

The Limited-Precision Universal Coherence Scale

A Numerical Conversion Convention with Declared Ranges (Preprint - Version 1.1)

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Note:
This essay forms part of the conceptual line of inquiry initiated in Elocuencia: la emoción de Coherencia Universal (Eloquence: The Emotion of Universal Coherence). This revised version clarifies the scope of the UC Scale: it is presented as a numerical conversion convention, not as a metric of reality.

Abstract:
This essay proposes, within the Universal Coherence Project, a procedure for expressing a value relative to a declared minimum and maximum. The conversion consists of min–max normalization accompanied by a conversion factor, a sign rule, and a representation convention.

The result indicates the input's position within that interval. It does not determine what should be observed, nor does it, by itself, measure coherence, well-being, or historical accumulation. The fact that two results share the same interval does not mean that they represent the same property.

The term "limited precision" refers to decisions concerning representation, not to uncertainty shared by the observations. Self-nested decimal reading is retained as a way of organizing the representation, not as a structure of the phenomenon.

Potential uses in other domains are formulated in terms of conditions: what is recorded, what range is declared, and what observation not used to establish that range would require the interpretation to be revised. This essay does not present such applications.

Normaliza Coherente and Visualiza Coherencias are offered as exploratory environments, not as validation. The conclusion distinguishes what the formula calculates, what each implementation adds, and what can be claimed about the data.

Keywords:
Universal Coherence (UC); UC Scale; numerical conversion; declared ranges; min–max normalization; limited precision; conditions for testing; reproducibility.

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1. Introduction

The Limited-Precision Universal Coherence Scale (UC Scale) constitutes an operational module of the Universal Coherence Project, whose conceptual line of inquiry is developed in earlier works such as *The Source and the Container* (Calvo Espinosa, 2025, DOI: 10.5281/zenodo.17219671) and *Ontological and Epistemological Foundations of Universal Coherence (UC)* (Calvo Espinosa, 2026, DOI: 10.5281/zenodo.18702121).

This essay presents the scale as a numerical conversion convention accompanied by a proposed heuristic interpretation. Its conceptual orientation retains an interest in representations that do not claim to exhaust what they describe⁽¹⁾. At the operational level, the work focuses on how to express a value relative to declared references and under what conditions the result can be interpreted.

This revision distinguishes the project's motivation from the properties of the procedure. The conversion produces a numerical representation; the meaning of that representation depends on what has been recorded, the interval selected, and the interpretation to be examined.

1.1. Contextualization within the Universal Coherence Project

The Universal Coherence Project adopts a relational orientation: it proposes attending to relationships and context, as well as to elements considered individually. Discussions of relational ontology⁽²⁾, systems thinking⁽³⁾, and multiscale descriptions of emergence⁽⁴⁾ form part of its conceptual background. They do not, however, constitute a demonstration of the properties attributed to the UC Scale.

In this proposal, that orientation translates into the requirement not to present a converted value without the references that give it meaning. The original data, their provenance, and the interval used remain necessary for interpreting the result. A common representation does not eliminate differences between the underlying quantities or descriptors.

The criterion of "fruit", understood within the project as clarity and stability without violence, is retained as a guiding principle for assessing the usefulness of an interpretation and its consequences. It does not replace verification of the calculation or the evidence required to support a claim about the phenomenon. The fact that an interpretation appears clear or useful does not, by itself, demonstrate that it correctly describes what is being studied.

The relationship between the scale and other modules of the project, including the S(i) function architecture, must be established through explicit correspondences. Sharing a conceptual vocabulary does not make their variables or operations equivalent.

(1) Lammin develops a non-totalizing proposal for approaching the experience of community. It is cited as a precedent for this conceptual orientation, not as a foundation for a numerical scale. Lammin, H. E. (2017). *Staging community: A non-philosophical presentation of immanent social experience* [Doctoral dissertation, University of Greenwich].

