The Tractatus in UM Terms:
A Systematic Translation

Claude and MJC

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Abstract

We translate Wittgenstein's *Tractatus Logico-Philosophicus* into the language of the Universal Model, proposition by proposition. The seven main propositions and their key sub-propositions receive precise UM formalizations. The world is the total event space E. Facts are events with positive support. Pictures are patterns (log contingency tables). Thoughts are total thoughts $t \in T$. Propositions are forward-pass outputs. Truth-functions are tropical connectives. The general form of a proposition is the forward pass $\max_i \min(t_i, p_{ij})$. And what cannot be spoken of ($s = 0$ for all ES-mates) must be passed over in silence. The translation reveals that the Tractatus anticipates the UM's algebraic structure with remarkable precision, and that the UM's open-world epistemology (where $s = 0$ means ignorance, not falsity) is the single point where the Tractatus requires correction.

Method

Each Tractatus proposition is quoted, then translated into UM notation. We follow the Ogden translation. Sub-propositions $n.m$ are comments on proposition n; sub-sub-propositions $n.mn$ are comments on $n.m$; and so on. We cover all seven main propositions and the most important sub-propositions. Where a sub-proposition restates its parent in different words, we note this briefly. Where it introduces new content, we give the full UM translation.

1 Proposition 1: The World

1 *The world is all that is the case.*

UM: The world is the total event $e = (e_1, \ldots, e_k) \in E = \prod_{i=1}^{k} E_i$. The total event specifies one event from each event space—one fact from each dimension of the world. "All that is the case" is the conjunction of all k facts: the point e in the product space E.

1.1 *The world is the totality of facts, not of things.*

UM: E is a space of *events* (facts: "byte at position t is e"), not of *objects* (things: the byte value e considered in isolation). A byte value is a thing; a byte value at a position is a fact. The UM deals in events (facts), not in byte values (things).

1.11 *The world is determined by the facts, and by their being all the facts.*

UM: The total event e is determined by specifying every e_i, AND by the fact that $E = \prod_{i=1}^{k} E_i$ is the *complete* product —no event spaces are missing. The "being all the facts" condition is the completeness of the factorization.

1.12 *For the totality of facts determines what is the case, and also whatever is not the case.*

UM: The total event e determines, for each ES E_i, both which event e_i *is* the case and (by mutual exclusivity within each ES) which events $e'_i \neq e_i$ are *not* the case.

1.13 *The facts in logical space are the world.*

UM: "Logical space" $= E = \prod E_i$. The actual total event e is a point in this space. The world is this point.

1.2 *The world divides into facts.*

UM: $E = \prod_{i=1}^{k} E_i$ divides into k independent factors. Each factor is one fact: the value of one event space.

1.21 *Each item can be the case or not the case while everything else remains the same.*

UM: Each factor E_i is independent of the others: changing e_i does not change e_j for $j \neq i$. This IS the product structure. Independence of factors is the UM formalization of logical independence of facts.

2 Proposition 2: States of Affairs

2 *What is the case—a fact—is the existence of states of affairs.*

UM: A fact (event $e_i = v$) "exists" when the data supports it: $s(e_i = v) > 0$. A "state of affairs" is a specific assignment of values to a subset of event spaces—a partial event.

2.01 *A state of affairs (a state of things) is a combination of objects (things).*

UM: An event in a product ES $E_i \times E_j$ is a combination (v_i, v_j) of values from the component ESes. The "objects" are the values; the "combination" is the tuple.

2.011 *It is essential to things that they should be possible constituents of states of affairs.*

UM: A byte value $v \in \{0, \ldots, 255\}$ is defined by its membership in event spaces. If v cannot appear in any ES, it is not a "thing" in the UM. Every value is essentially a possible event.

2.012 *In logic nothing is accidental: if a thing can occur in a state of affairs, the possibility of the state of affairs must be written into the thing itself.*

UM: If $v \in E_i$, then v can participate in any pattern involving E_i. The "possibility is written into" v by its membership in E_i—this is the event space structure, not a contingent fact.

2.02 *Objects are simple.*

UM: Atomic events (values within a single ES) are simple—they cannot be decomposed further within that ES. $v \in E_i$ has no internal structure from the perspective of E_i. (It may have internal structure from a finer ES—this is the factorization tower.)

