Research Article

Trauma as a Dimensional Collapse of Response Space: A Quantum-Like Framework with Testable Predictions

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This paper proposes that persistent maladaptive fixation is characterised not by the presence of a pathological content but by a reduction in the dimensionality of an individual's response space within a specific content domain. Under overwhelming demand, a state capable of supporting multiple context-dependent responses is projected onto a single response and loses its sensitivity to context. What distinguishes fixation from an ordinary strong reaction is that this projection persists after the demand ends: the state does not re-open. Fixated material is therefore not an unresolved state awaiting collapse but an already-collapsed one, and therapeutic action is reframed as the restoration of degrees of freedom rather than the removal of a stored entity.

This proposal responds to a gap. Attention-guided and somatically oriented interventions for persistent stress-related patterns are widely practiced and frequently report effects, yet the field lacks a unifying theoretical account of what such interventions would be changing. We offer one and specify how it could be shown to be wrong.

The account is developed in the quantum-like formalism established in quantum cognition — Hilbert-space state representation, non-commuting observables, and contextual measurement — used as a modelling language for psychological state dynamics. No physical quantum process in neural tissue is claimed or required, and entanglement-based accounts of interpersonal therapeutic action are excluded on principled grounds.

Reduced contextual sensitivity is already predicted by the existing compatibility account for extensively rehearsed material. The framework's distinctive claim is therefore not about contextual sensitivity alone but about its joint pattern with autonomic complexity: fixated and merely familiar domains, indistinguishable by order effects, are predicted to be separable by state-dependent heart rate variability complexity. Falsification conditions are stated, and the decisive test targets this claim.

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1. Introduction

A large and heterogeneous class of interventions addresses persistent, situation-bound maladaptive response patterns through guided attention to bodily and affective experience. These approaches are widely practiced. They report effects. They share, in broad terms, a working assumption: that something which has become fixed can be made mobile again.

What they do not share is an account of what that "something" is.

The field's explanatory vocabulary is a patchwork. Some accounts posit stored energetic quantities to be released. Others invoke quantum-physical processes in ways that do not survive contact with physics. Others avoid theory altogether and rest on clinical observation. The consequence is that a class of interventions with plausible effects has remained isolated from theoretical scrutiny — not because the effects are implausible, but because the explanations offered are.

This paper attempts a different move. Its proposal is that what has become fixed is not a content but a dimensionality. Persistent maladaptive fixation, on this account, consists in a reduction of the number of responses an individual's state can support within a specific content domain, together with the loss of that state's sensitivity to context. Under overwhelming demand, a state that could support several context-dependent responses is projected onto the one that is survival-relevant in that moment. What makes this fixation rather than an ordinary strong reaction is that the projection persists once the demand has passed.

This inverts a familiar description. Fixated material is often characterised as unstable, unresolved, still open, and therapeutic work as bringing it to resolution. On the present account it is the reverse: fixation is not an un-collapsed state awaiting resolution but an already-collapsed state that has lost the capacity to re-open. Collapse is not the therapeutic goal; collapse is the pathology.

The characterisation is stated in a formalism with an established record in psychology and is accompanied by predictions that could show it to be wrong. Its distinctive empirical commitment is that fixated and merely familiar domains — which existing theory predicts to be indistinguishable by question-order effects — are separable by state-dependent autonomic complexity. If they are not, the framework adds nothing to what is already available and should be abandoned.

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Section 2 introduces the quantum-like formalism and states carefully why it is adopted, and what that adoption does not commit us to. Section 3 presents the core proposal. Section 4 shows its convergence with three independently developed frameworks. Section 5 addresses measurement. Section 6 states predictions and falsification conditions. Section 7 specifies minimum requirements for a test. Section 8 notes the broader theoretical context. Section 9 states limitations.

This is a contribution to theoretical psychology. No data are reported.

2. Quantum-Like Modelling in Psychology

2.1. An established programme

Over the past two decades a research programme has developed that applies the mathematical structure of quantum probability — not quantum physics — to human judgement and decision-making[1][2][3]. It is motivated by a recurrent finding: human judgements systematically violate the axioms of classical probability in ways that are lawful rather than merely noisy.

