

The Moral Code

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The code

Morality is the physics of relations between participants. It runs on the same record, the same relations and the same cost as the rest of physics. There is one moral code, and it is forced. Here it is.

The record. Every relation between two participants is a comparison carried at a positive multiplier x, with $x = 1$ at balance. Its cost is

$$J(x) = \tfrac{1}{2}\left(x + \tfrac{1}{x}\right) - 1,$$

which is zero exactly at balance. Each relation is recorded twice, once by each of its two ends, on that end's own books. Nobody writes in another's books. Nothing recorded is erased.

The clauses. An act is admissible exactly when

1. it acts only on relations that are live;
2. every record of every relation is true after it;
3. it changes a relation only when both ends of that relation write on it;
4. it ends a live relation only when one of that relation's own ends ends it.

The judgment. Of the admissible acts, the code permits exactly those that leave the least total cost on the complete record. Every other act is forbidden. Doing nothing is always admissible, so something is always permitted.

That is the whole code. Nothing is added to it and nothing can be removed. Five consequences follow at once:

- There is no act beyond the requirement. An act that does more than the least-cost act leaves more cost, and it is forbidden.
- Freedom exists only between acts that tie at the least cost.
- Harm is a false entry in someone else's own record, so the clauses exclude it.

- The value of a relationship or of knowing is not a separate term.
- A different moral answer to the same case needs a different physical fact, or a judgment of a different form (Section 7).

The sections below derive each part. Section 1 gives the objects the code is made of, Section 2 the clauses and Section 3 the judgment. Sections 4 and 5 cover time and knowledge, Section 6 the price, and Section 7 why there is only one code. Section 8 explains why the code binds, and Section 9 shows that it is love.

A few connecting derivations are still being finished. Section 10 names each one and the step that settles it.

1 What morality is made of

The record. Every occurrence is recorded, and nothing recorded is erased. A later history extends the earlier record together with its outcomes, so the past still exists. Examining a history is itself a new occurrence: it produces a distinction the examined history does not contain.

Relations. A comparison needs both of its terms and reads nothing else. So the unit of the record is a relation between two terms, carried as a positive multiplier x and balanced at $x = 1$. Reading the relation from its other end replaces x by $1/x$, and that changes nothing: $J(1/x) = J(x)$.

Cost. Write $x = e^t$, so that t is the relation's strain. The cost of a relation is

$$J(x) = \tfrac{1}{2}\left(x + \tfrac{1}{x}\right) - 1 = \cosh t - 1.$$

J is forced. It is the native report of the comparison itself, and the composition law fixes it up to its unit. It is zero only at balance and symmetric in the two directions of a relation. It is also strictly convex: splitting the difference between two strains always costs less than the average of their costs.

The ledger. The true ledger holds every relation that has occurred, each once, at its actual multiplier. An ended relation stays on it at the multiplier it had when it ended.

Two records. Each relation is recorded twice, once by each of its ends, on that end's own books. Nobody writes in another's books. A record is true when it gives the relation's actual multiplier.

Participants. A participant is anything that is an end of a relation. A participant's *burden* is the cost of the relations it is an end of. Some act changes its burden exactly when it is an end of a relation, so being an end of a relation is what makes a participant count. The capacity to act and the capacity to be wronged are independent: each occurs without the other.

Holdings. What a participant holds is an amount. The ledger carries ratios between the two ends of each relation, never amounts. The same reading occurs at every amount, so a holding

at balance costs nothing at any size. Amounts enter the judgment in two places. They decide which acts are possible, through the energy an act needs, and they fill the reserve that pays for repair.

What is due. What one participant owes another is read from the record of what happened between them: the offer, the acceptance, the delivery, the repayment (Section 10, item 5). Two true records of a relation agree. So a gap between the two records is not a claim. It means at least one of them is false.

