defaults, residential arrangements designed for post-separation co-parenting, and childhood-stability mechanisms (consistent schooling, neighbourhood, peer group) that are decoupled from parental partnership status. The pace of this adaptation will vary dramatically across societies, with the gap between institutional design and partnership reality creating friction (and human suffering) during the transition.

5. The question of children. The most consequential unknown is whether societies can develop institutional arrangements that provide children with the stability benefits of continuous parental partnership without requiring the parents themselves to maintain a partnership that has ceased to be viable. The viability framework suggests that this is possible in principle — the child's viability set can be supported by a network of caregivers rather than a single dyad — but the empirical evidence for such arrangements at scale is limited. The structural prediction is that this will be the central policy challenge of the coming decades.

The viability framework does not resolve these questions, but it provides the structural vocabulary for addressing them with precision. The future of intimate partnership will be determined not by moral exhortation or nostalgic longing but by the interaction of evolved biology, cultural institutions, technological disruption, and deliberate policy design. Understanding the dynamical structure of the system is a precondition for designing it well.

25 Discussion

25.1 Summary of Contributions

This paper has accomplished three things. First, it has translated the popular-science analysis of romantic dissolution presented in Kriger (2024a) into a rigorous mathematical framework grounded in the Unified Structural Theory of Complex Systems (Kriger, 2026a). Second, it has demonstrated that ten empirically documented mechanisms of

relationship deterioration — spanning neurobiology, evolutionary psychology, economics, sociology, and media studies — can be represented as special cases of a small number of structural laws. Third, it has identified a set of ten control variables (Table 1) whose manipulation can, in principle, slow or reverse the dissolution process.

25.2 Theoretical Implications

The theory is *substrate-independent* (Kriger, 2026p): it applies to any two-agent cooperative system, not only to human romantic partnerships. Business partnerships, political alliances, and collaborative research teams are all two-agent systems subject to viability mismatch, reward adaptation, constraint–autonomy imbalance, and social contagion. The formal framework developed here is therefore more general than the domain of application explored in this paper.

The theory is also *self-consistent*: the formalization laws (Kriger, 2026d) apply to its own scope, meaning the theory acknowledges that its own formalisms are subject to the epistemic constraints (incompleteness, definition-dependence, uncertainty) that it identifies as universal properties of complex systems (Kriger, 2026f,e). This recursive self-applicability is a feature of the Unified Structural Theory that distinguishes it from frameworks that claim external validity without acknowledging their own limitations.

25.3 Practical Implications

For clinicians and therapists, the framework provides a structured diagnostic toolkit: given a couple in distress, one can ask which of the ten mechanisms is operative and target the corresponding control variable. For example, if the primary mechanism is reward adaptation (the couple is bored), the intervention is novelty injection; if it is constraint–autonomy imbalance (one partner feels overburdened), the intervention is redistribution of responsibilities; if it is social contagion (the couple's social network is dissolving around them), the intervention is to cultivate relationships with stable couples who model healthy partnership.

For policymakers, the model highlights that divorce is not merely a private matter but a *collective phenomenon* embedded in social networks and media ecosystems. Interventions that target the network level — community support for marriages, regulation of social media's role in relationship disruption, economic policies that reduce the gendered costs of dissolution — may be more effective than interventions aimed at individual couples in isolation.

25.4 On Determinism, Agency, and Stochasticity

The language of dynamical systems — "trajectories," "attractors," "deterministic consequences" — may suggest that the framework denies human agency. This is not the intended reading. The model describes *structural tendencies*: under given parameter values, the system tends toward certain outcomes. But the parameters themselves are partly under agentive control (Table 1), and the outcomes are subject to stochastic perturbation. The framework is best understood as describing a *landscape of propensities* rather than a deterministic machine. The Law of Imperative Uncertainty (Kriger, 2026f) guarantees that irreducible uncertainty is inherent in any system of autonomous agents: two couples

with identical parameter profiles may have different outcomes due to chance events, personality differences, or external shocks. Accordingly, the deterministic language used in earlier sections should be read as describing average tendencies, not individual destinies.