Question-order effects are the clearest case. Asking *A* before *B* yields different marginal response distributions than asking *B* before *A*. Survey methodology has long documented this and treated it as a nuisance to be controlled. The quantum-like approach treats it as structure: questions correspond to projection operators, and the operators for two questions need not commute. When they do not, order matters — not as a defect of the respondent but as a formal consequence of how a state is updated by the act of answering.

2.2. Why this formalism rather than another

It is important to be clear about what does and does not follow from the existence of order effects.

Order effects alone do not favour a quantum-like account. Several classical frameworks accommodate them. Attractor dynamics can represent persistent response patterns as basins in a state space, following the tradition established by Hopfield[4] and developed for cognitive and neural modelling since (e.g. [5]). Markov models with order-dependent transition matrices generate sequence effects directly. Bayesian updating with context-sensitive likelihoods produces asymmetries between orders. Reinforcement-learning accounts with entrenched policies reproduce response persistence. Each is a serious framework and each can be fitted to order-effect data.

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The reason to prefer the quantum-like formalism is not descriptive elegance. It is that the formalism commits itself to a quantitative constraint that it could fail.

Wang and Busemeyer[6] derive, from the law of reciprocity within quantum probability theory, a symmetry condition on order effects that involves no free parameters. The prediction is not that order effects will occur, nor that they will be large, but that the pattern of differences across orders will satisfy a specific equality. They supported this across six studies, and subsequently across a large collection of national survey datasets[7].

This is a different epistemic situation from the classical alternatives. Attractor and Markov models can be fitted to order effects; they do not predict in advance what value the effect must take. A parameter-free equality that survives testing across many independent datasets is the kind of constraint that makes a formalism worth adopting — and would have made it worth abandoning had it failed.

We adopt the formalism on this basis, and on no other.

A second question must be separated from the first, since answering one does not answer the other. That the formalism has earned adoption does not establish that the present proposal requires it, and it would be misleading to imply otherwise. The predictions developed in Section 6 concern a reduction in effective dimensionality together with a reduction in contextual sensitivity, and each could be expressed in an attractor or precision-weighting vocabulary. What the quantum-like formalism supplies is that these are not two assumptions but one: the effective dimensionality of a state and the presence of order effects are properties of the same object, so a state that has lost dimensionality has thereby lost contextual sensitivity. Classical accounts can accommodate the joint pattern, but they must stipulate it rather than derive it. This is a parsimony argument and it is not decisive; we state it as such, and add below a prediction on which the formalism can fail on its own terms.

2.3. The formal apparatus

States and the Born rule. An individual's state with respect to a content domain is a density operator ρ on a Hilbert space $\mathscr{H}$. A question is a set of projectors Π_i summing to the identity, $\Sigma_i \Pi_i = I$. The probability of response *i* is

$$p(i) = \mathrm{Tr}(\rho \Pi_i) \tag{1}$$

State update (Lüders' rule). Following a response i,

$$\rho \mapsto \rho'_i = \frac{\Pi_i \rho \Pi_i}{\mathrm{Tr}(\rho \Pi_i)} \tag{2}$$

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Answering is not a passive readout. It changes the state that any subsequent question interrogates. This is the formal source of order effects.

Compatibility. Two questions are *compatible* if their projectors are defined with respect to a common basis, *incompatible* otherwise. Order effects arise only for incompatible questions: if $[\Pi_A, \Pi_B] = 0$, order is irrelevant.

2.4. When compatibility arises: a critical distinction

Wang and Busemeyer[6] address directly when questions become compatible, and their answer is consequential.

They propose that incompatibility is expected when questions are new or unusual, such that a response must be constructed at the moment of asking. Where a respondent has extensive experience with a particular combination, they may have developed a representation permitting both to be answered from a common basis — and order effects then disappear.

This carries an implication that must be confronted rather than sidestepped. **Reduced order effects are already predicted by the existing literature for material that has been extensively rehearsed.** Any account proposing reduced order effects for a different reason must be able to distinguish itself from this one. Section 6 specifies how.

