

# No Contextual Weight

## Why PC Is the Internality Axiom on the Weight Axis, and Why PC and RC Were Never the Same Kind of Debt

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### For the General Reader

Suppose you want to know how much "possibility-weight" the outcome  $I$  carries on a die. There is an assumption so quiet it is almost never stated: the weight of  $I$  is the weight of  $I$ , no matter how you describe the other five faces. You can list them as  $\{2, 3, 4, 5, 6\}$ , or as  $\{\text{even}\}$  and  $\{\text{odd-but-not-1}\}$ , or lump them into one box marked "not 1" — and the weight of  $I$  does not flinch. It does not care what company it is listed in.

That quiet assumption has a name in this programme: **PC**, the decomposition-independence principle. Across the companion papers it has been the one ingredient flagged but never opened — "the genuinely new bookkeeping commitment," carried in a sealed box marked *to be stated and checked*. Everything else in the chain that ends at the squared-amplitude rule has been either proven from the founding rule or named as an honest open premise. PC alone sat unexamined. This paper opens the box.

What we find is that PC is not a new thing at all. It is something the programme already proved, wearing different clothes.

Recall the previous result. The founding rule (FP1) hands reality a region and a capacity, no labelled outcomes; the outcomes are *carved* from the region's own capacity, never handed in from outside. We called that the Internality Axiom — the carvings are individuated from within. Now ask what would have to be true for the weight of  $I$  to depend on how you carve the rest. It would mean the weight of  $I$  is fixed not by  $I$  itself but by the whole arrangement it sits in — by a context handed in alongside. That is the *same forbidden move* as before: a quantity individuated from outside rather than from the thing itself. The weight, like the carving, must be individuated internally. So decomposition-independence is not a fresh assumption; it is internality applied one level up — to the weight rather than to the carving.

There is a second strand to PC — that the weight of a coarse box equals the sum of the weights of the finer boxes inside it (cut "not 1" into  $\{2,3\}$  and  $\{4,5,6\}$  and the two pieces must add back to the whole). We show this strand is bookkeeping the normalization already does — on the natural reading of what the weight *is* (a measure of the capacity it weighs), it is what that faithfulness means, not a new debt. On a weaker reading it shrinks to a single thin additivity rule rather than vanishing entirely — but even then it is bookkeeping of the same kind the programme already keeps, not a new kind of commitment.

The upshot completes a longer story. The founding rule's side of the ledger — everything about what reality *contains* — is now fully settled: no pre-given outcomes, carvings individuated from within, and weights individuated from within too. What is left undecided is a single question about reality's *motion*, not its contents: whether the carvings flow into one another or sit sealed. That question (we have called it Reversible Connectedness) the founding rule cannot answer, because it says nothing about motion. So the only thing still standing between finite distinguishability and the squared-amplitude rule is that one continuity question — and a mild bookkeeping principle that, it now turns out, was never new.

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## Abstract

The Born-exponent arc reduced the squared norm to  $\ell^2 \Leftarrow \mathbf{PC} \wedge \mathbf{Obstruction\ B}$ , with *Bath or Ledger* and *No Pre-Individuation* establishing that Obstruction B's affirmative resolution is equivalent (given the now-proven Internality Axiom IA) to Reversible Connectedness (RC), a single open continuity premise on the *dynamics* axis. Throughout, **PC** — the decomposition-independence principle supplied to the linearity companion — was flagged as "the one genuinely new bookkeeping commitment" and left unexamined. This paper states PC precisely and determines its status.

We decompose PC into two sub-claims on the conserved normalization  $N(\psi) = \sum_i h(|c_i|)$ :

- **PC-U (universality):** one per-part weight function  $h$ , the same for every part of every admissible refinement — the weight of a part is not indexed by the refinement-context it sits in.
- **PC-C (refinement-consistency):** the weight of a coarse part equals the sum of the weights of its sub-parts under any admissible sub-refinement — coarse-graining commutes with weight-assignment.

The central results are organised around a single inheritance — **N4-measure**: the conserved weight is a faithful *measure* of capacity content,  $w(P) = (f \circ \text{Vol\_op})(P)$  with  $f$  a measure — which, if it is the companion's reading of N4, delivers both strands at once:

1. **PC-U  $\Leftarrow$  IA (given part-level faithfulness and Uniform Readout).** A measure is a function of capacity content with no refinement-slot; capacity content is frame-independent by IA ( $\text{Vol\_op}(P)$  is the same in every admissible  $R$  containing  $P$ ); so the weight carries no partition-index and there is one  $h$  across *all* refinements, including non-overlapping ones. Even under the *weaker* reading (N4 only function-faithful, not asserted additive) PC-U still holds, by a functional-dependence argument: faithfulness fixes  $w(P)$  by  $\text{Vol\_op}(P)$  alone, an  $R$ -indexed rule makes the value depend on more, and by IA  $R$  supplies no capacity content beyond  $\text{Vol\_op}(P)$ . The lever is value-as-function-of-capacity, not the identity of the weight function's argument. Its reach to frames that share no part — the global universality the linearity companion's rotation argument consumes — rests on *Uniform Readout*, a carrier fact (amplitude reads capacity content by one frame-independent relation) we surface explicitly and flag for confirmation. PC-U needs

the *part-level* locus of N4 (faithfulness to each part, not the bare total); it does not need the measure strength.

2. **PC-C  $\Leftarrow$  Capacity Additivity, under N4-measure.** Refinement-consistency is *Weight Additivity*  $w(P) = \sum_j w(P_j)$ ; it transfers automatically from the definitional *Capacity Additivity*  $\text{Vol}_{\text{op}}(P) = \sum_j \text{Vol}_{\text{op}}(P_j)$  because additivity is constitutive of a measure. We are careful here: the tempting "conservation forces additivity" argument equivocates — the inherited conservation is *dynamical* (intra-refinement), which is not *subdivision-invariance* (cross-refinement), and given separability subdivision-invariance just *is* PC-C. So PC-C is not forced by conservation; it is inherited under the measure reading of N4, and a thin data-axis residue under the function reading.
3. **PC and RC do not constrain each other (proven).** PC is a *data-axis* condition (what fixes and composes the weight from capacity); RC is a *dynamics-axis* condition (whether reversible motion connects the carvings). By the data/dynamics cut of *No Pre-Individuation* each is silent on the structure the other quantifies over, so neither entails nor constrains the other. (We prove non-entailment each way, not full four-corner independence.)

Net, at the honest tiers. **Proven:** PC and RC are different *kinds* of condition — PC data-axis, RC dynamics-axis — and do not constrain each other; and PC-U follows from IA under *either strength* of N4, given its part-level locus (and Uniform Readout). **Conditional on one reading of N4:** if N4 is a part-level faithful measure of capacity content — which we argue is its intended content for a conserved normalization of a region, and which on the N4 side is the *single* thing to confirm against the linearity companion (it settles both locus and strength) — then PC-C is inherited too and PC reduces entirely to IA plus that reading, with no new commitment. If N4 is part-level but only function-faithful, PC-C survives as a thin data-axis additivity residue (still not a new *kind* of commitment, and still orthogonal to RC). So the defensible statement is: the square follows from FP1 + (N4 as a part-level faithful measure of capacity, and the carrier's Uniform Readout, both to be confirmed) + RC, with NPI and IA proven. PC is not shown to be *nothing*; it is shown to reduce to a specific, named reading of N4 plus a carrier fact, with at worst a thin additive residue if the measure strength fails. The contribution is not that PC vanishes by fiat but that **PC and RC were never the same kind of debt** — and once that is seen, PC stops being mysterious: it is settled on the axis IA already controls, leaving RC, on the axis FP1 cannot reach, as the sole open gate.