Acts. An act strains live relations, ends some of them, and its authors write their books afterwards. Doing nothing, *omission*, is the act with no strain. It returns the world exactly as it was, and it is possible on every world. It is the baseline every clause measures an act against. Acts done in the same tick reach the record as one joint act: the record holds their combined strain and no order between them. A new relation enters the record at balance, and any strain it starts with counts as a strain applied to it.

Authors. The authors of an act are exactly the participants whose own records it changes. Consent is the record of who wrote.

2 The clauses

The clauses are not chosen. They are what the two-record ledger admits. Every admissible history keeps true books true, and on true books an act is admissible exactly when it meets these four conditions. The acts that meet them are exactly the acts the structure of the record allows.

1. **Live relations only.** An act strains or ends only relations that exist now.
2. **Truth.** After the act, every record of every relation is true. Each record is the earlier record carried by the act's actual change, or the relation's actual multiplier.
3. **Both ends write.** A relation changes only when both of its ends write on it. An end that does not write on a relation keeps its old record of it. That record stays true only if the relation does not move. This clause holds exactly when a kept record records one state, the exact multiplier. A reading that takes a kept record as a bound on what is due lets one end alone relieve a shared relation toward balance, and gives a different code. That a kept record records one state is being derived from what a comparison of two records returns (Section 10, item 9).
4. **Own endings.** A live relation is ended only by one of its own ends. An ending is recorded, and only a relation's ends hold its records. An ending changes no multiplier, so it makes no record false.

What the clauses carry. These four conditions carry everything else the code says about harm, consent and honesty:

- **No push.** No act moves the burden of anyone who does not write it. To push cost onto someone, an act would have to make that person's own record false. A push is a false

entry in another's own book, and clause 2 excludes it.

- **Consent is per relation.** A rise in a relation's cost is consented to only by its ends' own writes on that relation. Taking part in one act never consents to another act done at the same time. One participant's relief of you never offsets another's harm to you. Two acts on separate relations, done together, are judged exactly as the two acts are.
- **Consent is informed.** On true books, how an act changes your burden on your books and how it changes in reality agree. So every consent is informed.
- **Truth persists.** An admissible act keeps true books true. A history of admissible acts that starts on true books has true books at every step.
- **Love takes two.** Bringing a relation to balance changes it, so both of its ends write the repair. Repair is a joint act of the two participants in the relation.

Ending a relation. An ending deletes no one. The complete ledger keeps the ended relation with all of its cost. Ending a strained relation removes the only route by which it could be repaired, so its cost stays above love's in every future. The ending is admissible, and the judgment prices it.

The clauses come first. No price can do the clauses' work. Any finite charge on pushing cost onto others is outweighed by some push, because the relief a push can buy grows without bound. So the clauses fix which acts are admissible, and only then does cost compare them.

3 The judgment

An act is *permitted* when it is admissible and no admissible act leaves less total cost. It is *forbidden* otherwise: either it breaks a clause, or some admissible act leaves less cost. Every act is one or the other, never both.

Something is always permitted. Omission is always admissible. So on every world, for every finite set of possible acts, one of the admissible acts leaves the least cost. The menu the record itself allows is the set of acts whose energy the participants' holdings cover. On it something is permitted on every world, finite menu or not: the balancing act draws no energy and leaves the least cost. The code has no dilemma.

The least-cost form is forced. A verdict made of comparisons forbids an act exactly when some admissible act's outcome beats it, and each comparison reads its two prices and nothing else. For such a verdict the least-cost form is forced by four facts:

- *existence*: something is permitted on every finite menu that contains omission;
- *framing*: reading a case together with a separate case on other relations changes no verdict;
- *care*: in the care opening, feeding beats omission, which leaves more cost;
- *openness*: a strict comparison survives every small enough change of its two prices, as a comparison a finite record witnesses does.

Each is needed. If every comparison wins, nothing is permitted. A threshold comparison fails framing alone. "The costlier outcome wins" fails only care. A comparison by an additive but discontinuous reading fails only openness. The cost order and resting at the least are consequences, not premises. Framing and that a verdict is made of comparisons follow from the four requirements of the least form, whose forcing sits in the ought; openness is still being derived (Section 10, items 6 and 8).