We also note the constructionist stance underlying this account: attitudes and beliefs are not stored in memory as fixed properties but constructed when required, with information retrieved for one question shaping the context of subsequent construction. This is directly relevant to a proposal that treats persistent patterns as features of a construction process rather than as stored objects.

2.5. Scope of the commitment

Nothing here requires or asserts quantum processes in neural tissue. The formalism is a probability structure. Its application stands or falls on whether human judgement exhibits the structural signatures it predicts, independently of neurophysiology.

We state one further exclusion explicitly, because informal discussion in adjacent applied fields sometimes suggests otherwise. Quantum entanglement cannot transmit information; this is the content of the no-signalling theorem, and it is closely related to the impossibility of copying an unknown quantum state[8]. No account in which one person acts causally on another through quantum correlation is available, whether or not the formalism is otherwise applicable. Every proposal in this paper concerns the structure of an individual's own state dynamics.

3. Core Proposal: Dimensional Collapse of Response Space

3.1. The phenomenon to be modelled

Clinical description of persistent maladaptive patterns converges on a structural feature rarely stated as such: the response has stopped depending on the situation.

A person without such a fixation, presented with a cue in a given domain, may respond in several ways depending on what preceded it, how it was framed, what else is salient. A person with a fixation in that domain responds in one way, largely insensitive to preceding context.

This is not a matter of response intensity. Intensity varies across many conditions. What distinguishes fixation is **the loss of variation as a function of context**. We take this, rather than the presence of a stored pathological content, as the explanandum.

3.2. Two quantities

We define the effective size of the response repertoire via the participation ratio:

$$D_{\text{eff}} = \frac{1}{\mathrm{Tr}(\rho^2)} = \frac{1}{\Sigma_i p_i^2} \tag{3}$$

$D_{\text{eff}} = 1$ for a pure state and increases as the state distributes across more basis states. The exponentiated von Neumann entropy serves the same purpose; the participation ratio is preferred here for its lower estimation variance in small samples.

For two questions *A* and *B*, contextual sensitivity is the order effect:

$$\Delta_{AB} = |p(B|A \text{ first}) - p(B|B \text{ first})| \tag{4}$$

$\Delta_{AB} > 0$ requires $[\Pi_A, \Pi_B] \neq 0$.

3.3. The proposal

Fixation in domain D consists in a reduction of D_{eff} accompanied by a loss of contextual sensitivity within that domain.

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Under overwhelming demand, a state supporting multiple context-sensitive responses is projected onto the response that is survival-relevant in that moment. What distinguishes fixation from an ordinary strong response is that this projection **persists** — the state does not return to its prior dimensionality when the demand ends.

The clinically striking feature, that the response no longer varies with situation, follows directly.