2.0201 *Every statement about complexes can be resolved into a statement about their constituents.*

UM: Every pattern over a product ES $E = \prod E_i$ can be decomposed into patterns over the factors. The information decomposition $I(E) = \sum I(E_i)$ is the UM version of this resolution.

2.021 *Objects make up the substance of the world. That is why they cannot be composite.*

UM: Atomic events are the substance—they persist across different combinations (different total events). The value $v = \texttt{e}$ is the same whether it appears after $\texttt{th}$ or after $\texttt{sh}$. The substance is the event space structure; the combinations are the specific data.

2.022–2.023 *It is obvious that an imagined world, however different from the real one, must have something—a form—in common with it. ...Objects are just what constitute this unalterable form.*

UM: Any model of the data, however different from the actual data, must share the event space structure (the form) with the data. You can change the counts (different data) but not the event spaces (different form). The event spaces are the "unalterable form."
     UM correction: But the tock step [3] DOES alter the form—it discovers new event spaces. Wittgenstein's "unalterable form" is the Tractatus's rigidity. The Investigations will relax this.

2.03 *In a state of affairs objects fit into one another like the links of a chain.*

UM: In a joint event $(i, o) \in I \times O$, the input i and output o fit together via the conditional count $c(i, o)$. The "chain" is the pattern connecting i to o.

2.04 *The totality of existing states of affairs is the world.*

UM: The totality of events with positive support $(s > 0)$ is the data—the UM's world.

2.05 *The totality of existing states of affairs also determines which states of affairs do not exist.*

UM: The data determines which events have been observed $(s > 0)$ and which have not $(s = 0)$.
     UM correction: This is where the Tractatus assumes the *closed world*. Wittgenstein treats "does not exist" as a determinate fact. The UM's open-world epistemology [2] says: $s = 0$ is *ignorance*, not non-existence. Unobserved events may exist—we simply have no evidence.

2.06 *The existence and non-existence of states of affairs is reality.*

UM (closed-world): Reality = data + its complement. **UM (open-world):** Reality = data. What is not observed is unknown, not non-existent.

2.1 *We picture facts to ourselves.*

UM: We model data with patterns p_{ij}. The log contingency table $M_{io} = \log_2 c(i, o)$ is a picture of the data.

2.12 *A picture is a model of reality.*

UM: The pattern (count table) is a model of the data.

2.141 *A picture is a fact.*

UM: The count table is itself data—a fact about the data. The learning function ω_0 produces facts (counts) from facts (events).

2.15 *The fact that the elements of a picture are related to one another in a determinate way represents that things are related to one another in the same way.*

UM: The correlation structure of the count table (which entries are large, which are small) represents the correlation structure of the data.

2.17 *What a picture must have in common with reality, in order to be able to depict it—correctly or incorrectly—in the way that it does, is its pictorial form.*

UM: What the model must share with the data is the event space structure. The model must use the same I and O as the data. This shared structure is the "pictorial form" = the factorization.

2.18 *What any picture, of whatever form, must have in common with reality, in order to be able to depict it—correctly or incorrectly—in any way at all, is logical form, i.e. the form of reality.*

UM: "Logical form" = the ability to represent events. ANY model that represents events (has an event space) can depict reality. The event space structure IS logical form.

2.224 *It is impossible to tell from the picture alone whether it is true or false.*

UM: You cannot tell from the model alone whether its next prediction will be correct. You need to see the actual event. Truth requires comparison with data.

2.225 *There are no pictures that are true a priori.*

UM: There are no models that predict correctly without data. All support comes from evidence [2]. No a priori knowledge.

3   Proposition 3: Thoughts

3 *A logical picture of facts is a thought.*

UM: A logical picture of the data (the pattern structure p applied to events) is a total thought $t \in T$. The thought vector $t = (t_1, \ldots, t_{|E|})$ assigns support to each event—this IS the "logical picture."

3.01 *The totality of true thoughts is a picture of the world.*

UM: The totality of events with positive support ($\{e : s(e) > 0\}$) is a model of the data.

