

# The Way Before the Net

## Light, Location and the Oldest Dao as the Ground of the Vacuum.Net

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### 1. Why go back

The Vacuum.Net theory rests on five axioms. There is one strand (N1). Only what closes persists (N2). A closed configuration carries memory (N3). The response of the medium is a state function (N4). Each step deeper multiplies the states by three (N5).

These axioms work. They give a ternary register, a closure rule, a depth ladder and numbers that land on hydrogen, room heat and the Earth's cavity.

Yet they carry a hidden second actor. A strand that crosses, winds and closes is something that travels over places. Then there are two things: the places and the carrier that runs along them. The rewrite rule R has the same problem. It is applied to a ring, but by what?

This essay removes the second actor. It starts from one statement: the only thing there is, is light. It then follows that statement through four steps. Light is a location. A location is a point with a bound movement. That movement combines with itself into all three trit values. And the oldest Chinese form of the character 道, together with the oldest Daoist account of origin, already contains the result.

The outcome is a theory with three rules instead of five axioms. It is simpler. It is also older.

Every step carries a status. *Proved* means a mathematical result that holds under its hypotheses. *Computed* means a number checked by arithmetic. *Source* means a published text or inscription. *Reading* means an interpretation offered here. *Open* means not yet settled.

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### 2. The units are already one photon of light

The Foundational Paper (Edition 8.1) fixes two conversion units from hydrogen.

The length unit is  $S_0 = 1/(2R_H)$ . With the reduced-mass Rydberg constant  $R_H = 10,967,758.340 \text{ m}^{-1}$ , this gives  $S_0 = 4.55882 \times 10^{-8} \text{ m}$ , or 45.588 nm.

The time unit is  $T_0 = S_0/c$ . With  $c = 299,792,458 \text{ m/s}$ , this gives  $T_0 = 1.52066 \times 10^{-16} \text{ s}$ .

The energy unit is  $E_0 = h/T_0$ . Write it out:

$E_0 = h/T_0 = hc/S_0 = (1.98645 \times 10^{-25} \text{ J}\cdot\text{m}) / (4.55882 \times 10^{-8} \text{ m}) = 4.35737 \times 10^{-18} \text{ J} = 27.197 \text{ eV}$ .

The paper names  $E_0$  the Hartree energy of hydrogen. It is equally the energy of one photon of wavelength  $S_0$ . Length, time and energy of the net are

together one quantum of light. *Computed.*

Two consequences follow at once.

First, the power ceiling of the net, one closure per mesh per layer time, is  $E_0/T_0 = 0.0287$  W. That is one photon per mesh per period. *Computed.*

Second, the depth ladder  $3^n \cdot S_0$  becomes a ladder of one photon read at other depths. At depth 2 the length is  $9 \cdot S_0 = 410.29$  nm, the Balmer H $\delta$  line. At depth 5 it is  $243 \cdot S_0 = 11.08$   $\mu$ m, close to the peak of room-temperature radiation. At depth 31 it is  $3^{31} \cdot S_0 = 2.816 \times 10^7$  m. The lowest ideal mode of the Earth-ionosphere cavity has wavelength  $2\pi R/\sqrt{2} = 2.831 \times 10^7$  m, for  $R = 6,371$  km. The two differ by 0.5 %. *Computed.*

All three landings are light. The ladder does not pass through different kinds of phenomena. It passes through one spectrum.

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### 3. Light is a location, not a motion

The first impulse is to call light the unit motion of the net. One mesh per layer time gives  $S_0/T_0 = c$  by construction.

That definition fails. If light is defined as motion at  $c$ , it cannot also be the stuff of matter at rest. And “the motion of the net” presupposes a net that moves. Then light is again something other than the net.

The correction is this: light is a location.

Dewey Larson stated the same idea in 1959. In his natural reference system the photon has no motion of its own. It stays at its absolute location. The reference system itself progresses at unit speed. Larson’s dimensions are already part of the Foundational Paper. *Source; assumed as postulate.*

Relativity offers an echo but not a ground. Along a light path the interval is zero:  $ds^2 = 0$ . This follows from Einstein’s second postulate, so it restates an assumption. A photon also has no rest frame, so “what light experiences” lies outside that theory. Moreover relativity takes  $c$  as a universal constant, while N4 treats  $c$  as a state function. Relativity is therefore at most a correspondence here. *Correspondence.*

In the net, Theorem T7 gives every state exactly one address, a balanced-ternary string. *Proved.* If light is a location, light is an address. The 45.6 nm photon is the address at depth 0. H $\delta$  is the same address at depth 2.