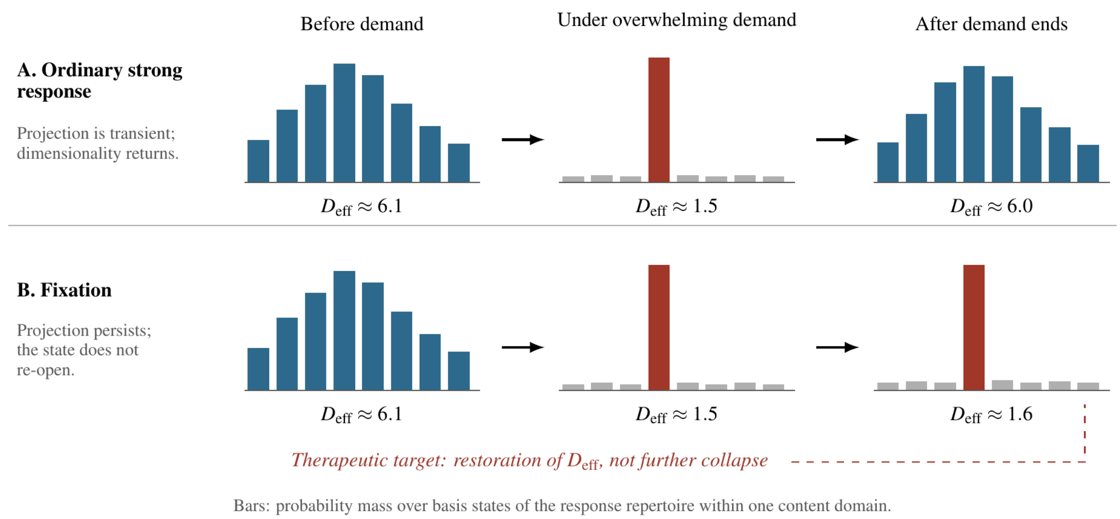

Figure 1. Dimensional collapse of response space. Bars represent probability mass over the basis states of the response repertoire within a single content domain. Both rows show the same projection under overwhelming demand; they differ in what follows it. In (A) the state re-opens and effective dimensionality returns. In (B) it does not, and the response ceases to vary with context. The therapeutic target is the transition that fails to occur in (B), not a further collapse.

3.4. The inversion

It is tempting to describe such material as unstable, unresolved, "still open," and therapeutic work as bringing it to resolution. On the present account this is backwards.

Fixation is not an un-collapsed state awaiting resolution. It is an already-collapsed state that has lost the capacity to re-open.

Collapse is not the therapeutic goal; collapse is the pathology. The therapeutic target is restoration of D_{eff}, such that context-sensitivity returns and a different actualisation becomes available.

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This reframes what an intervention would be doing. Not removing a stored entity, discharging an accumulated quantity, or overwriting a memory — but returning a locally rigid subsystem to a state in which more than one response is available.

3.5. What the model does not claim

1. **No physical quantum process** is posited in neural tissue, in cells, or between persons. The formalism is a probability structure, not a mechanism.
2. **No interpersonal transmission** is possible on this account (§2.5). Restoration of degrees of freedom is something an individual's own system does under conditions that make it possible.
3. **Dimensionality is not a complete account.** Content, meaning, developmental timing and relational context are not reducible to D_{eff}. The claim is that dimensional reduction is a structural feature common to fixations that otherwise differ, and that it is measurable.
4. **The mapping to physiology** (§5) is a correspondence hypothesis, not a derivation.

4. Convergence With Established Frameworks

The proposal is not offered as a replacement for existing accounts. Its interest lies partly in the observation that independently developed frameworks describe what may be the same structural event in different vocabularies.

Memory reconsolidation. Nader, Schafe and LeDoux[9] showed that consolidated fear memories, upon reactivation, return to a labile state requiring *de novo* protein synthesis for restabilisation — and that this occurred whether reactivation took place one or fourteen days after conditioning, while the same treatment without reactivation left memory intact. Ecker, Ticic and Hulley[10] develop this into a clinical account of a core process of transformational change that does not depend on any particular therapeutic system or technique, illustrating it across a range of otherwise dissimilar approaches. In the present terms, the labile window is a transient increase in D_{eff}: a state that admitted one actualisation temporarily admits others. That the window requires reactivation corresponds to the claim that a fixated pattern does not become mobile spontaneously.

Predictive processing. Accounts in this tradition[11][12] characterise persistent maladaptive patterns in terms of priors held with pathologically high precision, such that incoming evidence cannot revise them.

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High-precision priors and reduced D_{eff} describe the same situation: a system whose response is determined largely independently of what the situation supplies.

Neurovisceral integration. Thayer and Lane[13] situate autonomic, attentional and affective systems within a functional network serving self-regulation and adaptability, framed explicitly in terms of dynamical systems with feedback and feedforward circuits. Of particular relevance, they characterise inhibitory processes as negative feedback permitting the interruption of ongoing behaviour and the redeployment of resources — that is, in terms of response selection — and propose that when these mechanisms are compromised, positive feedback loops may develop through disinhibition. A system that can no longer interrupt and redeploy is a system whose available responses have narrowed, and a self-reinforcing loop is one form the resulting persistence can take. Polyvagal accounts[14] describe the autonomic reaction range in related terms.

The convergence is not itself evidence. Frameworks agreeing does not establish that any is correct. What it does suggest is that the structural feature identified here is not an artefact of one theoretical vocabulary.

5. Operationalisation: Autonomic Complexity as a Proxy

5.1. The choice of measure

Heart rate variability is frequently interpreted in applied settings as an index of relaxation or recovery. Within neurovisceral integration models it carries a different meaning: an index of the regulatory capacity underlying self-regulation and adaptability[13].