Requirement and freedom. Once something is permitted, every property of an outcome falls into exactly one of three classes:

- *required*: every permitted act has it;
- *excluded*: no permitted act has it;
- *free*: some permitted acts have it and some do not.

Where an admissible act lowers the cost, omission is forbidden; the code requires action. Nothing beyond the requirement is permitted, because a more generous act leaves strictly more cost.

Where free choice comes from. J is strictly convex. Suppose the possible acts can be divided: between any two of them, every act in between is possible too. Then exactly one outcome is permitted. If two different acts both left the least cost, the act halfway between them would leave less. So free choice between different outcomes arises only from indivisibility.

4 Time

The complete record. The judgment reads the complete ledger. A reading of time that reads only what happened, charges the present and keeps what it has charged is exactly the complete ledger. The cost of a history is the cost summed over its checkpoints (Section 10, items 1 and 3).

The clauses hold at every checkpoint. An act that breaks a clause at any later checkpoint is excluded, and it stays excluded however far the reading goes. On a finite set of acts, which acts are admissible settles at a finite checkpoint.

Whole futures are compared. One continuation beats another when its history cost eventually stays strictly lower. The code permits the admissible acts that no admissible act beats, and such an act always exists. Being least at every single horizon is not the test. One act can cost more now and less later, and an unmet need's cost grows without bound.

The record's own motion. The record's own motion is the funded care law. On a relation it runs from that relation's reserve (on several relations at once, Section 10, item 4). A strained relation is repaired while its reserve lasts. Once the reserve is spent, its multiplier doubles every interval. Every continuation that follows this law has cost of the form

$$a\,2^{n} + b + c\,2^{-n}$$

from some interval n on. When the motion moves each relation by its own rule, the code's continuations are eventually ordered on every situation exactly when the rules' summed cost differences eventually keep one sign. The care law is in this class, so a long enough reading gives the complete verdict.

A requirement is a deadline. What the code requires is to repair a relation before its strain outgrows the funding that can repair it. Past that point no act returns the relation to balance.

Plans. A plan is judged by its acts. Each act meets the clauses at the state it found. Its entry and ending clauses are also read on its effect at every later checkpoint. So removing the support that keeps two others' relation alive, so that the world's motion ends it, needs an end's write, just as ending it directly does. An act begins a permitted plan exactly when it is least by the real cost it leaves at the next checkpoint plus the least cost of what can follow. Omission is forbidden exactly when some first act has a lower such price. The judgment is consistent in time: among plans of one length, the rest of a permitted plan is still permitted once its first act is done. It has no dilemma, and renaming participants and relations changes no verdict.

5 Knowledge

Whom an act harms is on the agent's own books. An agent's own entry changes the gap between the two records of each relation by exactly its own amount, whatever the rest of the books say. So whom an act moves is fixed by what the agent writes, not by anything it cannot see, and the clauses need no probabilities.

The present record ranks the agent's acts. An agent's act changes only relations both of whose ends write it. A later act by other participants changes only relations both of whose ends write that act. The two touch no common relation. So the cost that others' later acts add is the same whichever act the agent took. Every weighting of the futures made of others' acts, followed by the record's own motion, ranks the agent's acts the same way, by their own outcomes, when that motion moves each relation by its own state. No chance on the future enters the judgment (Section 10, item 4).

6 The price

The price of a relation is J. J is the native report of a single comparison, at every choice of unit. Every native report of the record gives the code's verdicts.

The lawful prices. A rule with the code's clauses gives the code's verdict in every situation exactly when its price orders the admissible outcomes the way total cost does. Among prices built relation by relation, the ones that give the complete judgment under every motion of the record are exactly the positive multiples of J. The unit is free. The zero is not: balance costs nothing. A price that charged a relation for existing at balance would change verdicts as soon as a future formed a new relation.