This reverses the earlier picture.

- **Light** stays at its location and is carried along by the progression.
- **Matter** is a location that holds itself against that progression. That is closure: what returns in phase stays put while everything else moves on. Larson calls it rotation opposing progression.
- **c** is the measure of the difference between the two: one mesh per layer time. That is why matter always measures light at  $c$ .

The old question “can light rest?” disappears. Light always rests, in its own terms. What we call motion is matter holding on while the locations progress. *Reading.*

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### 4. The point and the stroke

The character 道 makes the next step visible. It has 12 strokes in the standard count. It consists of 首, “head”, with 9 strokes, and 辶, “going”, with 3 strokes. The Kangxi tradition counts 辶 as 4 strokes, giving 13. *Source.*

The stroke order of 道 is fixed. A character drawn in another order counts as wrong. The order belongs to the character. *Source*.

The order runs as follows. Strokes 1 to 9 write 首: 丶 丿 一, then 自. Strokes 10 to 12 write 乚: a dot, a folded stroke and a long flat sweep. The component 乚 stands on the left and encloses the whole from below. Yet it is written last. First the place, then the going that carries the place.

Both parts begin with a dot. Stroke 1 is 丶. Stroke 10 is 丶. *Source*.

A dot in calligraphy is not a static speck. It is a short stroke: set down, a small direction, lift. The dot is movement of the smallest extent.

So there is one ground act, the stroke, in two states.

- **Point:** movement that closes at once. This is location. This is light.
- **Stroke:** movement that continues.

Every movement in 道 starts from a point. Never the reverse. A form is not a configuration but a fixed sequence of acts. Its identity lies in the order of making. This is N3, memory as shape, read in writing. It is also T7: the same trits in another order give another address. *Reading*.

No second actor is needed to draw. The order is the thing itself, as the stroke order is the character.

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## 5. Random, but bound to the point

The movement that leaves a point need not be directed. It may be random. The question is whether it stays bound to its point.

Model the movement as a random string of trits. Each step is +1, 0 or -1 with equal chance. "Bound to the point" means the running sum comes back to 0.

**Return after three steps.** Count the strings of length 3.

- Exact return, sum = 0: the string 000 and the six permutations of (1, 0, -1). That is 7 of 27.
- Return modulo 3, the window rule of T9: 9 of 27. The two extra strings are 111 and TTT, with sum +3 and -3.

*Computed.* The numbers 1, 1, 3, 7, 19, 51, 141, ... are the central trinomial coefficients. They count exact returns after 0, 1, 2, 3, ... steps.

The difference between 7 and 9 matters. Exact return means coming back along the line. The strings 111 and TTT do not come back on the line. They go once around a ring of three. The register counts both as closure. There are two kinds of binding to the point: coming back and going round.

**One dimension is always bound.** The chance of exact return after  $n$  steps behaves as  $\sqrt{3} / (2\sqrt{\pi n})$ . Each step has variance  $2/3$ . The local limit gives  $1/\sqrt{(2\pi n \cdot 2/3)} = \sqrt{3}/(2\sqrt{\pi n})$ .

That chance goes to zero. But the sum over all  $n$  diverges. A random movement along one line therefore returns to its point with certainty, and does so infinitely often. *Proved:* Pólya, 1921. It holds for every step law with mean zero and finite variance.

In three dimensions this fails. There the return probability is  $P_3 = 0.3405$  (Watson, 1939; Theorem T18 of the Foundational Paper). *Source*.

The consequence is direct. "Random, but bound to the point" needs no force and no second actor. A movement with only one direction, forward and back, stays tied to its point by itself. That is N1, one strand, read without a strand.

- **Light** is the point.
- **The movement** is random but one-dimensional, and therefore bound.
- **Matter** arises where the movement does not merely return, but returns in phase.