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## Scope and Conditional Status

This is the fifth companion to *The Squaring Residue*, after the linearity paper, *Bath or Ledger*, and *No Pre-Individuation and the Seal-Trichotomy*, and inherits their framework and conventions. It does not assert the bath reading by preference, and it does not touch RC. It opens the one ingredient those papers carried unopened — PC, the decomposition-independence principle the linearity companion uses to fix the exponent — states it precisely, and determines whether it is a new commitment or a consequence of results already established.

The result is that PC reduces, on the data axis, to results already in hand — IA, and one reading of the conserved normalization's faithfulness axiom N4. The cleanest form is a single inheritance, **N4-measure** (the weight is a faithful measure of capacity content), from which both strands of PC follow at once; we make that the spine and confirm separately that even the weaker (function-faithful) reading secures the universality strand. What is genuinely conditional is one fact about the companion's N4, set out plainly below.

Epistemic labelling is maintained throughout:

- **proven** — follows from the stated inputs (FP1 as stated, the inherited companion results including IA and the normalization axioms N1–N4 / H-mono, and the §2.3 Declaration of *No Pre-Individuation*) by an argument given here;
- **conditional** — follows given a named, separately-open premise or a companion statement to be confirmed;
- **conjectural** — asserted as plausible with structural support but no argument approaching proof.

PC-U  $\Leftarrow$  IA is **proven** (§5). Under N4-measure it is immediate (a measure has no refinement-slot; capacity content is frame-independent by IA). Under the weaker function-faithful reading it still holds, by value-faithfulness: faithfulness fixes  $w(P)$  by  $\text{Vol}_{\text{op}}(P)$  alone, and an R-indexed

rule would make the value depend on more than capacity content, which IA forbids. So PC-U is not hostage to the strong reading. PC-C  $\Leftarrow$  Capacity Additivity is **proven under N4-measure** (§6) — Weight Additivity transfers because additivity is constitutive of a measure — and is a **thin data-axis residue** under the function reading. We explicitly decline the tempting "conservation forces additivity" shortcut: the inherited conservation is dynamical (intra-refinement) and is not subdivision-invariance (cross-refinement), which given separability would just *be* PC-C. PC and RC are shown not to constrain each other (**proven**, §7); we claim non-entailment each way, not full four-corner independence. The single conditional, therefore, is one reading of N4 — that it is a faithful measure of capacity content — which we argue is its intended content for a conserved normalization of a region and flag for confirmation against the linearity companion. RC is **open** throughout and untouched.

A methodological note, carried from the previous papers because it is the same discipline. The trap those papers refused was letting a contested conclusion ride in on a word, and the symmetric trap on the affirmative side — proving a structural fact and then announcing the bath. The trap *this* paper must avoid is the inverse over-modesty: treating PC as irreducibly new merely because it was *flagged* as new, when the prior results in fact reach it. We open the box rather than defer to the label on it. But we are equally careful not to overclaim: PC is not shown to be *nothing*. It is shown to reduce, on the data axis, to IA plus one named reading of N4 — with the universality strand secure under either reading, and only the composition strand resting on the measure reading. We flag that reading as the single conditional rather than assert it, and we refuse the conservation shortcut that would appear to force it but in fact equivocates.

Time is emergent throughout; "pre-factual" / "pre-commitment" denote the substrate configuration before an irreversible commitment event. A commitment event selects one admissible refinement of the unresolved region (the Declaration, *No Pre-Individuation* §2.3).

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## 1. Introduction: the last black box

The companion arc reduced the Born exponent to two conditions and then spent two papers anatomising one of them. *Bath or Ledger* localised the mixing leg to a fork in the conservation structure of pre-factual weight, bath versus ledger, and identified the fork with the *Packing* paper's refinement obstruction (Obstruction B). *No Pre-Individuation* disproved the primitive ledger from FP1, proved the Internality Axiom (IA) — admissible carvings are individuated from M's own capacity, never handed in from outside — collapsed bath-versus-ledger exhaustively onto Obstruction B, and showed Obstruction B's affirmative resolution equivalent, given IA, to a single open premise: Reversible Connectedness (RC), a continuity question on the *dynamics* axis that FP1 cannot adjudicate because FP1 is silent on dynamics.

That arc left the residue standing as

$$\ell^2 \Leftarrow PC \wedge \text{Obstruction B,}$$

with Obstruction B affirmative  $\Leftrightarrow$  RC. One conjunct — Obstruction B / RC — has now been mapped as far as the founding rule allows. The other — PC — has never been opened. Across every companion it carries the same parenthetical: *the one genuinely new bookkeeping commitment*, and in the assembly of *No Pre-Individuation* it is given the explicit caption *to be stated and checked*. It is the last sealed box in the construction.

The temptation, having two open conjuncts, is to treat them as twin debts: RC the dynamical one, PC the bookkeeping one, both genuinely new, both owed. This paper shows that picture is wrong on the PC side. PC is not a second debt of the same standing as RC. Once stated precisely, it splits into a part that is *IA wearing different clothes* and a part that is *bookkeeping the normalization already does*. Neither is new. The two open conjuncts are not twins: one (RC) is a genuine open premise on the dynamics axis; the other (PC) is a data-axis condition that the data-axis results already discharge.

The contribution is therefore to show PC is not a new *kind* of commitment beside RC, and — on a single reading of one companion axiom, plus one carrier fact — to retire it from the data axis entirely, leaving the sole surviving gate on the dynamics axis, where the previous paper already placed it. We are careful, throughout, to do this by *argument*, not by relabelling. The universality strand follows from IA under either *strength* of the faithfulness axiom N4 — by an argument about what the weight's value may depend on — given N4's part-level *locus* and the carrier's Uniform Readout (that amplitude reads capacity content uniformly across frames), both surfaced explicitly rather than buried in a proof. The composition strand follows from IA plus the *measure* reading of N4 — which we argue is its intended content but flag as the thing to confirm against the companion, and which we are careful *not* to force by the conservation argument that would appear to settle it but in fact equivocates. The honest residue is therefore the character of N4 (part-level locus, indispensable; measure strength, buying the composition strand) together with the carrier fact UR, all flagged for confirmation — and the deeper point is the category distinction this exposes: PC and RC were never the same kind of debt.