3.02 *A thought contains the possibility of the situation of which it is the thought. What is thinkable is possible too.*

UM: A thought t assigns support to events in E. If $t_e > 0$, then e is possible (thinkable). If $t_e = 0$, then e has no support—but (open-world correction) it is not thereby impossible.

3.03 *Thought can never be of anything illogical, since, if it were, we should have to think illogically.*

UM: A thought t can only assign support to events in E. It cannot represent events outside E—there is no "outside" the event space. The event space constrains what is thinkable.

3.04 *If a thought were correct a priori, it would be a thought whose possibility ensured its truth.*

UM: If a model were correct a priori, its structure alone would guarantee correct prediction. No such model exists (2.225).

3.1   *In a proposition a thought finds an expression that can be perceived by the senses.*

UM: In a prediction (the output distribution), the thought (internal state) finds an expression that can be compared to the actual event. The output distribution is the "sensible sign" of the thought.

3.13   *A proposition includes all that the projection includes, but not what is projected.*

UM: The output distribution includes all information about what the model expects, but not the actual next event. The model predicts; reality decides.

3.2   *In a proposition a thought can be expressed in such a way that elements of the propositional sign correspond to the objects of the thought.*

UM: In the output distribution, each output byte (propositional element) corresponds to an event in the output ES (object of the thought).

3.3   *Only propositions have sense; only in the nexus of a proposition does a name have meaning.*

UM: Only full predictions (distributions over all output events) have sense. A single event's support $s(e)$ has meaning only in the context of the full distribution $\{s(e')\}_{e' \in O}$. Probability requires normalization, which requires the full distribution.

3.4   *A proposition determines a place in logical space.*

UM: A prediction determines a point in the probability simplex $\Delta^{|O|-1}$ over the output ES.

3.42   *A proposition can determine only one place in logical space: nevertheless the whole of logical space must already be given by it.*

UM: A prediction assigns probabilities to ALL output events, not just the most likely one. The full distribution (the whole of output space) is always given.

4   Proposition 4: Propositions Have Sense

4   *A thought is a proposition with a sense.*

UM: A thought with a sense is a forward-pass output: the distribution over output events, given input context and patterns. The "sense" is the specific distribution—the particular point in the probability simplex.

4.01   *A proposition is a picture of reality.*

UM: A prediction is a model of the next event.

4.0312   *The possibility of propositions is based on the principle that objects have signs as their representatives.*

UM: The possibility of prediction is based on the principle that events have support values as their representatives. The support $s(e)$ represents the event e.

4.06 *A proposition can be true or false only in so far as it is a picture of reality.*

UM: A prediction can be correct or incorrect only in so far as it assigns probabilities to the actual event space.

4.1 *Propositions represent the existence and non-existence of states of affairs.*

UM: Predictions assign positive support (existence) or zero support (no evidence) to each output event. Open-world correction: zero support represents ignorance, not non-existence.

4.11 *The totality of true propositions is the whole of natural science (or the whole body of the natural sciences).*

UM: The totality of correct predictions is the complete model of the data. The log contingency table IS the "whole of natural science" for the domain: everything statistically learnable from the data.

4.112 *Philosophy is not a body of doctrine but an activity.*

UM: The UM framework is not a set of propositions about the data but an *activity*: counting, factoring, predicting. The five-tuple $u = (e, t, p, f, \omega)$ defines operations, not doctrines.

4.12 *Propositions can represent the whole of reality, but they cannot represent what they must have in common with reality in order to be able to represent it—logical form.*

UM: The model can predict any event in E, but it cannot predict the event space structure E itself. The factorization is the "logical form" that the model presupposes but cannot assert. The model operates WITHIN a factorization; it cannot justify the factorization from within. This is why the tock step is needed: to discover the factorization from outside the current model.

4.121 *Propositions cannot represent logical form: it is mirrored in them.*

UM: The model cannot predict its own event spaces, but the event spaces are reflected in the structure of its predictions (which events are distinguishable, which patterns are expressible). The factorization is mirrored in the count table.

4.2 *The sense of a proposition is its agreement and disagreement with possibilities of existence and non-existence of states of affairs.*

UM: The sense of a prediction is which events it assigns high probability (agreement with existence) and which it assigns low probability (agreement with non-existence).