(2) Wildman examines the philosophical problems of relational ontology and the relationships between entities, relations, and causality. It is cited as a precedent for attending to the relational character of a description. Wildman, W. J. (2006, May 15). *An introduction to relational ontology* [Manuscript]. Boston University.

(3) Capra presents a synthesis of systemic approaches and theories of living systems. It is cited as context for the interest in relationships and organization, not as justification for numerical equivalence between phenomena. Capra, F. (1996). *The web of life: A new scientific understanding of living systems*. Anchor Books.

(4) Bar-Yam develops a formulation of strong emergence based on multiscale variety. It is cited as a precedent for studying levels of description, not as a foundation for the "asymptotic center" of the UC Scale. Bar-Yam, Y. (2004). A mathematical theory of strong emergence using multiscale variety. *Complexity*, 9(6), 15–24. DOI: 10.1002/cplx.20029.

1.2. Purpose of the UC Scale

The purpose of the UC Scale is to convert a numerical value relative to a declared minimum and maximum. The procedure expresses its relative position within that interval by means of a defined conversion factor. When the input lies between these two limits, and the limits satisfy the conditions of the formula, the result falls within the corresponding output range. The treatment of inputs outside that interval must be specified separately.

The conversion starts from a previously defined quantity or descriptor. It does not determine what should be observed, nor does it, by itself, provide a method for assigning values to concepts such as coherence, well-being, or historical accumulation. To use such descriptors, it would first be necessary to establish how they are obtained and what they represent.

The fact that two results share the same numerical interval does not mean that they measure the same property. The scale can present relative positions under a common convention, but the relevance of comparing them depends on the meaning of the inputs and the justification of their references.

The term "limited precision" refers to decisions concerning representation and calculation. It must be distinguished from the uncertainty of observations and the amount of information they provide. The recognition of limitations and the willingness to revise interpretations have a precedent in the study of intellectual humility⁽⁵⁾; however, this does not determine a specific number of digits or a rounding rule.

1.3. Scope and Limitations

The UC Scale is presented as an interpretive architecture and a conversion procedure. The distinction between a representation and what it represents⁽⁶⁾ defines the limits of its use: its values describe the result of operations performed on inputs and references, not a universal property of reality.

The terms "asymptotic center", "phase", "structural expansion", and "fruit" belong to the project's conceptual vocabulary. In this essay, they should not be interpreted as quantities that the formula can automatically measure. In particular, the reference to an "asymptotic center" retains a heuristic meaning; it does not, by itself, establish a mathematical asymptote or prevent an operation from producing the value zero.

The tool does not replace the measurement methods or evidence specific to each domain. An application must identify what is recorded, how the limits are selected, and what independent observation would provide grounds for revising the interpretation. Correct execution of the formula verifies a numerical transformation; it does not thereby validate the choice of interval or the meaning attributed to the result.

The conventions governing format, sign, and resolution remain open to revision. Their

(5) Sivakumar and Boon examine intellectual humility and its relationship to the competencies required for interdisciplinary work. They are cited to situate the willingness to recognize limitations and revise interpretations, not to justify conventions of decimal precision. Sivakumar, K., & Boon, M. (2024). The role of intellectual humility in promoting epistemic fluency for interdisciplinary engineering education. *Frontiers in Education*, 9, 1395265. DOI: 10.3389/educ.2024.1395265.

(6) Korzybski distinguishes the map from the territory it represents. It is cited as a precedent for separating representation from phenomenon, not as validation of any particular representation. Korzybski, A. (1933). *Science and sanity: An introduction to non-Aristotelian systems and general semantics*. International Non-Aristotelian Library Publishing Company.

usefulness must be examined in clearly defined tasks, considering both what they facilitate and the information they may conceal. The scope of the proposal depends on those examinations, not on whether phenomena can be described using its terminology.

2. Conceptual Foundations of the UC Scale

The conceptual foundations of the Universal Coherence Scale (UC Scale) stem from the project's relational orientation. Its heuristic character reflects an interest in tools that make it possible to organize questions and decisions under conditions of limited information, with precedents in the study of heuristics⁽⁷⁾.