25.5 Falsifiability and Empirical Testability

A framework that can accommodate any observed outcome is not a scientific theory. We therefore identify specific predictions that, if falsified, would require revision of the model:

(a) **Viability contraction (Eq. 2):** If longitudinal studies demonstrated that randomly selected couples who make no deliberate maintenance effort nonetheless show increasing marital satisfaction on average, the default-contraction assumption would be refuted.

(b) **Reward adaptation (Eqs. 3–4):** If neuroimaging revealed that dopaminergic reward responses to a long-term partner's stimuli do *not* decline under conditions of low novelty, the adaptive-threshold model would require revision.

(c) **Quasi-Westermarck hypothesis (Eq. 5):** If cohabitation duration showed no correlation with reduced sexual desire after controlling for age, health, and relationship quality, the familiarity-suppression hypothesis would be falsified.

(d) **Social contagion (Eq. 6):** If divorce rates in social networks showed no clustering beyond what is expected from shared socioeconomic confounds (homophily), the contagion coefficient γ would be zero, eliminating this mechanism.

(e) **Economic threshold (Eq. 7):** If women's increasing economic independence showed no association with divorce initiation rates across countries and time periods, the economic-barrier model would be contradicted.

The model's current limitation is that it generates *qualitative* predictions (directions of effects) rather than *quantitative* ones (precise magnitudes). This is because the key parameters (α, γ, δ, P_{kin}) have not been empirically calibrated. Future work should pursue operationalisation of these parameters using existing longitudinal datasets (Gottman, 1994; Acevedo et al., 2012). Table 3 extends the five predictions above into a broader set of ten falsifiable hypotheses, each linked to a specific equation and proposed test design.

25.6 Operationalisation of the Viability Set

The viability set V_{AB} is the central construct of the framework, yet its empirical operationalisation remains underdeveloped. How many dimensions does $\mathcal{X}_A$ have? How would one measure whether a couple is inside or outside V_{AB}? We suggest that V_{AB} can be approximately operationalised through validated multi-dimensional instruments such as Gottman's Specific Affect Coding System (Gottman et al., 2002), the Dyadic Adjustment Scale (Spanier, 1976), and composite indices of marital quality that capture the relevant dimensions (satisfaction, communication, conflict, intimacy, shared goals). Each dimension of such an instrument corresponds to one axis of $\mathcal{X}_A$; the viability boundary is the hypersurface below which the agent reports the relationship as unsustainable. This operationalisation is approximate and subject to measurement error, but it provides a concrete empirical anchor for the otherwise abstract construct.

25.7 Further Limitations

Beyond the issues discussed above, several additional limitations must be acknowledged. The model treats each partner as a single agent with a single viability set, whereas real individuals are internally complex systems with conflicting needs, changing preferences, and unconscious motivations. A richer model would incorporate the internal structure of each agent, at the cost of considerably greater complexity.

The model does not account for cultural variation in marriage norms, the role of extended family networks (which are central in many non-Western societies), or the effects of trauma, mental illness, and substance abuse on relationship dynamics. The cross-domain correspondences in Table 2, while suggestive, are structural analogies rather than demonstrated formal isomorphisms; establishing the latter would require showing that the governing equations in each domain share identical mathematical form, a project beyond the scope of this paper.

Finally, the claim that women initiate approximately 70% of divorces (Brinig and Allen, 2000) should be interpreted with caution: the measurement of "initiation" is methodologically contested, and the figure varies substantially across jurisdictions, definitions (legal filing vs. first expression of desire to separate), and time periods. These extensions and refinements remain directions for future work.