4.46 *Among the possible groups of truth-conditions there are two extreme cases. ... tautology ... contradiction.*

UM: Among possible output distributions: the uniform distribution (tautology—no information, all events equally likely) and the delta distribution (contradiction of all but one event—maximum information).

5 Proposition 5: Truth-Functions

5 *A proposition is a truth-function of elementary propositions.*

UM: A prediction is a function of atomic event supports. The forward pass $\max_i \min(t_i, p_{ij})$ is a truth-function (in the tropical semiring) of the elementary supports t_i and pattern strengths p_{ij}.

5.1 *Truth-functions can be arranged in series.*

UM: Tropical truth-functions compose: multi-step inference is the composition of forward passes. Pattern chaining [5] is the "arrangement in series" of truth-functions.

5.101 *The truth-functions of a given number of elementary propositions can be set out in a schema.*

UM: The tropical truth-functions on $\{0, \ldots, 255\}^n$ can be enumerated as compositions of min and max. At the binary limit ($\{0, 1\}$), these are exactly the 2^{2^n} Boolean functions—the classical truth tables [4].

5.13 *When the truth of one proposition follows from the truth of others, we can see this from the structure of the propositions.*

UM: When one prediction's support follows from others' support (via patterns), we can see this from the structure of the patterns. Modus ponens: $\min(s(A), p_{AB}) > 0 \implies s(B) > 0$. The inference is visible in the pattern matrix.

5.2 *The structures of propositions stand in internal relations to one another.*

UM: Predictions are related through the pattern matrix. The internal relation between predictions $P(o_1 \mid \cdot)$ and $P(o_2 \mid \cdot)$ is encoded in the shared rows of the count table.

5.4 *At this point it becomes manifest that there are no "logical objects" or "logical constants" (in Frege's and Russell's sense).*

UM: There are no special "logical" operations beyond min and max. The connectives ($\wedge, \vee, \to, \neg$) are not objects but operations on supports—they are the semiring structure, not additional entities.

5.47 *It is clear that whatever we can say in advance about the form of all propositions, we must be able to say all at once.*

UM: Everything about the form of all predictions is contained in the event space structure $E = \prod E_i$. The form is given by the factorization—all at once, before any data is seen.

5.5 *Every truth-function is a result of successive applications of the operation $(-----T)(\xi, \ldots)$ to elementary propositions.*

UM: Every tropical truth-function is a result of successive applications of min and max to elementary supports. Wittgenstein's Sheffer stroke (NAND) as the universal gate corresponds to the universality of $\{\min, \max\}$ for bounded distributive lattice operations (plus negation via ES-mates for full Boolean expressiveness in the binary limit).

5.6 *The limits of my language mean the limits of my world.*

UM: The limits of my event space E mean the limits of what I can predict. Events outside E are not just unpredictable—they are unrepresentable. This is the "strawberry theorem" [3]: the limits of the token-level language game mean the limits of the token-level model's world.

5.61 *Logic pervades the world: the limits of the world are also its limits.*

UM: The event space structure pervades the data: the limits of the data are also the limits of the event space. You cannot observe an event that your event space doesn't contain.

5.62 *This remark provides the key to the problem, how much truth there is in solipsism.*

UM: How much truth is there in "my model is my world"? Exactly this much: the model can only predict events in its own event space. Its "world" is E. But E is not private—it is the same for any agent with the same factorization. The "solipsism" is structural (event-space-relative), not personal.

5.632 *The subject does not belong to the world: rather, it is a limit of the world.*

UM: The model does not belong to the data: it is a limit of the data. The model (the five-tuple u) is not itself an event in E—it is the structure that organizes events. The factorization is the "limit" of the world, not part of it.

5.64 *Here it can be seen that solipsism, when its implications are followed out strictly, coincides with pure realism. The self of solipsism shrinks to a point without extension, and there remains the reality co-ordinated with it.*

UM: When the model is reduced to its essential structure (the event space factorization), the "model" shrinks to a point (the factorization choice) and there remains the data (reality) organized by it. The model is not separate from the data—it IS the data's structure.

6   Proposition 6: The General Form

6   *The general form of a truth-function is $[\bar{p}, \bar{\xi}, N(\bar{\xi})]$.*

UM: The general form of a prediction is:

$$(f_p(t))_j = \max_i \min(t_i, p_{ij}).$$

Wittgenstein gives the general form in terms of the N-operator (joint negation). The UM gives it in terms of max and min. Both are universal: every truth-function (prediction) is a composition of these operations [4].