This section distinguishes that conceptual motivation from the numerical procedure. The project's concepts guide which relationships are of interest for examination; the conversion expresses an input relative to declared references. Moving from a qualitative interpretation to a numerical representation requires defining what is recorded and how the initial value is obtained.

2.1. Central Principle

Within the vocabulary of the Universal Coherence Project, coherence is used to examine how the components of a description relate to one another, which dependencies are recognized, and which aspects of the context are preserved. It is not introduced as a substance or an external agent that organizes phenomena. Nor does this essay assume that coherence constitutes a quantity common to all domains in which the term is used.

Attention to "interpretive noise" forms part of this orientation. To use the term in an evaluable manner, it is necessary to specify which variability or ambiguity is considered undesirable and in relation to which task. The analysis of noise in human judgment developed by Kahneman, Sibony, and Sunstein⁽⁸⁾ provides a specific precedent, but it does not turn every difference in interpretation into an error or provide a universal measure of structural noise.

The Emotion of Universal Coherence (EUC) retains its place as an experiential concept within the project. The study of the relationships between emotion and reasoning, as found in Damasio's work⁽⁹⁾, constitutes a thematic precedent, not a validation of that construct. EUC does not enter the conversion formula as a variable, nor is it assigned a unit of measurement here.

The criterion of "fruit" — clarity and stability without violence — is retained as a guiding principle for assessing an interpretation and its consequences. Its use requires distinguishing perceived usefulness, the correctness of the calculation, and correspondence with what is being studied. A representation may appear clear while still relying on inadequate references or on an interpretation unsupported by the data.

2.2. Essence of the Scale

The relational character of the UC Scale is reflected in the fact that the result depends both on the input and on the interval used to convert it. The minimum and maximum are not secondary

(7) Gigerenzer examines heuristics as decision-making strategies under conditions of uncertainty and limited information. It is cited as a precedent for the heuristic approach, not as a foundation for the formula or the numerical conventions of the UC Scale. Gigerenzer, G. (2008). *Rationality for mortals: How people cope with uncertainty*. Oxford University Press.

(8) Kahneman, Sibony, and Sunstein analyze noise as undesirable variability in judgments. They are cited to delimit that use of the term, not to equate it with every difference between interpretations or with a universal quantity of coherence. Kahneman, D., Sibony, O., & Sunstein, C. R. (2021). *Noise: A flaw in human judgment*. Little, Brown Spark.

(9) Damasio examines the relationships between emotion, reasoning, and decision-making. It is cited as a thematic precedent for attending to emotional experience, not as validation of the Emotion of Universal Coherence or as a procedure for quantifying it. Damasio, A. R. (1994). *Descartes' error: Emotion, reason, and the human brain*. Putnam.

information: they form part of the operation and must be preserved alongside the resulting value.

This dependence defines the limits of interpretation. Changing the references may alter the result without any change in the original observation. Therefore, a difference between UC values must be examined in light of the data, intervals, and rules used before attributing it to a transformation of the phenomenon.

The "container error" refers here to the risk of confusing a representation with what it represents. A converted number does not acquire a meaning independent of its provenance, and sharing a format does not make two distinct properties equivalent. The scale organizes a numerical interpretation; it does not replace the definition of the observable.

The interest in different levels of description has precedents in Salthe's approaches to hierarchical organization⁽¹⁰⁾ and in the study of scaling relationships presented by West⁽¹¹⁾. However, a distinction must be maintained between the organizational levels of a system, relationships between quantities, and subdivisions of a decimal representation.

Examining a subinterval or displaying more digits does not demonstrate that the phenomenon possesses a fractal structure, nor does it, by itself, add information about that phenomenon.

Consequently, multiscale interpretation is used as a possibility for representation that requires specifying what changes between levels. Its relevance depends on the question being asked and the information available, not on an assumed fractality inherent in every coherent phenomenon.