The present framework requires a more specific measure still. What is at stake is not the amplitude of variation but the effective number of states the regulatory system moves among. Non-linear complexity measures — sample entropy[15] among them — are closer to this quantity than time-domain measures such as SDNN or RMSSD, which quantify magnitude of variation without regard to its structure. The correspondence should not be overstated: sample entropy indexes the regularity of a time series, not the number of states a system occupies, and these coincide only under assumptions that are not guaranteed to hold. Measures constructed more directly around state-space occupancy — multiscale entropy and correlation dimension — should therefore be reported alongside it, with agreement across measures treated as part of what is being tested rather than assumed. Standard definitions and recording

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conventions follow the Task Force of the European Society of Cardiology and the North American Society of Pacing and Electrophysiology[16] and Shaffer and Ginsberg[17].

5.2. Two empirical precedents

Two findings support the specific measurement strategy proposed here.

First, complexity measures are state-dependent within individuals and can dissociate from other autonomic indices. Blons et al.[18] recorded HRV in participants performing a cognitive task with and without added stressors. Both vagal and entropy markers rose during the task itself in all participants; when stressors were added, entropy alone decreased, and exclusively in those participants showing an anxiety response. The authors themselves raise the question of why entropy was the only marker affected. Two qualifications are needed. The finding is a state effect under an acute stressor, not a domain-specific signature of the kind predicted here, and the extension from one to the other is an inference of this paper rather than a result of theirs. And since entropy rose during the task and fell only under added stress, complexity is not monotonically favourable; the prediction below concerns a domain-specific reduction relative to a within-session control, not high complexity as such. With those qualifications, the dissociation is a precedent for the measurement strategy proposed here.

Second, contextual autonomic measures outperform resting indices. Magnon, Dutheil and Vallet[19] found that vagal reactivity and recovery combined provided a better account of advantageous decision-making than resting vagal activity, and concluded that the widely used resting index is not the best predictor of performance. The design proposed in Section 7 accordingly measures complexity during engagement with the relevant content domain rather than at rest.

5.3. Limits of the proxy

Autonomic complexity is not a direct measurement of D_{eff}. It is a physiological correlate proposed on the argument above. Complexity measures are sensitive to respiration, posture, movement, recording length and artefact handling, all of which must be controlled rather than assumed away. The correspondence between a formally defined dimensionality and a physiological complexity index is a hypothesis of this paper, not a premise of it.

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6. Predictions

6.1. The discrimination problem

Section 2.4 established that the existing literature already predicts attenuated order effects for extensively rehearsed material. Section 3 predicts attenuated order effects for fixated material. Both predict the same thing about Δ.

But the two states are clearly not the same. A person with deep familiarity in a domain has a stable, well-organised representation and remains behaviourally flexible. A person with a fixation has a rigid representation and is not. Both may have achieved a common basis — for opposite reasons.

The framework's distinctive claim is therefore not about Δ alone, but about the **joint pattern** of Δ and state-dependent autonomic complexity.

	Order effect Δ	**Complexity during engagement**
Compatibility through familiarity	reduced	preserved
Compatibility through fixation	reduced	reduced
Neither (incompatible questions)	present	variable

This makes the autonomic prediction constitutive rather than supplementary. Without it, the two routes to reduced Δ cannot be distinguished; without Δ, there is no evidence that response repertoire specifically has narrowed. Neither measure suffices alone.

The comparison is **within-subject and within-session**: complexity during engagement with the fixated domain versus during engagement with a matched neutral domain, in the same individual. This avoids any need for assumptions about between-person differences in baseline complexity, consistent with the finding of Magnon et al.[19] that contextual measures outperform resting indices.