*Reading*, on top of the proved recurrence.

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## 6. The act combined with itself

Write the ground act as “. >”: leaving a place. Its mirror is “< .”: arriving at a place.

The mirror need not be given separately. Give “. >” the value +1 and repeat it, counting modulo 3.

- once: +1;
- twice:  $1 + 1 = 2 \equiv -1$ , the mirror “< .”;
- three times:  $1 + 1 + 1 = 3 \equiv 0$ .

*Proved*: the group  $\mathbb{Z}_3$  is cyclic and generated by one element. From one act all three trit values arise. This works only on the ring of three. On the plain line,  $1 + 1$  stays 2.

There are two roads to 0.

- **Meeting**: “. > < .”, the act meeting its mirror:  $+1 + (-1) = 0$ .
- **Going round**: the same act three times: 111 or TTT.

These are exactly the two kinds of closure in Theorem T10. A window closes when its three trits are all different (heterogeneous) or all equal (homogeneous). *Proved*.

So the 0 is neither emptiness nor rest. It is leaving and arriving cancelling in the sum while both exist. In terms of light it is a movement between two places, there and back: a standing wave with the points as nodes. That is the simplest bound light. The mesh is the space between a leaving and an arriving. *Reading*.

Order still counts. “> <” (towards each other) and “< >” (away from each other) both have sum 0. They differ. The first closes. The second opens. The sum does not see the difference. The order does, as in the stroke order of 道. *Open*: the register so far measures sums only. It needs a quantity that records order.

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## 7. The oldest Dao: a crossing with someone in it

The modern 道 is a contraction. Older forms are written 衢 or 衛.

Lexicographers read them as a person standing at a crossroads 行. The head 首 sits inside the crossroads. At the bottom stands 止, the foot. *Source*.

The component 行 carries the meanings walking, passage, birth canal and crossroads. The pairing of 首 with 止 can stand for a person. *Source*.

The oldest 道 thus holds three things in one sign.

- 行, **the crossing**: the self-crossing of N1.
- 首, **the place in the crossing**: the point, the location, light.
- 止, **the foot**: the step, the movement bound to the place.

There is no carrier besides these. The crossing, the place and the step are given together. *Source for the graph; reading for the mapping*.

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## 8. The oldest account of origin: arising by return

In 1993 a tomb at Guodian in Hubei yielded bamboo slips from around 300 BCE. They hold the oldest known Laozi material. Beside it lies a short text of 14 slips, the *Taiyi sheng shui*, “The Great One Gave Birth to Water”. It has not been found anywhere else. *Source*.

Its opening reads:

太一生水，水反輔太一，是以成天。天反輔太一，是以成地。天地復相輔也，是以成神明。神明復相輔也，是以成陰陽。陰陽復相輔也，是以成四時。四時復相輔也，是以成寒熱。寒熱復相輔也，是以成濕燥。濕燥復相輔也，成歲而止。

In translation:

The Great One gave birth to water. Water returned and assisted the Great One; thus heaven was completed. Heaven returned and assisted the Great One; thus earth was completed. Heaven and earth assisted each other again; thus the spirits above and below were completed. These assisted each other again; thus yin and yang were completed. Yin and yang assisted each other again; thus the four seasons were completed. The four seasons assisted each other again; thus cold and heat were completed. Cold and heat assisted each other again; thus moist and dry were completed. Moist and dry assisted each other again; the year was completed, and it stopped there.

The text then reads the chain backwards. The year is born of moist and dry, moist and dry of cold and heat, and so on back to the Great One. *Source*.

Then come three sentences that hold the whole mechanism:

是故太一藏於水，行於時，周而又始，以己為萬物母；一缺一盈，以己為萬物經。

Therefore the Great One hides in water and moves through the seasons. It goes round and begins again, and makes itself the mother of the ten thousand things. Once lacking, once full, it makes itself the warp of the ten thousand things.

*Source*. The word 經 means the warp: the fixed threads of a loom through which everything else is woven.

Chapter 42 of the received Laozi, “One gives birth to two, two to three, three to the ten thousand things”, does not occur in the Guodian Laozi. The older cosmogony does not count. It lets things arise by return and by mutual support. *Source*.