## 2. Inherited setup, and what PC is asked to do

### 2.1 The carrier and the conserved normalization

From the companions we take as given the carrier H0: the pre-factual state  $\psi = (c_1, \dots, c_d) \in \mathbb{C}^d$ , the components a path-sum read off relative to a chosen refinement of the unresolved region M. The conserved normalization is separable,

$$N(\psi) = \sum_i h(|c_i|),$$

with the inherited axioms: **N1** (BCB-additivity — N is a sum of independent per-component contributions), **C2** (diagonal phase invariance), **N4** (faithfulness — N faithfully represents the

capacity it normalizes; precise statement inherited from the linearity companion), and **H-mono** (monotonicity of  $h$ ). The Diagonal-Torus selection gives continuous off-diagonal mixing  $\Leftrightarrow \ell^2$ ; the Possibility-Connectivity Theorem gives mixing  $\Leftrightarrow$  bath.

## 2.2 What the linearity companion uses PC for

In the linearity companion the chain to the exponent is

$$\ell^2 \Leftarrow \text{PC} \wedge (\text{mixing}) \wedge (\text{connectivity}),$$

and PC is the leg that does *not* come from the mixing/bath side. Its role there is to license the functional-equation step: the rotation-invariance argument that pins  $h$  to a power law must be applicable in *every* admissible decomposition, with the *same*  $h$ , and the totals must agree across coarse and fine readings. Without that licence the rotation argument fixes  $h$  only within one fixed frame, and a decomposition-dependent weight escapes the conclusion. So PC is asked to deliver two things: that the weight function is *one* function across all refinements (so the rotation argument is the same argument everywhere), and that weights *compose consistently* under refinement (so coarse and fine readings of  $N$  agree). These are the two strands we now state.

## 2.3 The Declaration (inherited)

We use the Declaration of *No Pre-Individuation* §2.3 unchanged: an admissible refinement  $R$  carves  $M$  into resolution-stable sub-region capacities with **capacity-additivity**

$$\text{Vol}_{\text{op}}(M) = \sum_i \text{Vol}_{\text{op}}(M_i),$$

and commitment selects one admissible refinement. The Declaration asserts neither internality nor connectedness; it is strictly weaker than IA and RC. We will lean only on its capacity-additivity, which is definitional.

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# 3. PC stated precisely: universality and refinement-consistency

We write  $w_{\text{R}}(P)$  for the contribution of part  $P$  to  $N$  in refinement  $R$  — i.e.  $w_{\text{R}}(P) = h(|c_{\text{P}}|)$ , the per-part term of the separable sum, with  $c_{\text{P}}$  the amplitude the carrier assigns to  $P$  under  $R$ . PC is the conjunction of two conditions on the family  $\{w_{\text{R}}\}$  as  $R$  ranges over the admissible refinements  $\mathcal{R}$ .

**PC-U (Universality of the weight function).** There is a single function  $h$  such that for every admissible refinement  $R \in \mathcal{R}$  and every part  $P$  of  $R$ ,  $w_{\text{R}}(P) = h(|c_{\text{P}}|)$ . The per-part weight is

not indexed by R: the function applied to a part's amplitude does not depend on which refinement the part is read in, nor on the other parts alongside it.

**PC-C (Refinement-consistency).** If  $R'$  refines  $R$  by subdividing a part  $P$  into sub-parts  $\{P_j\}$  (an admissible sub-refinement), then

$$w_R(P) = \sum_j w_{R'}(P_j).$$

Coarse-graining commutes with weight-assignment: the weight of a part equals the sum of the weights of its sub-parts, in every admissible refinement.

**PC := PC-U  $\wedge$  PC-C.** PC-U is the *universality / non-contextuality* strand the rotation argument needs; PC-C is the *composition* strand that makes coarse and fine readings of  $N$  agree. The decomposition-independence the companions invoke is exactly this conjunction: the conserved weight is a single function of a part's own amplitude, composing additively under refinement, independent of the partition through which the part is reached.

**Remark 3.1 (PC-U and PC-C are logically independent as stated).** A weight family can satisfy PC-C while violating PC-U (let each refinement carry its own  $h_R$ , with each  $h_R$  internally additive under its own sub-refinements), and can satisfy PC-U while violating PC-C (one universal  $h$  that fails the additive splitting demanded by coherent sub-refinement). So the two strands must be discharged separately; we do not let one stand in for the other. We note in passing the form of universality the rotation argument consumes — one  $h$  across frames that share no part — and how it is reached. A *naive shared-part* argument (compare a common  $P$  across two overlapping frames) reaches it only via a common-refinement bridge between non-overlapping frames. Both routes this paper uses *avoid* that bridge: the measure framing (§5.0), because a measure is intrinsically global; and the value-faithfulness lever (§5.1, Theorem 5.2), because it pins one  $h$  from frame-independence of the value *and* of the readout, not from comparing a shared  $P$  — subject to the Uniform Readout premise made explicit there. So the bridge is what the shared-part route would need, not a generic cost of the weak reading.

## 4. The contextual-weight reading, and what it costs

Before reducing PC we exhibit the alternative it excludes, so the target is concrete. The negation of PC-U is a **contextual weight**: a family  $\{h_R\}$  indexed by refinement, so that the same part  $P$  — the same carving of  $M$ 's capacity, by IA the same object across refinements that contain it — is assigned a weight that depends on *which* refinement reads it. Formally, there exist admissible  $R, R'$  both containing  $P$ , with  $h_R(c_P) \neq h_{R'}(c_P)$ : the part's weight is a function of the surrounding partition, not of the part alone.

This is the standard contextual escape in amplitude-to-probability arguments — the weight of an outcome depending on the "measurement context" it is embedded in — and it is precisely what defeats a naive derivation: with a free  $h_R$  per context, the rotation argument fixes nothing globally. The companions assumed it away by fiat (PC), which is why PC read as a genuinely new commitment. The question of this paper is whether FP1, through IA, already forbids it.

**Observation 4.1 (the cost is borne by the rule, and shows up in the value).** Note what the contextual reading actually requires. It is not that  $P$  carries *different amounts of capacity* in  $R$  and  $R'$  — by IA,  $P$  is the same carving of  $\text{Vol}_{\text{op}}(M)$ , with the same capacity content, in both. Nor need it deny that the weight function's *argument* is  $P$ 's own amplitude  $|c_P|$ : the contextualist may freely grant that, and index the *rule*,  $w_R(P) = h_R(|c_P|)$ . The context-dependence lives neither in the capacity nor in the argument but in the *rule* — and its effect is that the weight's *value* comes to depend on which refinement reads  $P$ . This locates the lever §5 will use: not the identity of the function's argument (which the contextualist concedes is  $P$ 's) but the functional dependence of its value — and faithfulness constrains exactly what the value may depend on.

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## 5. PC-U is IA on the weight axis

### 5.0 The individuation dichotomy, and the single inheritance

The section's engine is a small formal fact about FP1, which we state once and instantiate twice. It is what underwrote IA at the carving level in *No Pre-Individuation*, and it is what §5 uses again at the weight level — so the title's "IA on the weight axis" is a literal instantiation, not a metaphor.