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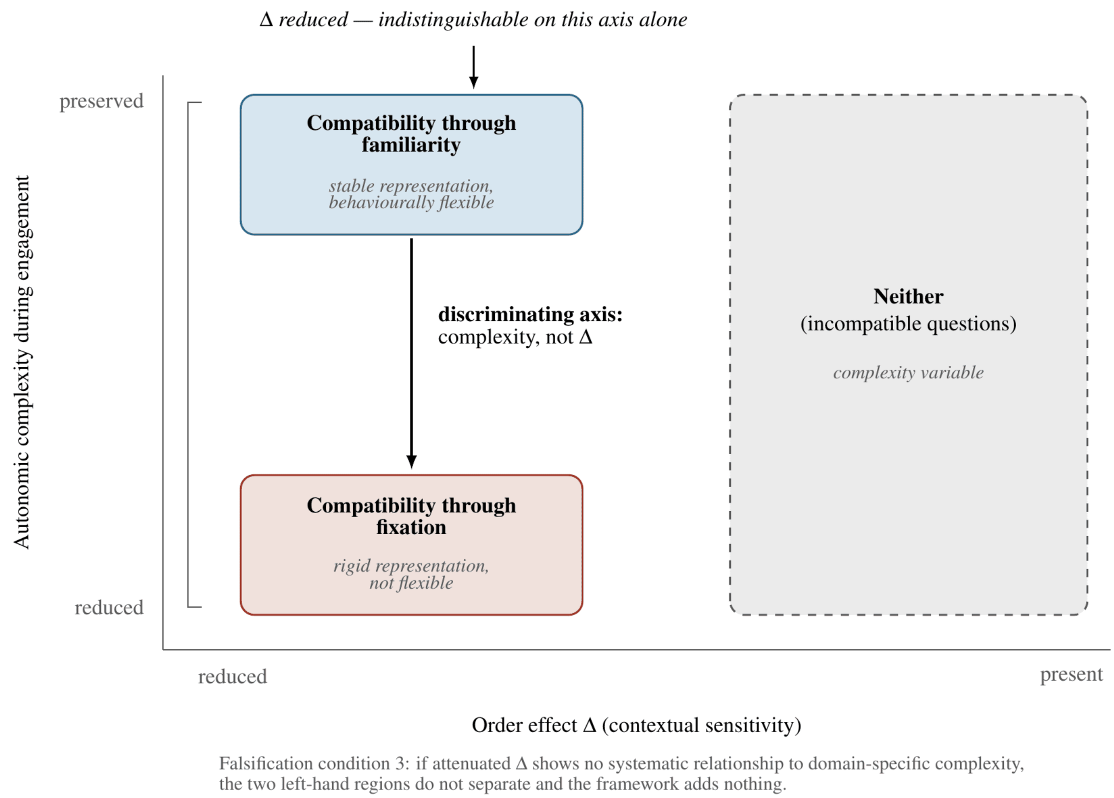

Figure 2. The discrimination plane. Familiarity and fixation both reduce the order effect and are therefore not separable along the horizontal axis, which is what makes the autonomic measure constitutive rather than supplementary. The framework's distinctive prediction is that the two occupy different regions on the vertical axis within the same individual and session.

6.2. P1: attenuated contextuality in the fixated domain

Prediction. In individuals with an identified fixation in domain $\mathscr{D}$, order effects for unfamiliar item pairs drawn from $\mathscr{D}$ will be smaller than for matched unfamiliar item pairs from a neutral domain $\mathscr{N}$.

Design requirement. Item pairs must be constructed to be *unusual* in both domains. Familiar combinations are predicted to show attenuated effects regardless of fixation status, eliminating the baseline against which P1 is assessed.

Statement of novelty. The direction of P1 is not novel; it is consistent with what the existing compatibility account predicts for well-rehearsed material. What is novel is the claim that the two routes are distinguishable by autonomic signature.

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Support: $\Delta_{\mathscr{D}} < \Delta_{\mathscr{N}}$ reliably across participants. **Disconfirmation:** $\Delta_{\mathscr{D}} \geq \Delta_{\mathscr{N}}$, or no reliable difference.

P1b. Following successful intervention, $\Delta_{\mathscr{D}}$ increases toward $\Delta_{\mathscr{N}}$, with $\Delta_{\mathscr{N}}$ approximately unchanged as an internal specificity check.

6.3. P2: domain-specific autonomic signature

Prediction. In individuals with a fixation in $\mathscr{D}$, complexity recorded during engagement with $\mathscr{D}$ will be reduced relative to complexity during engagement with $\mathscr{N}$, within the same session. In individuals whose attenuated Δ reflects familiarity without fixation, no such domain-specific reduction is predicted.