25.8 Conclusion

We have shown that the major empirical drivers of romantic dissolution — biochemical adaptation, evolutionary familiarity suppression, economic asymmetries, constraint imbalance, social contagion, child effects, and media-mediated norm distortion — can be classified as special cases of structural laws governing the persistence of complex systems. The resulting framework reinterprets "falling out of love" not as a failure of will, character, or compatibility, but as a structurally constrained trajectory in the parameter space of a two-agent cooperative system — one shaped by identifiable tendencies but never fully determined by them. By identifying the control variables that govern this trajectory, the framework opens the door to evidence-based interventions that address the structural conditions of dissolution rather than merely treating its symptoms. Whether the framework ultimately proves to be a useful scientific tool or merely a suggestive vocabulary will depend on the success of future efforts to operationalise its constructs and calibrate its parameters against empirical data.

26 The Present Paper within a Broader Research Programme

The Unified Structural Theory of Complex Systems, on which this paper draws, did not originate as a top-down axiomatic project. Rather, it emerged *inductively*: a series of domain-specific investigations — into persistence and transformational dynamics (Kriger, 2026b), self-sufficient systems (Kriger, 2026h), structural resilience (Kriger, 2026g), cyclical closure (Kriger, 2026i), and the formalization of scientific frameworks themselves (Kriger, 2026d,e) — revealed recurring structural patterns that were too consistent to be coincidental. The recognition that these patterns could be unified under a small set of substrate-independent laws (Kriger, 2026c,a) came *after* the individual investigations, not before them.

This developmental history is important for understanding the epistemic status of the present paper. The structural laws cited throughout — Viability Mismatch (Kriger, 2026j), Constraint–Autonomy Compatibility (Kriger, 2026k), Structural Distortion (Kriger, 2026l), Non-Neutrality (Kriger, 2026m), and others — were first identified in their respective domains (biological, cognitive, social) and only subsequently recognised as instances of a common formal architecture. The current paper on dyadic dissolution is therefore not an *application* of a pre-existing theory to a new domain; it is a *further articulation* of the theory itself — a test of whether the structural-law vocabulary can coherently organise yet another class of empirical phenomena.

Each paper in the programme addresses a specific structural principle: the epistemic constraints on formalisation (Kriger, 2026ab), the role of metaphor and narrative in system maintenance (Kriger, 2026x), the diagnostic criteria for viability failure (Kriger, 2026y), the dynamics of extractive subsystems (Kriger, 2026p), the informational preconditions of meaning (Kriger, 2026w), and the predictive processing architecture (Kriger, 2026n), among others. The present paper fills a specific gap in this programme: it applies the structural-law framework to the *two-agent cooperative case* — arguably the simplest non-trivial multi-agent system — and shows that the mechanisms of romantic dissolution can be systematically classified using the same vocabulary. The success or failure of this application provides evidence for or against the universality claim of the broader theory.

The frequency of self-citation in this paper reflects this programme structure: each cited work contributes a named structural law or principle that is deployed here, not as an appeal to authority but as a cross-reference within a developing formal system. Readers are encouraged to evaluate each cited principle on its own merits, as presented in the referenced work, rather than treating the citation network as self-reinforcing.

27 Implications for Dyadic Persistence Interventions

The ten control variables identified in Table 1 suggest a structured approach to relationship maintenance. We emphasise that these are *structural hypotheses* derived from the model, not proven therapies; each would require validation through randomised controlled trials or longitudinal designs. Nevertheless, the framework provides a principled basis for intervention design.

Counteracting reward-signal decay (variable: $N(t)$, α). The adaptive threshold $\tau(t)$ rises toward the stimulus level S at rate α. Intervention: periodic introduction of shared novel experiences that increase the *variance* of S, preventing τ from equilibrating. This is consistent with Aron et al.'s experimental finding that couples who engage in novel, exciting activities together report higher relationship satisfaction than those who engage in merely pleasant activities (Aron et al., 2005). Concretely: travel to unfamiliar places, learning new skills together, or breaking established routines.

Reducing predictability saturation (variable: $P(t)$). The Quasi-Westermarck predictability index $P(t) = 1 - e^{-\lambda T}$ rises with cohabitation duration. Intervention: maintain zones of individual autonomy — separate friendships, independent hobbies, periodic time apart — that preserve each partner's capacity to surprise the other. The goal is not distance but *differentiation*: ensuring that neither partner becomes fully predictable.