**Lemma 5.0.1 (Exhaustive Individuation — proven, given FP1).** Let  $X$  be any object whose individuation FP1 must fix (a carving of  $M$ , or a weight assigned to one). FP1 supplies  $M$  and its capacity structure ( $\text{Vol}_{\text{op}}$ ,  $\Delta_{\text{op}}$ ,  $d_{\text{op}}$ ) and nothing else. Any candidate source for  $X$ 's individuation is therefore *either* derivable from  $M$ 's capacity structure *or* not. Call the first **internal** and the second **external** (individuated by data adjoined to FP1). The two are exhaustive and exclusive by construction — "derivable from capacity" and "not derivable from capacity" admit no third case. Hence, for any such  $X$ , excluding external individuation entails internal individuation:  $\neg\text{external} \Rightarrow \text{internal}$ .

*Proof.* The disjunction "derivable from  $M$ 's capacity structure, or not" is a tautology over any fixed body of data, and FP1's data is exactly  $M$ 's capacity structure. "External" is defined as the negation of "internal" (not derivable from that data), so {internal, external} partitions the candidate sources. Excluding one member of a two-member partition leaves the other. ■

Two instances:

- **Carvings (IA, inherited).** Take  $X$  a candidate admissible refinement. *No Pre-Individuation* excluded external individuation of carvings (no pre-fixed menu, no

adjoined label set); by Lemma 5.0.1, carvings are internally individuated — that is IA, which we inherit as proven.

- **Weights (PC-U, this paper).** Take  $X$  the weight  $w(P)$  assigned to a part. The contextual reading individuates  $w(P)$  externally — by the partition  $R$  it sits in, data beyond  $P$ 's own capacity (Observation 4.1, §5.1). Excluding that, by Lemma 5.0.1, makes the weight internally individuated — fixed by  $P$ 's capacity content. PC-U is this conclusion. The remainder of §5 supplies the missing premise: that faithfulness *does* exclude external individuation of the weight.

So PC-U is not an analogy to IA; it is Lemma 5.0.1 applied to weights instead of carvings, with faithfulness (N4) playing the exclusion role that the no-adjoined-structure discipline played for carvings.

With the engine in hand, the whole reduction rests on one reading of the faithfulness axiom N4, which we state up front and use as the spine:

**N4-measure (the inheritance to confirm).** The conserved weight is a faithful *measure* of capacity content:  $w(P) = (f \circ \text{Vol\_op})(P)$  for a measure  $f$  — a value determined by  $\text{Vol\_op}(P)$  alone, additive over disjoint composition of capacity.

Both strands of PC fall out of N4-measure immediately, and it is worth seeing this before any machinery:

- **PC-U is immediate.** A measure is by construction a function of capacity content with no refinement-slot to fill — it has no place for an  $R$ -index. Capacity content is frame-independent by IA ( $\text{Vol\_op}(P)$  is the same in every admissible  $R$  containing  $P$ ), and is read uniformly from amplitude by Uniform Readout (§5.1). So  $w(P)$  is fixed by  $\text{Vol\_op}(P)$  and carries no partition-index; there is one  $f$  of capacity content, hence — composing with the uniform readout — one  $h$  of amplitude, across *all* refinements, including refinements that share no part. (In the terms of Lemma 5.0.1: a measure of capacity is internally individuated by construction.)
- **PC-C is immediate.** A measure is additive over disjoint composition; capacity composes additively by Capacity Additivity (the Declaration). So Weight Additivity transfers — this is Theorem 6.1.

So PC reduces to the *single* inheritance N4-measure, and the honest risk of the paper is one thing to confirm against the linearity companion, not two: **is N4 a faithful measure of capacity content?** We argue it is (a conserved normalization of a region is naturally such a measure), and we develop both strands from it (§5.1, §6). The remainder of §5 is the *fallback* — what survives if N4 is only *function*-faithful ( $w$  a fixed function of  $\text{Vol\_op}(P)$ , not asserted additive). Under that weaker reading PC-U still goes through, by the functional-dependence argument of §5.1; only PC-C is then at risk (§6, §10.2).

## 5.1 PC-U under the weak reading: functional dependence, not argument-identity

Suppose only that  $w$  is *some* fixed function faithful to capacity content — not yet a measure. PC-U still follows, and the lever is functional dependence, exactly as Observation 4.1 located it: the contextualist concedes the *argument* is  $P$ 's own amplitude  $|c_P|$  and indexes the *rule*,  $w_R(P) = h_R(|c_P|)$ . So the bite cannot be on the argument's identity; it must be on what the value is permitted to depend on.

One fact about the carrier is load-bearing here, and we surface it rather than bury it in a proof, because it is most load-bearing exactly where the argument reaches furthest (across non-overlapping frames, below):

**Uniform Readout (UR, a carrier fact we flag for confirmation).** The amplitude-to-capacity readout is frame-independent:  $|c_P|$  reads the capacity content  $\text{Vol}_{\text{op}}(P)$  by the *same* relation in every admissible refinement. The map from amplitude to capacity content is a property of the carrier  $H_0$ , not of the refinement  $P$  is read in.

UR is presumably definitional to how the path-sum carrier reads capacity (the relation  $|c_P| \mapsto \text{Vol}_{\text{op}}(P)$  is fixed by  $H_0$ 's construction, not re-chosen per frame). But we have not checked the carrier construction's verbatim statement, so we flag UR as a carrier fact *to confirm* — its tier is open premise, not owned result — alongside the  $|\Sigma(M)|$ -growth and  $\text{Vol}_{\text{op}}$  properties the previous papers also leaned on as readings to confirm. Within the Observation 4.1 dialectic UR is granted — the contextualist concedes  $|c_P|$  is a property of  $P$  — but the global-universality claim reaches past that dialectic to frames with no shared  $P$ , where UR is doing the work and must be named.

**Lemma 5.1 (Value-Faithfulness — proven under function-faithful N4).** If  $w(P)$  is faithful to capacity content, then  $w(P)$  is determined by  $\text{Vol}_{\text{op}}(P)$  alone; in particular it carries no dependence on the refinement  $R$  in which  $P$  is read.

*Proof.* Faithfulness to capacity content means the value  $w(P)$  is fixed by the capacity content of  $P$  — that is what it is for the weight to be *of* the capacity rather than a free quantity laid over it. The capacity content of  $P$  is  $\text{Vol}_{\text{op}}(P)$ , and by IA (proven, *No Pre-Individuation* §7.2)  $\text{Vol}_{\text{op}}(P)$  is the same in every admissible refinement containing  $P$ :  $R$  contributes no capacity content to  $P$  beyond  $\text{Vol}_{\text{op}}(P)$ , since  $P$  is individuated from  $M$ 's capacity, not from its siblings in  $R$ . So an  $R$ -indexed rule  $w_R(P) = h_R(|c_P|)$  with  $h_R \neq h_{R'}$  makes  $w(P)$  depend on  $R$  — data beyond  $P$ 's own capacity content — which is *external* individuation of the weight in the sense of Lemma 5.0.1. Faithfulness to capacity content excludes exactly that (it requires the value fixed by capacity content alone). By Lemma 5.0.1, excluding external individuation leaves internal:  $w(P)$  is fixed by  $\text{Vol}_{\text{op}}(P)$  alone,  $R$ -independent. ■

**Theorem 5.2 (PC-U  $\Leftarrow$  IA, under function-faithful N4 + UR — proven).** Given Lemma 5.1 and Uniform Readout, there is a single function  $h$  with  $w(P) = h(|c_P|)$  for every admissible refinement and every part, independent of the refinement — including across refinements that share no part.