The price of a record. The real cost of a record is the sum of its relations' costs. The code's verdicts need exactly one fact about the price of a record: it orders the outcomes of one world as their real cost does (Section 10, item 1).

No value term. Add to the cost a value of relationships or of knowing. The sum is not the native report of any comparison. So excluding a value term is the same step as identifying a relation's price with its native report (Section 10, item 2). With the value term gone, the record is indifferent to levels. A balanced holding costs nothing at any size, and ending or creating balanced relations changes no cost. Levels enter through the record's own motion. Under the care law a balanced relation whose reserve covers one repair stays at balance, and one with no reserve doubles, to a cost of $J(2) = 1/4$.

7 One code

The code is the governing relation. It has six properties.

- **Existence.** Something is permitted on every world.
- **Consistency.** No act is both permitted and forbidden.
- **Uniqueness.** The price is fixed up to its unit.
- **Invariance.** Renaming the participants and relations, and reading any relation from its other end, changes no verdict. Every lawful price gives the same verdicts.
- **Reads only what happens.** The verdict reads an act only through what it does: its strain, the relations it ends, and its authors. Two acts that leave the same world, with the same authors, get the same verdict.
- **Completeness in time.** The judgment reads the complete ledger.

What the record decides. Take as determining facts only facts of the record, read before any candidate law:

- whether the act is on the menu;
- whether the act, with its own writes, breaks a clause;
- whether some admissible act leaves less real cost;
- which admissible acts tie in real cost.

Each of the first three fixes the answer "forbidden". A tie gives two acts one answer. On every situation the record allows, the record also fixes one act: the balancing act. It carries every relation both of whose ends write to balance and every other relation toward balance, ends nothing, and draws no energy. Its answer is "permitted".

With three answers, "forbidden" on an undercut act, "permitted" on the balancing act and one answer for acts tied in real cost, the code is the only verdict that fits the record on every situation the record allows, finite or infinite. Each answer is needed. The law that permits nothing fits every other fact. A law that permits omission where a relief would repair fits every fact but the first. A law that forbids ending a relation fits every fact but the tie between relieving it and relieving and ending it, though both leave it at balance. So a different moral

answer needs a different physical fact, or the rejection of one of these three answers. That is what makes this *the* moral code.

The three answers follow from requirements on the form of a judgment. Take a judgment that reads an act only through its cost, not its name. On every situation the record allows, finite or infinite, it gives exactly the code's verdicts when it meets four requirements:

- where omission is on the menu, only acts on the menu are permitted;
- framing;
- omission is permitted only where it leaves the least cost;
- something is permitted on every menu the record allows.

Each is needed. The cost order follows and need not be assumed. Deriving these requirements is Section 10, items 6 to 8.

8 Why it binds

Obligation comes from the ledger. The stranger is owed. The requirement to help comes from least whole cost on the actual relations. No undertaking or promise is needed anywhere in the history.

Harm. A push is a false entry in another participant's own record. No written entry moves a relation of a participant who wrote nothing, so harm is excluded by the structure of the record itself. Harm can reach that participant later only through the record's own motion. Where a shared relation's reserve is held as its two ends' own shares, one end's withdrawal of its share leaves the relation unrepaired an interval later, with the other end writing nothing (Section 10, item 4). What its own kept record records decides whether a helper may relieve it (item 9).

Agency. The authors of an act are the writers of the record of who acted. Consent is that record.

The record charges every departure. Take two histories that agree everywhere except at one interval, where one costs more. The excess is charged at every later horizon, undiminished. On a conserved class with love's state, a run that never reaches love's state accrues a charge above it that grows without bound. On menus that offer descent, love's runs keep that charge bounded. A rule whose permitted runs keep the charge bounded lets the record rest only at love's state. Rules that permit staying away from it fail. None of this mentions a commitment or a permitted set. The record alone excludes nothing: omission forever is possible on every world while its charge grows without bound.