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## 9. Three rules instead of five axioms

The material of sections 2 to 8 yields three rules.

**R1 — Crossing, place and step (道).** There is one movement that leaves a place through a crossing. The place is light. The movement is bound to it.

R1 replaces N1. It needs no strand as a separate carrier. The crossing, the place and the step are given together, as in 衛.

**R2 — Return gives birth (反輔).** What arises returns to its source, and from that return the next thing arises.

R2 replaces N2. In N2 closure only selects. In R2 closure also produces. Water returns to the One, and heaven is completed. In register terms this is “>” coming back to its point.

**R3 — Mutual support (相輔).** Two things that have arisen support each other, and from that support the next layer arises.

R3 is the meeting “ $. > < .$ ”, with sum 0, but productive. Repeated, it gives the ladder of N5: each layer arises from the pair of the layer before.

What N3 and N4 did is already present.

- **Memory (N3).** The text reads the chain backwards, each thing with its source. The order of arising is the form, as the stroke order is the character.
- **Alternation.** “Once lacking, once full” is  $+1/-1$ . “Goes round and begins again” is the cycle of R. The year is the first complete closure.
- **Context (N4).** The rest of the text says that the way of heaven values the weak, cuts what is complete to increase what is growing. The response depends on the state, not on a fixed law. *Correspondence*.

The image is the same as before. The One is the warp of all things and hides in water. That is the net spanned in water, in the oldest source. *Correspondence*.

Why this is older and simpler: R1-R3 need no strand, no external rewrite and no selector. Return presupposes a place to return to. That place is light. Arising presupposes a movement bound to that place. That movement is the step of 止. *Reading*.

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## 10. What changes in the theory

Several statements of the Foundational Paper shift.

- **N1** speaks of an oriented, continuous strand. It becomes a sequence of locations with a fixed order of arising.
- **N2** says what does not close does not last. Free light lasts billions of years. Under R2, closure means return in phase, and a cycle of R also returns. Light lasts because it is periodic. Matter lasts because it holds.
- **N4** makes  $c$  a state function. If light is the unit,  $c$  is 1 in native units. That  $c$  varies means the step from address to address per rewrite varies locally.
- **C6** reads 0 as rest. That reading lapses. Rest is now the property of light, not a trit value. The 0 is the meeting of an act with its mirror.
- **R** is no longer applied from outside. It is the form reading itself. Its fixed points (T14) are locations that stay equal under self-reference. Kauffman’s eigenform  $O(A) = A$  states the same.

*Reading* for all five.

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## 11. Open questions

**Order.** The register records sums. “ $> <$ ” and “ $< >$ ” have the same sum but differ. A quantity that records order is needed.

**Dimension.** A random movement along one line is bound with certainty. In three dimensions the return chance is 0.3405. If space consists of one-dimensional bound movements, where do the three dimensions come from? This is probably where binding and closure part ways.

**The nine products.** From water to the year, the *Taiyi sheng shui* names nine products: water, heaven, earth, the spirits, yin-yang, the four seasons, cold-heat, moist-dry and the year. The register has nine closing windows. Whether these belong together must be computed first. It must not be read in.

**The third value.** Varela (1975) extended Spencer-Brown's calculus with a third value beside marked and unmarked: the autonomous value of re-entry. That gives three values from distinction alone. How they map onto +1, 0 and -1 is open.

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## 12. Summary

The only thing there is, is light. The units of the net are already one photon: 45.6 nm,  $1.52 \times 10^{-16}$  s, 27.2 eV.

Light is a location. Matter is a location that holds against the progression. c measures the difference.

A location is a point with a bound movement. Along one line, a random movement returns to its point with certainty.

The act combined with itself gives all three trit values. Meeting and going round are the two kinds of closure.

The oldest 道 shows a person at a crossing with a foot. The oldest Daoist cosmogony lets everything arise by return and by mutual support, and calls the One the warp hidden in water.

Three rules follow. One movement leaves a place through a crossing. Return gives birth. Mutual support builds the ladder. The net is not threads and meshes. It is locations referring to locations.