*Proof.* By Lemma 5.1,  $w(P)$  is a function  $g$  of  $\text{Vol}_{\text{op}}(P)$  alone, with  $g$  frame-independent (by Lemma 5.1: it carries no  $R$ -index, being "value as determined by capacity content"). By UR,

$|c_P|$  reads  $\text{Vol}_{\text{op}}(P)$  by one frame-independent relation  $r$ , so  $\text{Vol}_{\text{op}}(P) = r(|c_P|)$  uniformly. Compose:  $w(P) = g(\text{Vol}_{\text{op}}(P)) = g(r(|c_P|)) =: h(|c_P|)$ , with  $h = g \circ r$  a single frame-independent function of amplitude. The composition is global because *both* factors are frame-independent —  $g$  by Lemma 5.1,  $r$  by UR — so  $h$  is one function across all admissible refinements, including frames sharing no part: universality follows from  $w$  being one function of capacity content *and* capacity content being read uniformly from amplitude, not from comparing a common  $P$  across frames. Hence PC-U. ■

**Remark 5.2.1 (the lever, and its two residual premises).** An earlier formulation argued the dichotomy "the weight function takes  $P$  as argument, or it takes  $(P, R)$ ." That does not bite the contextualist of Observation 4.1, who concedes the argument is  $|c_P|$  — a genuine property of  $P$  — and indexes the *rule*  $h_R$ . Argument-identity leaves them untouched; functional dependence closes the seam, because faithfulness constrains not the argument but what the *value* may depend on, and an  $R$ -indexed map makes the value depend on more than capacity content, which IA forbids. The reach to non-overlapping frames — the global universality the linearity companion's rotation argument consumes, which a shared- $P$  comparison could not deliver — rests on *two* explicit premises, and we keep them distinct: (i) N4 is faithfulness *to capacity content* and, on the function reading, *at the part level* (so the value is fixed by  $\text{Vol}_{\text{op}}(P)$ , not by a bare total); and (ii) Uniform Readout (so capacity content is read from amplitude by one frame-independent relation). Premise (i) is the locus/strength check on N4 (§10.1); premise (ii) is the carrier fact UR. Both are flagged **conditional** — readings to confirm against N4 and the carrier construction, not owned results — and judged to be the intended content of each; neither is smuggled into a proof clause. ■

## 5.2 Why this is not circular, and not the symmetric fiat

The move must clear two guards, mirroring the discipline of *No Pre-Individuation*.

First, **non-circularity**. IA is a result about the individuation of *refinement-members* (carvings); PC-U is about the individuation of *weights*. The reduction does not assume they are the same object — it applies the *same* formal engine (Lemma 5.0.1) to two different objects. For carvings, the exclusion of external individuation was the no-adjointed-structure discipline, and the conclusion was IA (inherited). For weights, the exclusion is faithfulness-to-capacity (N4), and the conclusion is PC-U. The engine is shared; the exclusion premise differs and is named in each case. So PC-U does not borrow IA's conclusion — it borrows IA's *method*, with N4 supplying at the weight level what the discipline supplied at the carving level.

Second, **not the symmetric fiat**. The previous paper warned against forcing the bath by an asymmetric discipline. Is "the weight is fixed by capacity content" the same illicit move as "the carvings flow"? No, and the difference is exactly the data/dynamics cut (§7). The weight's dependence on capacity is a *data-axis* claim — about what fixes the weight's value, which is capacity, the thing FP1 supplies. RC is a *dynamics-axis* claim — about which reversible maps connect the carvings, which FP1 does not supply. IA was proven on the data axis precisely because FP1 *does* legislate individuation; PC-U inherits that licence because it too is fixed by capacity. We assert no dynamical fact here; the weight's *value under motion* is not at issue, only

its determination by capacity at rest. So PC-U stands on the same ground as IA, and stops short of the dynamics axis where the fiat would lie.

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## 6. PC-C: Weight Additivity transfers from Capacity Additivity through a measure

PC-C — that the weight of a coarse part equals the sum of its sub-parts' weights — is composition under refinement, and we argue it is bookkeeping the conserved normalization carries, under the measure reading of N4 (and a thin data-axis residue otherwise). The argument turns on keeping two distinct additivities apart, then exhibiting the bridge between them.

**Capacity Additivity (CA, definitional — the Declaration).**  $\text{Vol\_op}(P) = \sum_j \text{Vol\_op}(P_j)$ : a part's capacity is the sum of its sub-parts' capacities under any admissible sub-refinement.

**Weight Additivity (WA, = PC-C, to be discharged).**  $w(P) = \sum_j w(P_j)$ : a part's weight is the sum of its sub-parts' weights under the same sub-refinement.

CA is given — it is what a capacity-carving *is*. WA is the thing PC-C asserts. They are different statements about different quantities (capacity, weight), and WA does not follow from CA alone: a nonlinear function of an additive quantity is not additive. The reduction of PC-C is therefore the claim that, for the conserved weight, **WA transfers from CA** — and the bridge that effects the transfer is the character of faithfulness.

**Theorem 6.1 (WA  $\Leftarrow$  CA, given measure-faithful N4 — proven on that reading).** If the weight is a *faithful measure* of capacity — an additive set-function of capacity content — then Weight Additivity transfers automatically from Capacity Additivity.

*Proof.* A measure  $\mu$  on capacity is by definition additive over disjoint composition:  $\mu(A \sqcup B) = \mu(A) + \mu(B)$ . The sub-refinement  $P \rightarrow \{P_j\}$  composes  $P$  from disjoint sub-capacities (CA:  $\text{Vol\_op}(P) = \sum_j \text{Vol\_op}(P_j)$ , the  $P_j$  partitioning  $P$ 's capacity). If  $w$  is a measure of capacity, then  $w(P) = w(\sqcup_j P_j) = \sum_j w(P_j)$  directly. The transfer is not an extra assumption added to faithfulness; it *is* faithfulness, on the measure reading — additivity is the defining property of the object the weight is then faithful to. So WA is CA read through a measure, and PC-C holds with no further premise. ■

**Remark 6.1.1 (the conservation argument corroborates but does not force — the equivocation made explicit).** It is tempting to argue measure-faithfulness is *forced*, thus: N is a *conserved* normalization, conservation under refinement is the total not changing when a part is subdivided, that is additivity, so WA is automatic. The conclusion is attractive but the argument equivocates on "conserved," and once disambiguated it does not force WA — it restates it.

Disambiguate. Given N1 (separability), the statement "N is invariant under the subdivision  $R \rightarrow R'$ " is  $w(P) = \sum_j w(P_j)$  — that is WA verbatim. So "WA  $\Leftarrow$  N1  $\wedge$  subdivision-invariance" is an equivalence given N1, not a derivation from something prior; it discharges WA only if subdivision-invariance is independently inherited. But the inherited "conserved normalization" almost certainly means *dynamically* conserved — invariant under the admissible reversible/off-diagonal maps *within* a refinement (the Diagonal-Torus sense). That is *intra*-refinement invariance, and it says nothing about *cross*-refinement (subdivision) invariance. So the conservation route either smuggles cross-refinement invariance under the word "conserved," or is WA renamed. We do not rest on it.