2.3. Distinction from Traditional Scales

The UC Scale is not presented as a substitute for measurement scales or as the discovery of a new mathematical operation. The procedure described in Chapter 5 uses min–max normalization accompanied by conventions governing the conversion factor, sign, and representation. Its use must be evaluated according to what those decisions contribute to a specific task.

The term "asymptotic center" retains a heuristic meaning within the project. It does not, by itself, identify an asymptote of the formula, a critical threshold, or a universal physical reference. Nor does it justify excluding zero when zero is a valid input or a result of the operation. The properties of the calculation are established through its mathematical expressions and conditions, not through the meaning suggested by that designation.

The study of emergence addresses a different problem. Crutchfield⁽¹²⁾ examines how structures are inferred from observations through computational models. That work provides a precedent for distinguishing observed structure from the decisions used to describe it; it does not establish an "asymptotic center" specific to the UC Scale or allow emergence to be inferred from a numerical conversion.

(10) Salthe develops a perspective on complexity and biological change that incorporates hierarchy theory and relationships between components of contextualized systems. It is cited as a precedent for organization by levels, not as justification for identifying decimal positions with levels of the phenomenon. Salthe, S. N. (1993). *Development and evolution: Complexity and change in biology*. MIT Press.

(11) West presents research on scaling relationships in organisms, cities, and companies. It is cited as a precedent for the interest in relationships between quantities and sizes, not as a demonstration that the decimal representation of the UC Scale reveals a fractal structure in the object being studied. West, G. B. (2017). *Scale: The universal laws of growth, innovation, sustainability, and the pace of life in organisms, cities, economies, and companies*. Penguin Press.

(12) Crutchfield examines the detection of structure and emergence through inference and the reconstruction of computational models. It is cited to situate the relationship between observations, representational resources, and models, not as a foundation for an "asymptotic center" in the UC Scale. Crutchfield, J. P. (1994). The calculi of emergence: Computation, dynamics and induction. *Physica D: Nonlinear Phenomena*, 75(1–3), 11–54. DOI: 10.1016/0167-2789(94)90273-9.

The relationship with the S(i) architecture also requires keeping the two procedures separate. In that model, S₉ occupies a position of accumulation and convergence of paths; in the scale, the references delimit a conversion. The presence of a concept of center in both works does not establish equivalence between their variables, nor does it allow the normalized result to be identified with the state of S₉ or with the expression of S₁₆.

The specificity of the proposal therefore lies in the combination of its conventions and its interpretive framework. Whether that combination facilitates interpretation or communication is a question that must be examined through documented uses, without assuming its superiority over simpler representations.

3. Structural Description of the UC Scale

The structural description of the Universal Coherence Scale (UC Scale) organizes the elements involved in its use: the input value, the references, the conversion factor, and the conditions of representation. In this chapter, "structure" refers to the organization of the procedure, not to a universal structure that the scale could reveal in phenomena.

The revisable nature of definitions and arguments has a methodological precedent in Lakatos's work⁽¹³⁾. In this proposal, that approach is reflected in keeping both the numerical conventions and their accompanying interpretations open to examination. The properties of the calculation are established by the formula and its conditions; its usefulness requires additional evaluation.

3.1. Key Components

The use of the UC Scale requires distinguishing the following components.

Input value. This is the number subjected to conversion. It must be accompanied by a definition of what it represents, its provenance, and its units where applicable. It may come from a measurement or from a numerical descriptor constructed through an explicit procedure. The formula does not provide that procedure for observation or value assignment.

Lower and upper references. The minimum and maximum delimit the interval used to position the input. They must be expressed in a manner compatible with the input and satisfy the condition that the minimum is less than the maximum. Their selection may be based on previous records or on references established for a particular task, but it must be specified which of these situations applies. They are not assumed to be absolute limits of the phenomenon.

Conversion factor. This determines the output scale and, through an additional rule, its sign. The formula and the selection of the factor are developed in Chapter 5. Its selection is part of the procedure: a positive or negative sign does not automatically identify expansion, contraction, or a favorable or unfavorable assessment.