Rebalancing constraint loads (variable: ΔC). When the asymmetry index $\Delta C = |C_A - C_B|$ grows, the overburdened partner's viability is compromised. Intervention: explicit negotiation and periodic audit of responsibility distribution. Gottman's research identifies the refusal to share influence as a key predictor of divorce (Gottman, 1999); the constraint-load framework gives this finding a precise structural interpretation.

Managing exit-barrier dynamics (variables: $E(t)$, n_d, M_{ext}). The exit barrier $E(t) = E_0 - \gamma n_d(t)$ is lowered by peer divorce and media-mediated norm distortion. Interventions: (i) cultivate friendships with couples in stable, healthy relationships (increasing exposure to persistence models rather than dissolution models); (ii) establish deliberate boundaries on social media consumption, particularly content that promotes social comparison or idealised relationship portrayals; (iii) joint financial planning that increases the perceived cost of dissolution (economic barrier) while simultaneously improving the quality of the shared life.

Leveraging child-mediated stabilisation (variable: δK). Children raise the exit barrier, but do not address the underlying viability contraction. Intervention: use the shared parenting project as a *renewal mechanism* (expanding V_{AB}) rather than merely a barrier to exit. Joint parenting decisions, collaborative problem-solving around children's needs, and shared celebration of developmental milestones can serve as sources of novelty and cooperative engagement.

A note on structural ethics. The framework is deliberately non-moralising: it does not claim that dissolution is always bad or that persistence is always good. Some marriages are in regions of state space where $V_{AB} = \emptyset$ and no intervention can restore viability. In such cases, dissolution is the structurally appropriate outcome. The interventions above are relevant only when V_{AB} is non-empty but contracting — when there is something to save.

28 Comparison with Existing Formal Models

To clarify the marginal contribution of the present framework, Table 4 contrasts it with the two most prominent existing formal approaches to relationship dynamics.

The three approaches are complementary rather than competing. The Gottman–Murray model (Gottman et al., 2002) describes the proximate dynamics of marital interaction; the Becker model (Becker, 1981) captures the economic decision calculus; the present framework identifies the structural forces that cause the background parameters of both to shift over the lifespan of a relationship. A complete theory of romantic dissolution would integrate all three levels.

A Illustrative Dyadic Trajectories

The following three vignettes are composite cases drawn from published longitudinal studies (Gottman, 1994; Amato, 2001; McDermott et al., 2013; Acevedo et al., 2012) and anonymised clinical reports. They are not empirical data but serve to illustrate how the structural parameters of the dyadic viability model map onto concrete relational

trajectories. In each case we identify the dominant mechanisms, the evolution of key variables, and the point at which the joint trajectory exits the viability set V_{AB}.

Vignette 1: Reward-signal decay and Quasi-Westermarck suppression

Alex (34) and Jordan (36) married after a passionate two-year courtship. For the first three years the relationship was characterised by high novelty (frequent travel, new shared hobbies) and low predictability. By year 7, daily life had settled into stable routines: same evening meals, same weekend activities, same conversational patterns. Sexual frequency had declined from 4–5 times per week to once every 10–14 days. Both partners reported "We still love each other, but the spark is gone" and described feeling more like "roommates who get along well."

Model mapping. Novelty $N(t) \to 0$ implies adaptation rate α drives threshold $\tau(t)$ toward stimulus S (Figure 2). Simultaneously, cohabitation duration $T = 7$ years pushes predictability index $P(t) = 1 - e^{-\lambda T}$ ($\lambda \approx 0.25$) above the critical threshold $P_{\text{kin}} \approx 0.85$ (Figure 3). The joint viability set V_{AB} contracts along the intimacy and sexual-satisfaction dimensions. The trajectory drifts out of the invariant intersection at $t \approx 6.8$ years.

Outcome. Dissolution initiated by mutual agreement. A hypothetical intervention restoring $N(t)$ (e.g., quarterly "novelty weekends") and deliberately increasing differentiation (separate hobbies, occasional travel apart) could have kept both reward signal and predictability below critical levels.