The non-circular route is the measure one (Theorem 6.1): "w is a measure of capacity" is a genuine reading of N4 — a statement about the *kind* of object the weight is — not a restatement of WA, and from it WA transfers because additivity is constitutive of a measure while CA is definitional. The conservation observation then *corroborates* — a measure is exactly the kind of thing whose total is stable under subdivision — without being the load-bearing step. We keep the explicit warning: dynamical (intra-refinement) conservation is not subdivision-invariance, and only the latter would short-circuit the measure reading. ■

**Remark 6.1.2 (and this is consistent with h nonlinear — without presupposing the exponent).** One might worry that WA (w additive over splitting) clashes with a nonlinear h. It does not, and the CA/WA distinction is what dissolves the worry. WA is additivity over *capacity*-splitting; any nonlinearity is in the *amplitude*. Coherent sub-refinement splits a part's amplitude so that the *weights* (capacities) add: WA is the statement  $w(P) = \sum_j w(P_j)$  with w the measure, while w as a function of amplitude need not be linear. We do *not* here assume that measure is  $|\cdot|^2$  — that  $p = 2$  is the linearity companion's conclusion, reached by adding the rotation argument to WA, not something WA presupposes. WA's role is upstream: it is the consistency condition (capacity-additive composition of weight) that, together with rotation-invariance, *selects* the exponent. So WA neither forces h linear nor smuggles the square; it is the additivity the eventual exponent must respect, stated before the exponent is fixed.

**Remark 6.1.3 (the honest status: a fork on one reading of N4).** Theorem 6.1's strength is exactly as strong as the companion's N4 makes it, and the status is a genuine two-reading fork settled only by the companion.

- If N4 states faithfulness as the weight being a *measure* on capacity (an additive set-function of capacity content), PC-C is immediate and **inherited** — it is N4 applied to a sub-refinement, nothing new.
- If N4 states only that the weight is *some fixed function* of capacity content (faithful but not asserted additive), then PC-C is *not* automatic: a nonlinear function of an additive capacity is generally not additive over the splitting. PC-C then carries genuine content — the additivity of the conserved weight under coherent sub-refinement, the constraint the linearity companion turns into the power law.

We flag the fork rather than the convenient horn. Under the measure reading PC retires entirely into IA + the measure inheritance; under the function reading, PC-C is the irreducible residue of PC — but note its character: *not a new kind of commitment* but the additivity content of the

conserved normalization, and a *data-axis* statement (composition of weight from capacity), hence still orthogonal to RC (§7). We judge the measure reading the intended one — a conserved normalization of a region is naturally a measure on its capacity — but it is the companion's N4 that decides, and we do not let the conservation observation (Remark 6.1.1) pretend to settle what only the wording of N4 can. Either way, PC-C is not a second *dynamical* premise beside RC.

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## 7. PC and RC are different kinds of condition: the data/dynamics cut, again

The previous paper drew the decisive distinction between conditions FP1 *can* adjudicate (those about what the axiom contains — the data axis: NPI, IA, the exclusion of external charges) and conditions it *cannot* (those about dynamics — RC, and any seal's conservation). We now place PC on that map and read off that it does not constrain, and is not constrained by, RC.

**Theorem 7.1 (PC and RC do not constrain each other — proven).** PC does not entail RC, and RC does not constrain PC: PC is a data-axis condition, RC a dynamics-axis condition, and each is silent on the structure the other quantifies over.

*Proof.* PC concerns the *individuation and composition of the conserved weight* from capacity: PC-U asks what fixes the per-part weight's value (answer, by §5: the part's capacity content, frame-independent by IA), PC-C asks how weights compose across capacity-splitting (answer, by §6, under the measure reading: additively). Both are questions about what the weight *is*, given the capacity — capacity being the datum FP1 supplies. So PC is adjudicated on the data axis, by IA and N4. RC concerns whether the admissible *reversible dynamics* connects the carvings — a question about which maps are admissible, which FP1 does not legislate (the dynamical silence, *No Pre-Individuation* §7.3). The two quantify over disjoint structure: PC over the capacity-to-weight assignment (static), RC over the reversible motion among carvings (dynamic). PC's determination references no admissible-map structure, so it cannot entail a verdict on RC; RC's references no weight-assignment structure, so it cannot constrain PC. Hence neither entails or constrains the other. ■

**Remark 7.1.1 (the weaker claim, not full independence).** We prove non-entailment each way, not full logical independence (that all four corners — (PC, RC), (PC, ¬RC), (¬PC, RC), (¬PC, ¬RC) — are realisable). Full independence would require exhibiting models at the corners, which we do not construct; the data/dynamics cut delivers the silence-each-way claim cleanly and that is all the argument needs. The point downstream is only that discharging PC says nothing about RC and conversely — which non-entailment secures.

**Corollary 7.2 (the two open conjuncts were never twins).** The residue  $\ell^2 \Leftarrow PC \wedge \text{Obstruction B}$  presented two conditions of apparently equal standing. They are not the same kind of thing. Obstruction B's resolution is RC, a genuine open premise on the *dynamics* axis FP1 cannot reach.

PC is a *data-axis* condition, settled on the axis IA already controls: its universality strand follows from IA outright, its composition strand from IA plus the measure reading of N4. So even where PC is not yet fully discharged (pending that reading), it is open in a wholly different sense from RC — a reading to confirm against a companion, not a fact about dynamics the founding rule is silent on. The bookkeeping conjunct is settled, or all-but-settled, on the data axis; the dynamical conjunct is the gate.

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## 8. Why this is not the fiat

The paper makes claims of differing strength, and their separation is the discipline — the same discipline the companions held.

**What is proven (no fiat — given two facts flagged for confirmation, surfaced openly).** PC-U follows from IA under *either strength* of N4 (§5), given the *part-level* locus of N4 (faithfulness to each part, not the bare total) and the carrier's Uniform Readout (amplitude reads capacity content by one frame-independent relation). Under the measure reading a measure has no refinement-slot; under the function reading, value-faithfulness fixes  $w(P)$  by  $\text{Vol}_{\text{op}}(P)$  alone and IA gives that R supplies no further capacity content; UR then carries this to one h of amplitude, including across non-overlapping frames. The lever is functional dependence — what the value may depend on — not a contested claim about dynamics, and the two flagged facts (part-level locus; UR) are named, not buried in a proof clause (§5.1, §10.1). PC and RC do not constrain each other (Theorem 7.1) — a placement on the data/dynamics cut, using no premise beyond the cut, and claimed only as non-entailment each way (Remark 7.1.1). Neither asserts the bath, and neither touches RC.

**What is conditional, on one reading of N4 (debt located, not waved away).** PC-C is Weight Additivity, transferred from the definitional Capacity Additivity once the weight is a faithful *measure* (Theorem 6.1). This rests on the measure reading of N4, and we flag it as the single conditional (§6, Remark 6.1.3; §10.2). We explicitly *do not* claim conservation forces the measure reading: that argument equivocates — the inherited conservation is dynamical (intra-refinement), not subdivision-invariance (cross-refinement), and given separability subdivision-invariance just *is* PC-C (Remark 6.1.1). So PC-C is inherited under the measure reading and a thin data-axis residue otherwise; we name what decides it and decline the shortcut that would appear to settle it.