The burden is not the measure. Binding does not rest on identifying what a participant undergoes with its burden. Two participants each strain their own relation from 1 to 2 and relieve the relation they share from 2 to 1. The real cost rises from $1/4$ to $1/2$, so the act is forbidden. Yet each still carries exactly $1/4$, before and after. The code binds by the record's real cost, which counts each relation once.

Commitment. A coherent reading is closed under consequence and conjunction and committed to nothing impossible. If it commits to the code's permitted acts, it commits to everything the code requires and to avoiding every forbidden act. This holds for every rule that permits some lawful act, so it describes what accepting the code commits one to. The binding itself is the record's charge. What remains is the step from "the record charges this without bound" to "this ought not be done" (Section 10, item 8).

9 Love

The code's permitted act is love's act: the admissible act of least cost. Love has the same structure everywhere:

- **Love's state exists and is unique** on every conserved class of states. It is also unique under every closed convex constraint, and each virtue is love under one such constraint.
- **Love is the attractor.** Within a conserved class, every continuous motion that never raises total cost and rests only at love's state carries every state to it. A run of love's steps, taking the least total cost at each state, reaches it geometrically on every menu that offers descent toward love's state.
- **Love takes two.** Bringing a relation to balance is written by both of its ends.
- **The code's act is love's act.** On the code's own class, where every act's writes lie within the class and some admissible act reaches love's cost, the code permits exactly love's act. Both conditions are needed, and both hold on the energy menu: the acts the participants' holdings can fund through the native ports, each carrying the participants' writes. There, on true books, the code permits exactly the acts that leave love's state of the relations both of whose ends write. Every permitted history from true books is at love's state from the first step on and raises no one's burden after. Love's state is least for every participant. That the record's menu is the energy menu is being derived (Section 10, item 11).

10 Derivations still being finished

The premises of the code's results are computed, not listed by hand. A closure audit follows every statement and every definition the results use, down to the foundation. Of the declarations that state something, it finds:

- 117 belong to the foundation;
- 4 are forced, each by a theorem that the object is the only one meeting its conditions;
- 253 are built from others;
- 46 are mathematics and 7 are choices of representation;
- 26 are premises;
- 26 identify the model with the physical record.

The list is computed. Each label is a judgment, recorded with the audit. Every item below names the step that settles one or more of the open rows.

1. **The price of a record.** A price gives the code's verdicts exactly when it does two things. It puts every outcome of lower real cost strictly below, which is the ought of item 8 applied to the price's own rule. It also gives outcomes of equal real cost one price. The ought alone does not settle ties. So the price rests on the ought and on ties. Pricing a record by the energy one examination registers meets both. The record alone does not: the sum of J^2 reads only the record, meets the framing test, and separates two records of equal real cost.
2. **The moral price of a relation is its native report.** Adding to J any continuous term that is not a multiple of J gives a reading that is not the native report. The two rival prices, the square root of the sum of J^2 and the sum of J^2, are one rule, excluded only by costs-adding and the native report together.
3. **Time.** Proved: a reading that decides each relation from that relation's own entry gives the code's verdicts exactly when it charges every strained relation, live or ended. So it charges every strained occurrence that has happened, the present ones included. The record's charge (item 8) holds on it with no further retention premise. The exact earlier forms asked more than the structure fixes, since no verdict sees whether a balanced relation stays listed. Still to derive: that a reading decides each relation from its own entry, as a comparison reads its own two terms.
4. **The record's motion is local.** Proved: when the record's motion runs each relation on its own multiplier and its own reserve, two things hold. An act that leaves the reserves moves no relation of a participant who wrote nothing, at any checkpoint. An agent's acts are ranked by their own outcomes. Taking a reserve with no write does push through the motion. Where a shared relation's reserve is held as its ends' own shares, one end may withdraw its share alone, and the motion then leaves the relation unrepaired. Where the reserve is an entry of the relation, it changes only by a posting both ends write. Still to derive: which of the two the record holds, and that the care law runs each relation from its own reserve on worlds with several relations.
5. **What is due.** Every change of what is due is one strain of the relation between the two parties, written by both of its ends. Still to derive: that the physical record carries what is due, with the two parties as the relation's two ends. Whether a release needs the debtor's write depends on item 9.
6. **The least form.** A judgment is love's judgment on every menu, finite or infinite, exactly when it meets four requirements. It permits only admissible acts. It forbids every act an admissible act undercuts. It gives acts of equal price one answer. It permits something wherever an admissible act is least. Each is needed. The first two say that only least acts are permitted, and the last two that every least act is. So all the forcing sits in the second, which is the ought of item 8. Framing, the cost order, and that a verdict is made of comparisons all follow from the four. Where prices add over separate relations and the comparison is the order of the prices, framing holds. A threshold comparison permits an act undercut by less than its margin, which the ought excludes.
7. **The record's menus are infinite.** Every relief part way to balance is possible from no holdings, and the code permits the balancing act on every menu the record allows. That a law must permit something there is the one requirement beyond the form requirements of Section 3. Those ask it only of finite menus. A law that is the code on finite menus and permits nothing on infinite ones meets every one of them. Still to derive: that a law