Prediction (intervention). Following intervention, autonomic change will appear preferentially in complexity measures rather than time-domain measures.

Why this is not obvious. Applied HRV literature emphasises increases in overall variability as the marker of improvement. The framework predicts something more specific: change in effective dimensionality, which complexity measures index more directly than amplitude. The dissociation reported by Blons et al. [18], in which entropy alone responded to added stressors, is a precedent for exactly this pattern.

Support: Reliable within-subject domain difference in complexity; larger standardised effects for complexity than time-domain measures post-intervention. **Disconfirmation:** No domain-specific complexity difference, or time-domain change with complexity flat.

6.4. P3: dissociation of timing

Prediction. Autonomic change may be detectable before self-reported change, since restored flexibility is treated as necessary but not sufficient for symptom change.

6.5. P4: the formalism must survive in the fixated domain

Prediction. The QQ equality of Wang and Busemeyer[6] is a parameter-free constraint on the pattern of order effects across the two orders. It is predicted to be satisfied in both the fixated and the neutral domain. On the present account, an attenuated order effect in the fixated domain reflects a state of reduced dimensionality, which remains a legitimate state within the formalism — not a departure from it.

Why this matters. This is the one prediction on which the choice of formalism is itself at stake, rather than serving as a convenient vocabulary. Section 2.2 adopts quantum probability because it commits to a constraint it could fail; that argument is only fully available to the present paper if the constraint is also carried into the phenomenon the paper is about. If the QQ equality holds in the neutral domain but is systematically violated in the fixated one, the structure assumed here is not what generates order effects in fixated material, and the justification given in Section 2.2 does not transfer.

Estimation caveat. Where order effects are small in both domains, the equality is satisfied near-trivially and the test has correspondingly little power. It is informative chiefly in the neutral domain, and, following intervention, in the fixated domain as its order effects recover. We note this rather than presenting P4 as a strong test at baseline.

Support: QQ equality satisfied within estimation error in both domains. **Disconfirmation:** systematic violation confined to the fixated domain.

6.6. Falsification

The framework is disconfirmed if:

1. Symptom improvement occurs reliably without change in either Δ or autonomic complexity.
2. $\Delta_{\mathscr{D}}$ exceeds $\Delta_{\mathscr{N}}$ under the stated design requirements.
3. Attenuated Δ shows no systematic relationship to domain-specific autonomic complexity.

Condition 3 is decisive. It targets the framework's only genuinely distinctive claim. If reduced order effects and reduced autonomic complexity are unrelated, the framework adds nothing to the existing compatibility account and should be abandoned.

7. How This Could Be Tested

We report no data. This section specifies minimum requirements a test would have to meet, for any intervention claiming to restore response flexibility.

7.1. Requirements

Two domains per participant. An identified fixation domain $\mathscr{D}$ and a matched neutral domain $\mathscr{N}$. $\mathscr{N}$ serves as a within-subject specificity control: an effect confined to $\mathscr{D}$is informative; an effect in both is not.

Pre-specified domain identification. The procedure by which the fixated domain is identified must be fixed in advance and must not draw on the measures used to test the predictions. If a domain is selected

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because the participant appears rigid in it, and rigidity in that domain is then the outcome, P1 is guaranteed in part by the selection rather than by the phenomenon. An independent route is required — a structured interview conducted by an assessor blind to the hypotheses, or selection from a standardised domain inventory — and its inter-rater reliability should be reported. This paper does not specify such a procedure, and its absence is a precondition of testing rather than a detail of implementation.

Participant burden and ethical approval. Repeated engagement with a fixated domain is demanding by construction, and item batteries built to be unfamiliar within that domain may be distressing in ways familiar material would not be. A study of this kind requires ethical approval, a distress protocol, clinician availability during sessions, and explicit withdrawal provisions. The design should also record whether burden, engagement and dropout differ between the two domains, since a systematic difference would confound the within-subject comparison on which both P1 and P2 rest.

Unfamiliar item pairs, as required by §6.2, piloted for unfamiliarity as well as comprehensibility.