Vignette 2: Constraint–autonomy imbalance and economic asymmetry

Sam (29) and Taylor (31) had a relatively equitable division of labour during the first four years of marriage. After the birth of their second child, Taylor's career accelerated (promotion, frequent travel, higher income) while Sam assumed the majority of childcare, housework, and emotional labour. By year 6, Sam's autonomy had been compressed to near zero; Taylor reported "I feel like I'm carrying everything financially and professionally." Sam began to experience chronic resentment and symptoms of burnout.

Model mapping. Constraint load asymmetry $\Delta C(t)$ rose from 0.1 to 0.75. The compensating partner (Sam) was pushed toward the boundary of their individual viability set V_{Sam} along the autonomy and well-being axes. The joint set V_{AB} contracted sharply. Economic incentive $\Delta U(t)$ for Taylor simultaneously increased as independent income rose, lowering the exit barrier $E(t)$.

Outcome. Sam initiated separation. Redistribution of responsibilities (formal 50/50 schedule plus external childcare) could have restored $\Delta C(t) < 0.3$ and preserved viability overlap.

Vignette 3: Social contagion amplified by media distortion

Mia (38) and Chris (40) were embedded in a tight-knit professional friend group. Between years 5 and 7 of their marriage, four of the eight couples in their primary social circle divorced. Each divorce was accompanied by polished social-media narratives of "conscious uncoupling," new partners, and "finally living my truth." Mia began comparing her

own relationship unfavourably, scrolling through curated highlight reels late at night. Chris's perceived exit utility $U_{\text{exit}}(t)$ rose dramatically as alternative partners became algorithmically salient.

Model mapping. Fraction of divorced peers $n_d(t)$ crossed the critical threshold $n_d^* \approx 0.5$, driving exit barrier $E(t) = E_0 - \gamma n_d(t)$ below internal tension (Figure 4). Media exposure simultaneously inflated perceived $U_{\text{exit}}(t)$ and contracted the perceived viability set via comparison distortion. The positive feedback loop (friends–media–contagion nexus, Eqs. 10–12) accelerated the drift of the joint trajectory out of V_{AB}.

Outcome. Divorce finalised 14 months after the first friend's separation. Cultivating a secondary network of stable couples and implementing strict digital boundaries on comparison content could have kept $n_d(t)$ and media distortion below critical levels.

These vignettes demonstrate that the ten mechanisms rarely operate in isolation; most dissolutions involve 2–4 interacting parameters. They also illustrate that the model's control variables (Table 1) correspond directly to observable intervention points. Future empirical work could test these mappings quantitatively by tracking the relevant parameters in longitudinal dyadic datasets.

B Numerical Illustration: Parameter Sweeps

To illustrate the quantitative behaviour of the model's core equations, we present parameter sweeps for the two most analytically tractable subsystems: reward-signal adaptation and exit-barrier dynamics. These are not simulations of real couples but demonstrations of how the model's qualitative predictions depend on parameter values.

B.1 Reward-signal decay under varying adaptation rates

Figure 6 shows the reward signal $R(t) = g(S - \tau(t))$ for three values of the adaptation rate α (with $g(x) = \max(x, 0)$, $S = 4$, $\tau_0 = 0.3$, $\beta = 0.3$). Faster adaptation (larger α) produces a steeper decline in subjective reward, consistent with the prediction that highly routinised couples lose the "spark" more quickly.