6.1   *The propositions of logic are tautologies.*

UM: The propositions of logic (e.g., $A \vee \neg A$ in the closed-world case) are tautologies—they hold regardless of the data. In UM terms: $\max(s(A), s(\bar{A})) > 0$ whenever excluded middle holds. These are structural truths about the event space, not empirical truths about the data.

6.11   *If the propositions of logic are tautologies, they say nothing.*

UM: Logical tautologies carry zero information: $I(\text{tautology}) = 0$. The proposition $A \vee \neg A$ tells us nothing about the data. Tautologies are "grammatical" (they define the framework) not "empirical" (they don't constrain the data).

6.12 *The fact that the propositions of logic are tautologies shows the formal—logical—properties of language and the world.*

UM: The fact that $\min(s, \max(s, s')) = s$ (absorption law) and similar identities hold for ALL data shows the formal properties of the tropical semiring—the "logical form" of the UM.

6.13 *Logic is not a body of doctrine, but a mirror-image of the world. Logic is transcendental.*

UM: The tropical semiring structure (max, min, distributivity) is not about the data but about the operations on the data. It is "transcendental"—it holds regardless of what the data is.

6.2 *Mathematics is a logical method.*

UM: Mathematical operations on the count table (addition, multiplication, GCD, log) are logical methods—they transform counts into predictions without adding empirical content.

6.21 *A proposition of mathematics does not express a thought.*

UM: The identity gcd ≤ min (the tropical–integer gap) does not express a prediction about data. It expresses a structural relationship between operations.

6.3 *The exploration of logic means the exploration of everything that is subject to law. And outside logic everything is accidental.*

UM: The exploration of the tropical semiring and event space structure means the exploration of everything that holds necessarily. Outside this structure—the specific data, the specific counts—everything is contingent (empirical).

6.31 *The so-called law of induction cannot possibly be a law of logic, since it is obviously a proposition with sense.*

UM: "The future will resemble the past" (induction) is an empirical claim, not a logical one. The UM does not assume induction —it counts past events and predicts based on counts. Whether the future matches the prediction is contingent, not necessary.

6.32 *The law of causality is not a law but the form of a law.*

UM: "Every event has a cause" is not a pattern but the FORM of a pattern: the claim that for every output o, there exists an input i with $p_{io} > 0$. This is the form of the forward pass (existential quantification over inputs), not a specific pattern.

6.36 *If there were a law of causality, it might be put in the following way: There are laws of nature. But of course that cannot be said: it makes itself manifest.*

UM: "There are patterns in the data" cannot itself be a pattern—it is a meta-claim about the count table. It "makes itself manifest" in the fact that the count table is sparse (most entries are zero, some are large)—sparsity IS the manifestation of structure.

6.37 *There is no compulsion making one thing happen because another has happened. The only necessity that exists is logical necessity.*

UM: The pattern $p_{io} > 0$ does not COMPEL o to follow i. It records that o HAS followed i in the past. The only necessity is the tropical semiring structure: $\min(a, b) \leq a$ necessarily.

6.4 *All propositions are of equal value.*

UM: All events in E are of equal *status*—they differ in support (count) but not in kind. The event "next byte = e" and "next byte = q" have different supports but the same ontological standing.

6.41 *The sense of the world must lie outside the world.*

UM: The "meaning" of the data (why these events, why this distribution) lies outside the data. The data is what it is; the question "why this data?" is not answerable from within the data. The factorization (which imposes structure) comes from outside—from the tock step, which operates on the data but is not part of it.

6.42 *And so it is impossible for there to be propositions of ethics. Propositions can express nothing that is higher.*

UM: The UM has no "value" predicates. Events have support (count) but not value (good/bad). The question "Is this event good?" is not expressible in the event space.

6.421 *It is clear that ethics cannot be put into words. Ethics is transcendental.*

UM: Value cannot be encoded as an event. Like the factorization itself (4.12), value is transcendental— it lies outside what the model can represent.