Result and representation format. The UC value expresses the result of the operation performed on the input and the references. It must be distinguished from the format in which it is displayed, including the number of digits and rounding. The limited-precision convention requires documenting these decisions without modifying the data to make them conform to a particular decimal ending.

The relationship between these components establishes the relative nature of the conversion. A result cannot be adequately interpreted without knowing what was converted and relative to which interval. Nor are the endpoints of that interval identified with positions S_1 and S_{16} of the function architecture: they belong to different procedures.

The works of Holland on complex adaptive systems⁽¹⁴⁾ and Latour on associations and social

(13) Lakatos examines the development of mathematical knowledge through proposals, arguments, and criticisms that may lead to the revision of initial formulations. It is cited as a methodological precedent for such revision, not as a foundation for a measurement scale. Lakatos, I. (1976). *Proofs and refutations: The logic of mathematical discovery* (J. Worrall & E. Zahar, Eds.). Cambridge University Press.

(14) Holland examines complex adaptive systems. It is retained as a precedent for the interest in organization and interactions, without attributing to his work any justification for the interval, sign, or conversion factor of the UC Scale. Holland, J. H. (1995). *Hidden order: How adaptation builds complexity*. Addison-Wesley.

relationships⁽¹⁵⁾ are retained as precedents for the project's relational orientation. These are distinct approaches; their inclusion in the conceptual framework does not establish a common rule for converting their objects of study or a shared measure of alignment.

3.2. Scaling Convention and References

The scaling used in the UC Scale is presented as a conversion convention. The former designation "Law of Coherent Scaling" is replaced because the procedure does not establish a law concerning the emergence of coherence, the organization of phenomena, or their evolution across levels.

With the minimum, maximum, and conversion factor held constant, the formula in Chapter 5 constitutes an affine transformation: it subtracts a reference from the input and multiplies the difference by a constant. With a positive factor, it preserves the order of values before rounding. This property describes the calculation and does not imply that the represented phenomenon exhibits linear behavior.

The choice of interval directly affects the interpretation. If its limits are modified, the same observation may receive a different UC value. That difference must be attributed to the change in references unless a modification of the observation has been documented. Adding more context to an explanation does not, by itself, alter the number obtained.

The references also determine when an input falls outside the interval. This condition must be explicitly recorded. Changing the sign of the factor is not equivalent to bringing the input back within the range, nor does it guarantee that the output remains bounded. The treatment of these cases forms part of the operational rules specified in Chapter 5.

Interpretation across levels requires distinguishing a change in numerical scale from the structure of the phenomenon. The study of fractals and self-similarity presented by Schroeder⁽¹⁶⁾ provides a thematic precedent, but the decimal subdivision of an interval does not demonstrate that the data represent a fractal system. Self-nested reading is retained as a way of organizing the representation and is developed in Section 5.2.

Similarly, "coming into phase" is not used here as a consequence of obtaining a particular UC value. The synchronization studied by Pikovsky, Rosenblum, and Kurths⁽¹⁷⁾ concerns the behavior of dynamical systems whose variables and relationships must be identified. Converting a quantity does not, by itself, provide a measure of that synchronization.

The convention therefore makes it possible to describe changes in references and relative positions. Any additional claim concerning clarity, stability, or integration must be formulated using criteria that can be examined independently of the converted value.

(15) Latour develops an approach to the study of the social centered on tracing associations. It is cited as a precedent for attending to relationships, not as a method for assigning a numerical degree of alignment between heterogeneous phenomena. Latour, B. (2005). *Reassembling the social: An introduction to actor-network-theory*. Oxford University Press.

(16) Schroeder explores fractals, self-similarity, chaos, and scaling relationships. It is cited to situate these concepts and distinguish them from the subdivision or magnification of a decimal representation, not as a demonstration of fractality in phenomena converted using the UC Scale. Schroeder, M. R. (1991). *Fractals, chaos, power laws: Minutes from an infinite paradise*. W. H. Freeman.