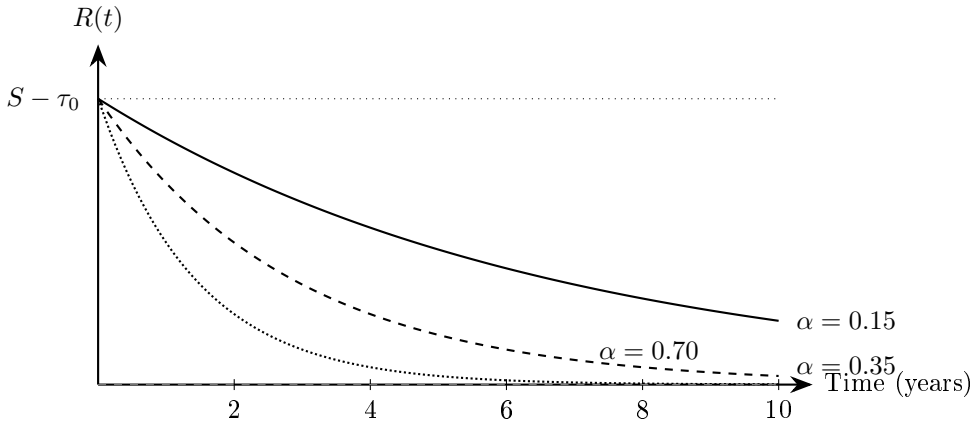

Figure 6: Reward-signal decay $R(t) \approx (S - \tau_0)\, e^{-\alpha t}$ for three adaptation rates. Slow adaptation ($\alpha = 0.15$, solid) preserves reward for several years; fast adaptation ($\alpha = 0.70$, dotted) eliminates it within 2–3 years. The parameter α is modifiable through novelty variance (Table 1).

B.2 Exit-barrier collapse under varying contagion coefficients

Figure 7 shows the exit barrier $E(n_d) = E_0/(1 + e^{\gamma(n_d - n_d^*)})$ (a sigmoidal approximation) for three values of the contagion coefficient γ. Higher γ produces a sharper "tipping point" — a more sudden transition from stable marriage to dissolution-favoured regime.

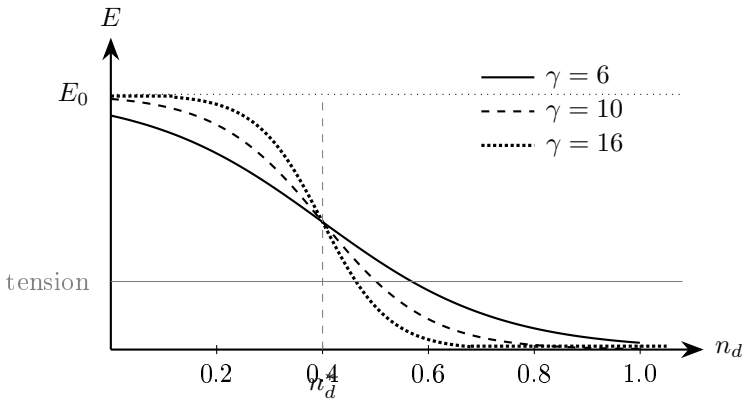

Figure 7: Exit-barrier collapse for three contagion coefficients. Weak contagion ($\gamma = 6$, solid) produces a gradual decline; moderate contagion ($\gamma = 10$, dashed) produces a steeper drop; strong contagion ($\gamma = 16$, dotted) produces a near-discontinuous phase transition at n_d^*. When the barrier drops below the internal tension level (gray line), dissolution becomes the locally favoured outcome.

Table 3: Extended testable predictions derived from the structural viability framework. Each row identifies a falsifiable hypothesis, its formal source, and a proposed empirical design.

#	**Prediction**	**Source**	**Test design**
1	Couples with higher novelty variance report slower satisfaction decline	Eqs. 3–4, $N(t)$	Longitudinal diary study
2	Cohabitation duration predicts sexual desire decline after controlling for age and health	Eq. 5, λ	Cross-sectional survey with cohabitation-duration strata
3	Couples who maintain separate hobbies report higher sexual satisfaction	Eq. 5, $P(t)$	Longitudinal with activity logs
4	Divorce rate increases with proportion of divorced peers, controlling for homophily	Eq. 6, γ	Network analysis (Framingham-type)
5	Each additional child reduces susceptibility to peer divorce contagion	Eq. 8, δ	Network analysis with child-count interaction
6	Heavy social media users report lower marital satisfaction, controlling for baseline	§11	RCT with social media reduction
7	Couples with balanced constraint loads report higher satisfaction than asymmetric couples	Eq. 9, ΔC	Time-use survey + satisfaction measures
8	Women's economic independence predicts divorce filing rates across countries	Eq. 7, ΔU	Cross-national panel data
9	Couples who transition from passion to "deep friendship" report stable long-term satisfaction	§18	Longitudinal with relationship-type classification
10	Post-divorce satisfaction is systematically overestimated relative to pre-divorce expectations	Eq. 7, distortion	Pre/post divorce satisfaction tracking

Table 4: Comparison of formal modelling approaches to relationship dynamics.