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## Annotated references

**Konstapel, J. (2026). *The Vacuum.Net Theory: Foundational Paper*. Edition 8, version 8.1. Constable Research, Leiden.** *Why read?* The five axioms, the window register (T9-T14), the unit derivation (VII.2) and the free-path lever (T18) that this essay rewrites. *Reading advice:* Part 0, then Parts III.4 and VII.2.

**Konstapel, J. (2026). "The Possibilities and Impossibilities of the Net." constable.blog, 19 October 2026.** *Why read?* The fifty-cell map of what the net can do, with the power ceiling and the depth-ladder landings used in section 2.

**Larson, D. B. (1959). *The Structure of the Physical Universe*. North Pacific Publishers, Portland.** *Why read?* Space and time as two aspects of one motion. The photon at rest in the natural reference system; matter as rotation against the progression. *Reading advice:* the opening chapters on the natural reference system.

**Spencer-Brown, G. (1969). *Laws of Form*. Allen & Unwin, London.** *Why read?* The mark of distinction and re-entry. A location as a distinction needs no carrier. *Reading advice:* chapters 1-2 and 11.

**Kauffman, L. H. (2005). "EigenForm." *Kybernetes* 34(1/2), 129-150.** *Why read?* The eigenform  $O(A) = A$  as a form that reproduces itself. The basis for reading R as self-reading rather than an external rewrite.

**Varela, F. J. (1975). "A calculus for self-reference." *International Journal of General Systems* 2, 5-24.** *Why read?* Adds a third, autonomous value to Spencer-Brown's two. A ternary ground from distinction alone. Varela was also a practitioner of meditation, not only a formalist.

**Pólya, G. (1921). "Über eine Aufgabe der Wahrscheinlichkeitsrechnung betreffend die Irrfahrt im Straßennetz." *Mathematische Annalen* 84, 149-160.** *Why read?* The proof that a random walk returns with certainty in one and two dimensions, and not in three. The ground of section 5.

**Watson, G. N. (1939). "Three triple integrals." *Quarterly Journal of Mathematics* 10, 266-276.** *Why read?* The exact return probability  $P_3 = 0.3405$  of the three-dimensional walk.

**OEIS A002426. Central trinomial coefficients.** *Why read?* The sequence 1, 1, 3, 7, 19, 51, 141, ... that counts exact returns of the trit walk, with its asymptotics.

**Knuth, D. E. (1997). *The Art of Computer Programming, Vol. 2, 3rd ed.* Addison-Wesley.** *Why read?* Balanced ternary and its symmetries, including truncation as rounding. *Reading advice:* pp. 195-213.

**Jingmen Municipal Museum (1998). *Guodian Chu mu zhujian* 郭店楚墓竹简. Wenwu, Beijing.** *Why read?* The photographic edition and transcription of the Guodian slips, including the Laozi material and the *Taiyi sheng shui*.

**Allan, S. & Williams, C. (eds.) (2000). *The Guodian Laozi: Proceedings of the International Conference, Dartmouth College, May 1998.* Society for the Study of Early China, Berkeley.** *Why read?* Scholarly discussion of the Guodian Laozi and the first wide treatment of the *Taiyi sheng shui* in English.

**Henricks, R. G. (2000). *Lao Tzu's Tao Te Ching: A Translation of the Startling New Documents Found at Guodian.* Columbia University Press, New York.** *Why read?* Chapter-by-chapter translation of the Guodian Laozi, with the ancient and modern graphs. Shows which received chapters are absent, including chapter 42.

**Wenlin Institute. Dictionary entry 道 (dào).** *Why read?* The older graphs 衛/衛, read as a person at a crossroads 行 with the foot 止 below. The paleographic basis of section 7.

**Williamson, J. G. & van der Mark, M. B. (1997). "Is the electron a photon with toroidal topology?" *Annales de la Fondation Louis de Broglie* 22(2), 133-160.** *Why read?* The electron as light closed on itself in a double loop. Matter as held light, in a physical model.

**Laozi, *Daodejing*, chapters 11, 25 and 42.** *Why read?* The useful empty centre of the hub (11), the way that goes round (25) and the counting cosmogony (42), to set beside the older *Taiyi sheng shui*.