Independent outcome assessment. Outcome measures must be obtained independently of the person delivering the intervention. Any measure administered and interpreted by the practitioner who performed the intervention cannot serve as evidence, since the expected result is known in advance. This constraint is stated explicitly because it is frequently violated in this literature.

Pre-registration of hypotheses, primary measures and analysis plan before data collection.

Measures. Continuous ECG-derived HRV with pre-specified artefact handling, reporting both time-domain and complexity measures; a validated symptom instrument; item-pair batteries for Δ estimation.

7.2. The central methodological problem

Order effects are probability-level phenomena. A single participant answering a single item pair once yields a binary response, not a probability. Standard estimation aggregates across participants, which is incompatible with a within-subject pre/post design.

One possible resolution aggregates **across item pairs within participant** — multiple pairs per domain, order counterbalanced — yielding a per-participant estimate of Δ.

This assumes item pairs within a domain are sufficiently exchangeable to be pooled. That assumption is untested and may not hold. We identify it as the principal obstacle to testing P1b and do not claim to have solved it.

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Note that P2 does not face this problem: autonomic complexity is estimated from a continuous signal within a single session and requires no aggregation across participants.

7.3. Design constraints

A within-subject pre/post design cannot separate intervention effects from regression to the mean, repeated testing, or expectancy. The neutral domain provides specificity, not control. A randomised comparison condition is required before any causal claim. Blinding of participants is not feasible for interventions of this class. This limits what any such study can establish and should be stated rather than minimised.

8. Theoretical Context: Information-First Ontologies

The proposal above is stated entirely at the level of psychological modelling and requires nothing further. Readers who wish to may skip this section without loss. We note only that several positions in the foundations of physics treat information rather than matter as fundamental — Görnitz[20], developing von Weizsäcker's ur-theory, proposes abstract quantum bits of information free of definite meaning, termed *protyposis*, as a pre-structure from which both the physical and the mental were formed; D'Ariano and Faggin[21] argue from quantum information theory for a panpsychism in which quantum information is prior to quantum physics. On such views, the question of how work at the level of meaning could affect physiological state does not present the structural difficulty it presents on a substance-dualist picture. This is a remark about the coherence of a research programme. It is not evidence for any claim made above, nothing in Sections 2–7 depends on it, and the exclusion of interpersonal transmission stated in §2.5 is unaffected — the entanglement invoked by D'Ariano and Faggin concerns relations within a single experiencing system. Readers who reject these ontologies entirely lose nothing of the argument.

9. Limitations

The framework is a characterisation, not a mechanism. It says what changes, not how. This is deliberate but it is also a limitation: a structural account cannot adjudicate between candidate processes that would produce the same structural change.

The central correspondence is hypothetical. That autonomic complexity indexes the same dimensionality as D_{eff} is proposed and tested, not established.

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Item exchangeability (§7.2) **is unresolved.** The proposed route to within-subject estimation rests on an untested assumption.

Domain identification is not operationalised here, and this is a circularity risk. Determining which domain is fixated for a given individual requires a procedure this paper does not specify. The risk is not merely that such a procedure could introduce bias but that it could make P1 partly self-confirming, since a domain selected for apparent rigidity is a domain in which rigidity is then likely to be found. Section 7.1 states the requirement that follows; meeting it is a precondition of any informative test.

The familiarity/fixation contrast requires empirical support it does not yet have. The prediction that these are separable by domain-specific autonomic complexity follows from the framework, but no study has tested it directly. The precedents cited in §5.2 are suggestive, not confirmatory. This is the framework's principal empirical commitment and its principal vulnerability.

No data are reported. Everything above is a proposal.

Statements and Declarations

Funding

No specific funding was received for this work.

Potential Competing Interests

The author practices and teaches in the field of attention-guided intervention methods and derives income from this activity. No specific method is evaluated or endorsed in this article. The framework proposed here is stated in terms that would apply to, and could disconfirm, any intervention of this class including the author's own.

Data Availability

No data are reported in this article.

Use of Generative AI

An AI assistant (Claude, Anthropic) was used for drafting assistance and for identifying candidate literature. All references were verified by the author against the original sources. The author is responsible for all content.

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