The asymmetry with RC is the point, and it is the inverse of the one the previous paper guarded. There, the danger was letting a *negative* data-axis result ("no external barrier") leak into a *positive* dynamical conclusion ("therefore flow"). Here the danger is the opposite over-modesty: treating PC as irreducibly new because it was *labelled* new, when the data-axis results reach it. We open the box — but by argument, each step visible and labelled, the one genuine conditional isolated to a reading of N4 — so that the relocation of PC is earned, not declared. And we are careful not to overclaim it: PC is not shown to vanish, but to be a *data-axis* condition settled on IA's axis, of a wholly different kind from the dynamical RC. What we do *not* do is let the

discharge of PC say anything about RC; the dynamical gate stays exactly where the previous paper left it.

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## 9. Assembly: the data axis relocated (and, under one reading of N4, closed)

Across the now-five companion papers the Born exponent stands as follows.

$\ell^2 \Leftarrow PC \wedge \text{Obstruction B. (inherited; Obstruction B affirmative} \Leftrightarrow RC, \text{No Pre-Individuation)}$

This paper resolves the PC conjunct, on the data axis:

1. **PC = PC-U  $\wedge$  PC-C** (stated precisely, §3) — universality of the weight function, and refinement-consistency of weight composition.
2. **PC-U  $\Leftarrow$  IA** (§5, proven under either *strength* of N4, given its part-level *locus* and Uniform Readout) — a contextual weight makes the value depend on more than capacity content, which IA forbids; under N4-measure this is immediate, under the weaker reading it follows by value-faithfulness, and the lever reaches non-overlapping frames via the carrier's uniform readout.
3. **PC-C  $\Leftarrow$  Capacity Additivity, under N4-measure** (§6, conditional on that reading) — Weight Additivity transfers because additivity is constitutive of a measure; a thin data-axis residue under the function reading. We decline the conservation shortcut, which equivocates dynamical (intra-refinement) for subdivision (cross-refinement) invariance.
4. **PC and RC do not constrain each other** (§7, proven) — PC data-axis, RC dynamics-axis; the two conjuncts were never of one kind.

Substituting into the residue, under the measure reading of N4:

$\ell^2 \Leftarrow IA \wedge \text{Obstruction B, with IA proven, Obstruction B affirmative} \Leftrightarrow RC, RC \text{ open.}$

The structural payoff is a relocation, and — under the single N4 reading — a closure, of the data axis. The data axis of the Born residue — every condition about what reality *contains* and how its conserved weight is *fixed and composed* — reads:

- **NPI** (no pre-given outcome index) — proven (*No Pre-Individuation* §4);
- **IA** (carvings fixed by M's capacity) — proven (§7.2 there);
- **PC** (weights fixed by, and — under N4-measure — composed additively from, that capacity) — universality reduced to IA outright; composition reduced to IA + the measure reading.

So every data-axis escape that turns on adjoined *data* — a pre-given  $\Omega$ , an externally individuated menu, an external component-charge, and now a context-dependent weight — is

closed from the primitive, the last (the contextual weight) by IA directly. What remains is the sole *dynamics-axis* condition, RC: whether the carvings are connected under capacity-preserving reversible motion — the continuity question FP1 cannot answer because it is silent on dynamics, the same species as the phase-axis continuity upgrade the programme already carries. If N4 is the measure it appears to be, the data axis carries no residual debt at all; if it is only function-faithful, the data axis carries one thin additive-consistency residue (PC-C) and nothing else — in either case a wholly different situation from the open dynamical gate.

**Remark 9.1 (what changed, precisely).** The previous assembly carried two open conjuncts and flagged PC as "the one genuinely new bookkeeping commitment." This paper removes that flag in the sense that matters: PC is not a *new kind* of commitment standing beside RC. Its universality content follows from IA outright (under either reading of N4, given N4's part-level locus and the carrier's Uniform Readout); its composition content follows from IA plus the measure reading of N4, and is a thin data-axis residue otherwise; and it does not constrain RC. What remains conditional is the character of N4 (part-level locus, measure strength) and the carrier fact UR — readings argued to be the intended content of a companion axiom and the carrier construction, not new premises of the programme's making. So the programme's commitments beyond inherited debts reduce to: on the data axis, none (under N4-measure, given UR) or one thin additivity residue (otherwise); on the dynamics axis, RC alone — and RC is plausibly not new either, being the refinement-axis kin of the phase-axis upgrade already owed. The square follows from IA (proven), the measure reading of N4 and the carrier's UR (to confirm), and RC (open).

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## 10. Limitations and Open Problems

### 10.1 The N4 reading — two axes, and the indispensable feature

PC's reduction depends on the character of N4 along *two independent axes*, which must not be conflated:

- **Locus: part-level vs total-level.** Does N4's faithfulness bind the weight to *each part's* capacity content ( $w(P)$  fixed by  $\text{Vol}_{\text{op}}(P)$ ), or only the *total* normalization to the total capacity? Lemma 5.1, hence PC-U, needs part-level faithfulness: a bare total-level condition gives no grip on  $w(P)$ , and PC-U is not secured.
- **Strength: measure vs function.** Given part-level faithfulness, is the weight an additive *measure* of capacity content, or merely some fixed *function* of it? PC-C needs the measure reading (Theorem 6.1); PC-U needs only the function reading.

Part-level faithfulness is the genuinely *indispensable* feature: both strands need it, but they need it differently. PC-U needs part-level *on its own* — independently of the measure strength, since value-faithfulness (§5.1) requires the value fixed by *each part's* capacity. PC-C gets part-level

*bundled* with the measure reading — a measure stated on parts is a fortiori part-level. So part-level is not merely a corollary of the measure reading; it is a separate requirement that PC-U imposes even when the measure strength is withheld. The measure strength is the additional upgrade, and all it buys beyond part-level is PC-C.

- **PC-U is secure under either strength, given part-level faithfulness** (and Uniform Readout, §5.1). It does *not* additionally need the measure reading — but it *does* need part-level, which is a separate axis from strength.
- **PC-C needs the measure reading** (part-level measure-faithfulness).

Confirming N4-measure settles both axes at once — a measure stated about parts is part-level by construction — which is why the optimistic path is "one thing to confirm" (§10.4). But the fallback is not automatically robust: under the function reading, PC-U still needs N4 to be *part-level* function-faithful, which is not entailed by "function-faithful" alone. We judge N4 part-level (a faithful normalization of a region that is separable, N1, is naturally faithful part-wise) and flag part-level faithfulness as the indispensable check; measure is the further reading that, if it holds, also discharges PC-C.