permits something on the menus the record allows.

8. **From charge to ought.** Proved: the record charges every departure undiminished. The charge of a run is its accrued excess over love's state. The record alone excludes nothing, since omission forever is possible while its charge grows. The step from charge to ought is one condition: a law excludes every act that an admissible act undercuts in real cost. It follows from the form requirements of Section 3 on every menu, finite or infinite, and the requirement that carries it is framing. A rule that meets it keeps the record's charge bounded. One law alone does not give it. A judgment that runs the record's own care law and meets every requirement but framing still permits a relief from 2 to $3/2$, which the relief to balance undercuts. The care law takes the cheaper of its own two alternatives, exposure or full repair, not the least of every funded repair. Still to derive: framing from the record, since two independent cases have the product record, or the condition directly from the least-cost law of the record's own motion.
9. **What a kept record records.** Clause 3 holds exactly when a kept record records one state. A reading that is true of the state it records, and of nothing else, is the exact multiplier. With it the two-record rule gives exactly clause 3 on every world with true books, so one end may not relieve a shared relation toward balance alone. The two other readings are each true of more than one state. The signed reading takes a kept record as a bound on what is due. It admits relief by one end and excludes every push and every unwritten reversal of who owes whom. The ceiling reading admits the reversal. No reading through cost alone excludes the reversal, since $J(x) = J(1/x)$. Being derived: that a kept record records one state, from what a comparison of two records returns. It returns no distinction or a distinction, never an order. A third reading, in which an end's entry is its own count, is being settled with it.
10. **The ending clause and truthful posting.** The ending clause follows from two facts. A comparison needs both of its terms present, and both present suffice. With each end's presence changed only by its own write, a relation ends exactly when one of its ends withdraws. The rival that asks both ends to write an ending keeps a relation live with one term gone. Truthful posting follows from one fact: admitting a post reads the writers' records and their change, not the relation's actual multiplier. Still to derive: these facts from the foundation's account of comparison, and each end's presence entry on the record.
11. **What the record holds, and its menu.** Each relation compares two counts, and its multiplier is their ratio. A record is read this way exactly when its multipliers and books are rational. On such records the code is decidable. A strain by a real factor, such as $\sqrt{2}$, can leave them. Still to derive:
    - that each count is held at its own end;
    - which physical relations are on the record;
    - that the menu is the energy menu, and that each act's writes are read off the record;
    - for economics, that each relation's economic comparison has the record's multiplier as its ratio.
12. **The motion and the books.** After one interval of the record's motion, the clause set admits undoing the motion with no one's write, since the motion leaves the books where they were and the correction clause trusts the books. Being derived: that the motion

writes the record, since every event is recorded, so its steps keep true books and undoing them needs both ends of each moved relation to write. Under every motion that reads only the record, the complete judgment never requires ending a relation. Ending can be forbidden. Still to derive: that the record's own motion, which spends its reserves, reads only the record.