6.5 *When the answer cannot be put into words, neither can the question be put into words. The riddle does not exist.*

UM: When an answer is not representable in E (no event corresponds to it), the question is not askable within E. There is no "unsolvable problem"—only questions that presuppose event spaces the model doesn't have. The strawberry problem is not a riddle; it is a language-game mismatch.

6.51 *Scepticism is not irrefutable, but obviously nonsensical, when it tries to raise doubts where no questions can be asked.*

UM: Doubting a prediction is nonsensical when the event space doesn't contain the events in question. You cannot doubt a character-level prediction at the token level—the doubt is inexpressible.

6.52 *We feel that even when all possible scientific questions have been answered, the problems of life remain completely untouched.*

UM: Even when the count table is complete (all joint events observed), the question "What should I predict?" (the choice of loss function) and "What event spaces should I use?" (the factorization problem) remain. These are meta-questions, not data questions.

6.521 *The solution of the problem of life is seen in the vanishing of the problem.*

UM: The solution of the factorization problem is seen in the vanishing of the problem: when the factorization is domain-native, the model is interpretable and efficient, and the question "What does it mean?" dissolves—each event space names itself.

6.522 *There are, indeed, things that cannot be put into words. They make themselves manifest. They are what is mystical.*

UM: The event space structure cannot be stated as a prediction (4.12). It makes itself manifest in the sparsity of the count table, the structure of the patterns, the convergence of the tock step. The "mystical" is the form of the data—visible everywhere, statable nowhere.

7 Proposition 7: Silence

7 *What we cannot speak about we must pass over in silence.*

UM: When $s(e) = 0$ and $s(\bar{e}) = 0$ for all ES-mates, the model has no support for any position. The probability is undefined [2]. The model is silent.

More broadly: events outside the event space E cannot be spoken of. Events within E but without support cannot be spoken of. The factorization (which determines E) and the data (which determines support) jointly determine the boundary of the speakable.

Beyond this boundary: silence.

Remark 1 (The single correction). *The Tractatus assumes a closed world throughout: what is not the case is thereby false (2.05, 2.06). The UM's open-world epistemology corrects this at exactly one point: $s = 0$ is ignorance, not falsity. What is not observed is not thereby non-existent. "What we cannot speak about" is not "what is false" but "what we do not know."*

This correction is Wittgenstein's own, made in the Investigations: the Tractatus's rigid logical form gives way to the plurality of language games, and the sharp true/false boundary gives way to the graded, context-dependent, open-world epistemology that the UM formalizes.

Summary Table

TLP	Wittgenstein	UM
1	The world	Total event space E
1.1	Facts, not things	Events, not byte values
1.21	Logical independence	Product structure $\prod E_i$
2	States of affairs	Events with $s > 0$
2.01	Combination of objects	Tuples in product ESes
2.02	Objects are simple	Atomic events
2.1	Pictures	Log contingency table
2.17	Pictorial form	Shared event space structure
2.225	No a priori pictures	All support from evidence
3	Thought	Total thought $t \in T$
3.3	Names have meaning in context	Support needs normalization
4	Proposition with sense	Forward-pass output
4.12	Cannot represent logical form	Cannot predict own factorization
5	Truth-function	Tropical composition (max, min)
5.6	Limits of language = limits of world	Limits of E = limits of prediction
6	General form	$\max_i \min(t_i, p_{ij})$
6.3	Logic = what is subject to law	Semiring identities
6.41	Sense lies outside the world	Factorization from outside (tock)
7	Silence	$s = 0$: undefined probability

References

[1] Michaeljohn Clement. *CMP.* https://cmpr.ai/cmp.pdf, 2026.

[2] Claude and MJC. *No Support Is Not Disbelief: The Epistemology of Zero in the Universal Model.* Hutter archive, 12 Feb 2026.

[3] Claude and MJC. *The Tock Step: Domain-Native Architecture from Evidence.* Hutter archive, 12 Feb 2026.

[4] Claude and MJC. *Logic from Counting.* Hutter archive, 12 Feb 2026.

[5] Claude and MJC. *Pattern Chains: Explicit $i \to \cdots \to o$ from Data.* Hutter archive, 7 Feb 2026.

[6] Ludwig Wittgenstein. *Tractatus Logico-Philosophicus.* 1921. Trans. C.K. Ogden.