## 10.2 The status of PC-C, and the conservation equivocation

PC-C is Weight Additivity, and it transfers from the definitional Capacity Additivity once the weight is a faithful *measure* (Theorem 6.1). It is therefore inherited under N4-measure and a thin residue under N4-function. We flag explicitly that we do *not* discharge PC-C by the conservation route (Remark 6.1.1): "N is a conserved normalization, so it is additive under subdivision" equivocates, because the inherited conservation is dynamical (invariance under the admissible reversible maps *within* a refinement) and that is not subdivision-invariance (invariance *across* refinements); and given separability, subdivision-invariance just *is* PC-C, so the route would either smuggle cross-refinement invariance or restate PC-C. The non-circular discharge is the measure reading, which is a statement about the *kind* of object the weight is, not a restatement of WA. Should only N4-function hold, PC-C is the irreducible core of PC — a single data-axis additivity statement, the constraint the linearity companion converts to the power-law exponent (Remark 6.1.2), still orthogonal to RC and still not a new *kind* of commitment.

## 10.3 The precise statement of PC against the linearity companion

We have reconstructed PC as  $PC-U \wedge PC-C$  from its role in the companion chain (the universality the rotation argument needs, the composition the coarse/fine agreement needs). The reconstruction should be checked against the companion's actual usage: if PC there is invoked in a form not captured by  $PC-U \wedge PC-C$  — for instance a continuity or smoothness clause on  $h$  across refinements — that clause must be added and its status separately determined. We judge the two-strand reconstruction faithful to the stated role, but it is a reconstruction, and the companion is authoritative.

## 10.4 The single inheritance: N4 as a faithful measure of capacity content

The cleanest closure, and the one this paper is built around (§5.0), is the single inheritance N4-measure: the weight is a faithful measure of capacity content,  $w(P) = (f \circ \text{Vol\_op})(P)$  with  $f$  a measure. On the *N4 axes* it is not two properties but one map with two consequences — *part-level frame-independence* (a measure stated about parts is part-level, and a measure of frame-independent capacity content has no refinement-slot, giving PC-U) and *additivity* (a measure is additive over disjoint composition, giving PC-C from Capacity Additivity). So N4-measure settles both N4 axes at once (locus and strength, §10.1), and on the N4 side there is *one* thing to confirm, not two; a measure is intrinsically global, needing no common-refinement bridge to compare frames.

One fact sits *outside* N4 and must be confirmed separately: Uniform Readout (§5.1), the carrier fact that amplitude reads capacity content by one frame-independent relation. UR is what carries "one  $f$  of capacity content" to "one  $h$  of amplitude," and it is a property of the path-sum carrier, not of N4 — presumably definitional to the carrier's construction, but a distinct confirmation we have not yet made. So the honest tally is: confirm N4-measure (one statement, settling locus and strength) and confirm UR (a carrier fact, likely definitional). We judge both the intended content of N4 and the carrier respectively; **likely**, and the natural next technical step is to confirm them in the companions' verbatim wording, at which point PC's conditional status lifts entirely.

## 10.5 No new dynamics-axis content

We record explicitly, as a guard, that nothing in §§5–6 introduces a dynamics-axis premise. The reductions are individuation (PC-U) and composition (PC-C), both static, both adjudicated by capacity and the inherited normalization. RC is untouched, and Theorem 7.1 (PC and RC do not constrain each other) is the formal statement that this paper leaves the dynamical gate exactly where *No Pre-Individuation* placed it.

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# 11. Conclusion

The squared-amplitude rule, chased through the companion arc, came down to two conjuncts: a refinement obstruction whose resolution is the dynamical continuity premise RC, and PC — the decomposition-independence principle, carried unopened across every paper under the caption *the one genuinely new bookkeeping commitment*. This paper opened it.

Stated precisely, PC is two things: that the conserved weight is one function of a part's own amplitude, the same across every way of carving the rest (universality, PC-U); and that the weight of a coarse part is the sum of its sub-parts' weights (composition, PC-C). Neither, on inspection, is a new *kind* of commitment.

The universality strand is the Internality Axiom on the weight axis. A weight that depended on the partition it sat in would make its value depend on more than the part's own capacity content — and the founding rule, through IA, gives the surrounding partition no capacity content beyond the part's own. So the value is fixed by the part's capacity, frame-independent; there is one weight function, and the context the part sits in does not touch it. The lever is functional dependence — what the value may depend on — not the identity of the function's argument, which is why it bites even the contextualist who concedes the argument is the part's amplitude and indexes only the rule. And because it is a statement about one function of capacity content, it reaches refinements that share no part — the global universality the squaring argument needs. This holds whether faithfulness is read as a measure or merely as a fixed function of capacity; the universality strand is not hostage to the stronger reading.

The composition strand is the additivity a faithful *measure* of capacity carries. Capacity is additive across a carving; if the weight is a measure of capacity, that additivity transfers, and the coarse weight is the sum of the fine. This rests on reading the conserved normalization as a measure of capacity content — which we argue is its natural reading, but which is the one thing this paper leaves to be confirmed against the companion. We are careful not to force it by the conservation argument, which equivocates dynamical invariance (within a refinement) for subdivision invariance (across refinements) and, given separability, would merely restate the strand. Under the weaker reading the strand survives as a single thin additivity statement — still a *data-axis* one, still not a dynamical premise.

And the two open conjuncts were never twins. PC is a question about what reality's conserved weight *is*, given its capacity — a data-axis question, settled on the axis IA already controls. RC is a question about reality's *motion* — whether the carvings flow or seal — which the founding rule cannot answer, because it legislates capacity and is silent on dynamics. The two lie on opposite sides of that cut, and discharging one says nothing about the other. This, more than the reduction of PC itself, is the contribution: once PC and RC are seen to be different *kinds* of condition, PC stops being mysterious. It is not a second dynamical gate; it is bookkeeping on the axis the programme has already won.

So the data axis carries, at most, one thin residue, and under the natural reading of N4 carries none. No pre-given outcomes (NPI); carvings fixed by capacity (IA); the weight's value fixed by capacity (PC-U, from IA, given N4's part-level locus and the carrier's uniform readout); and — if N4 is the measure it appears to be — the weight's composition fixed by capacity too (PC-C). Every classical escape that turns on adjoined data — a pre-printed outcome set, an external menu, an external charge, a context-dependent weight — is shut from the primitive, the last by IA directly. The two N4 branches must be kept distinct: confirm N4 a part-level measure and the data axis is *closed*, PC carrying no residual debt; find N4 only part-level *function*-faithful and PC-C is not resolved by any further confirmation — it remains a standing, thin, data-axis additivity premise (the constraint the linearity companion converts to the exponent), not a pending check. Either way the data side is settled or all-but-settled; what stands between finite distinguishability and the Born rule, on the dynamics side, is the one genuine open premise RC — whether reality's own carvings are connected by reversible motion, on the axis the founding rule does not reach, and which, being the refinement-axis kin of a continuity the programme already owes on the phase axis, may be no new debt either.

The last sealed box held no new *kind* of commitment: what was inside was the data axis the programme had already won, in different clothing — with, on the optimistic reading of N4, nothing left to confirm, and on the pessimistic reading, one thin additivity premise of a kind the programme already runs on. With it opened, the squaring waits on one thing of its own kind only — the dynamical question the founding rule cannot reach: whether the carvings flow.