Feature	**Gottman–Murray (2002)**	**Becker (1981)**	**Present framework**
Level of analysis	Behavioural interaction (turn-by-turn)	Economic decision (utility maximisation)	Structural parameters (viability sets)
Core question	How do couples fight?	When does leaving beat staying?	Why do background conditions shift toward dissolution?
Mathematical tools	Coupled difference equations	Utility functions, equilibrium analysis	Dynamical systems, set-valued analysis
Time scale	Minutes (conversation)	Decision point (static)	Years (lifespan of relationship)
Empirical anchor	Observed affect coding	Income, labour data	Longitudinal satisfaction, neuroimaging, network data
Strengths	High predictive accuracy for individual couples	Parsimonious, testable economic predictions	Unifies biological, psychological, social, and economic mechanisms
Limitations	Does not explain *why* parameters shift over time	Ignores non-economic dimensions	Parameters not yet empirically calibrated

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Appendix C: Location within the Unified Structural Theory

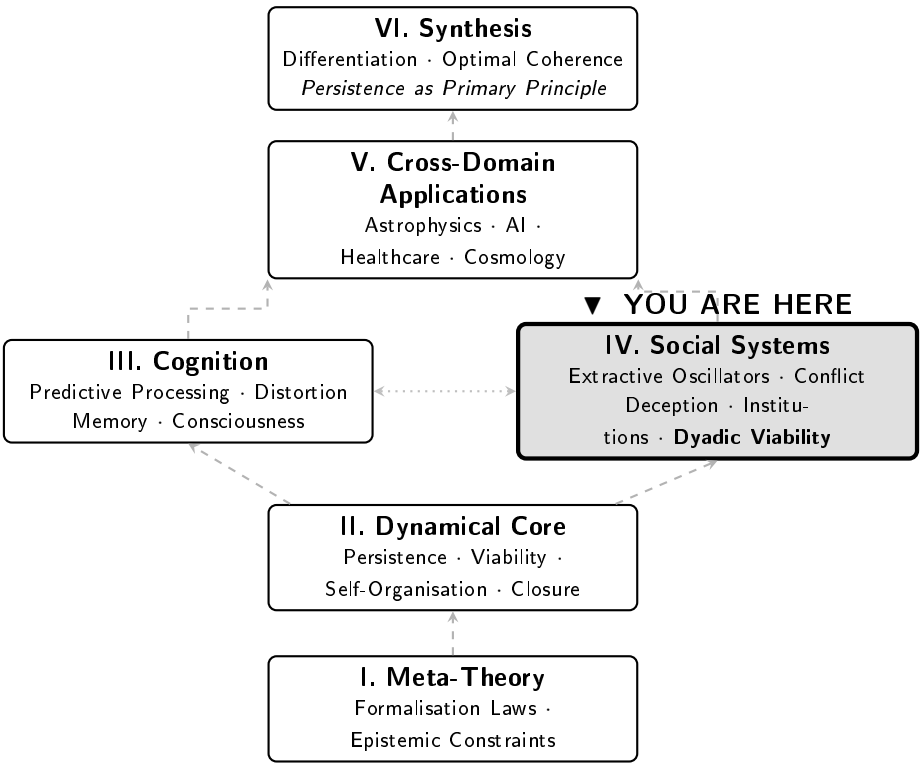

Figure 8: Location of the present paper within the Unified Structural Theory of Complex Systems (Kriger, 1999–2026). The theory comprises six layers: foundational meta-theory (I), the dynamical core of structural laws (II), cognitive architecture (III), social systems (IV), cross-domain applications (V), and the overarching synthesis (VI). This paper develops the *Dyadic Viability* model within Part IV, drawing on the viability, cooperation, and interference laws from Part II, the structural distortion and extractive oscillator frameworks from Parts III–IV, and connecting to applications in healthcare, AI, and civilisational analysis in Part V.

Appendix D: The Publication Edifice

All 76 publications (Kriger, 1999–2026) organised bottom-to-top. The present paper is marked ▼.

UNIFIED STRUCTURAL THEORY OF COMPLEX SYSTEMS

VI SYNTHESIS

Differentiation as Ontol. Cond. (2026)	Coherent Syst. via Diff. (2026)	Optimal Coherence (2026)	Inform. Preconditions of Meaning (2026)

V APPLICATIONS

Astrophysics

Binary-First Star Form. (2025)	Why Binary Optimal (2026)	Swept-Volume Geometry (2026)	Persist.-Driven Domin. (2026)
Protostellar Core Paradox (2026)	Observ. Tests VLA/L1551 (2026)	Can a Star Be Single? (2026)	Dormant Neutron Stars (2025)
Timescape Cosmology (2025)	Holographic Universe (2025)	Bayesian Model Comp. (2026)	Struct.-Bayesian Framew. (2026)
Ledger Time Model (2025)	Viral Dynamics Framew. (2022)	Quant. Clinical Framew. (2000)	Clinical Discont. & AI (2024)
Biospheric Complexity (2026)	Cognitive Syst. Compl. (2026)	Local Entropy Inv. AI (2026)	Time Density Dynamics (2026)
Inward Turn: Fermi (2026)			

Astrophysics, Methodology & Methodology

Information, AI, Healthcare

IV SOCIAL SYSTEMS

Extractive Oscillators (2017)	Conflict as Phase Trans. (2005)	Deception & Perc. Reality (2025)	Autonomy Suppression (2020)
Conceptual Responsibility (2014)	Asymm. Totalizing Ideals (2026)	Pre-Integrative Rejection (2026)	Comparative Asymmetry (2026)
Non-Participation Excl. (2026)	Pascal's Wager Dual-Syst. (2026)	Addiction as Extr. Osc. (2026)	**Structural Viability of Dyadic Systems (2026)**
AI-Extended Communic. (2026)	Stimulus Probl.: Post-Sc. (2026)	Inevit. Unified Civilis. (2026)	

III COGNITION

Structural Distortion Pr. (2026)	Predictive Processing (2026)	Representational Isolation (2026)	Epistemic Constraint Th. (2021)
Atemporal Memory (2025)	Evol. Sel. Atemp. Mem. (2019)	Chronoperception Accel. (1999)	Consciousness: Contrad. (2021)
Functional Sufficiency (2024)	Operational Term. IIT (2024)	Evol. Theory of Credence (2022)	Reflexive Inference Law (2026)
Mental Disintegration (2026)	Eruptive Manifestation (2026)	Elim. Distortion: Biol. Pr. (2026)	Predict. Mind: Myth & Rit. (2026)

II DYNAMICAL CORE

Four Laws of Self-Org. (2017)	Transformational Persis-tence (2024)	Structural Resilience (2019)	Constraint–Autonomy Law (2026)
Viability Mismatch Law (2026)	Newtonian Dynamics Struct. (2018)	Structural Diagnostic Pr. (2018)	Cyclical Hierarchical Syst. (2024)
Self-Sufficient Systems (2024)	Assert.–Dismantling Cycles (2015)	Chaos Is Relative (2026)	Structural Non-Neutrality (2026)

I META-THEORY

Formalisation Laws (2025)	Imperative Uncertainty (2025)	Limit to Negation (2025)	Absurdity as Mercy (2025)
Undecidability as Signal (2023)	No Final Theory: Scale Laws (2024)	Choice of Formal Realities (2026)	Def.-Dependent Provability (2026)