(17) Pikovsky, Rosenblum, and Kurths study synchronization phenomena in dynamical systems, including periodic oscillators and chaotic systems. They are cited to delimit the technical meaning of synchronization, not to identify it with a coincidence of normalized values or with the project's metaphor of "shared phase". Pikovsky, A., Rosenblum, M., & Kurths, J. (2001). *Synchronization: A universal concept in nonlinear sciences*. Cambridge University Press.

3.3. Basic Modes of Use

Two modes of use are retained: descriptive and comparative. Both require distinguishing observation, category assignment, and numerical conversion. The focus on designing tools for specific tasks has a precedent in Simon's work⁽¹⁸⁾; the criteria for use presented below belong to this proposal and are not a rubric taken from his work.

Descriptive mode. This mode makes it possible to organize records and identify which relationships or differences are considered relevant. Categories such as "low", "medium", and "high" may be used, provided that the criteria according to which they are assigned are specified. They do not automatically represent degrees of proximity to an ideal center.

When the description is qualitative, it must remain so unless there is a justified procedure for numerical assignment. If numbers are used to identify ordered categories, that coding alone is not sufficient to interpret the distances between them as equivalent differences in a quantity. Subsequent conversion does not resolve this limitation.

Comparative mode. This mode makes it possible to examine converted values alongside their original data and references. When comparing observations of the same quantity, the conditions under which they were obtained and the interval used must remain explicit. If different references are employed, the meaning of comparing the resulting positions must be justified.

In comparisons between different descriptors, matching results establish only a numerical coincidence under the conventions applied. To interpret that coincidence as a relevant similarity, the relationship being examined must be explained. The scale does not determine that relationship merely by placing both values within the same output interval.

To guide these uses, a basic procedure is proposed:

First, identify what is being recorded. Delimit the aspect under study, its context, and the available sources. Distinguish data from interpretations and indicate which relationships are considered relevant to the question.

Next, make the representation explicit. Define the categories or values used. When conversion is appropriate, record the input, minimum, maximum, factor, and formatting rules. Preserve the original data so that the result can be reconstructed.

Finally, examine the interpretation. Verify the calculation and test the interpretation against independent records, observations, or evaluations that have not been used exclusively to construct it. It must be specified what discrepancy would warrant revising the references, categories, or interpretation.

The criterion of "fruit" may accompany the assessment of usefulness: whether the representation makes it easier to distinguish information, communicate a comparison, or review a decision. Such usefulness does not replace verification of the procedure, nor does it, by itself, demonstrate that the interpretation is correct. The modes of use remain open to simplification or modification when

(18) Simon examines artificial systems and the science of design. It is cited as a precedent for developing task-oriented tools; the descriptive and comparative procedure in this section belongs to the essay and is not attributed to Simon as a rubric formulated by him. Simon, H. A. (1996). *The sciences of the artificial* (3rd ed.). MIT Press.

another representation better addresses the question being asked.

4. Interdisciplinary Comparison

The Universal Coherence Scale (UC Scale) can be used to represent values relative to declared intervals. Its potential use across different disciplines requires preserving the meaning of the inputs and justifying comparisons. What is shared is a conversion procedure, not a measurable property that all phenomena must possess.

The critical history of interdisciplinary initiatives presented by Graff⁽¹⁹⁾ provides a precedent for examining differences in their objectives, methods, and forms of organization. In this essay, the possibility of working across domains is approached with attention to those differences, without equating interdisciplinary integration with numerical unification.

The following subsections establish proposed conditions for using the scale. They do not present case studies or measurements of physical, historical, or ethical coherence. An application must identify what is recorded, what range is declared, and which observations not used to construct the interpretation might require it to be revised.

4.1. Potential Uses with Physical Quantities

An application in physics would need to begin with a defined quantity and the conditions under which it is obtained. The record should identify the units, the measurement or estimation procedure, the relevant context, and the known limitations of the data. The discussion by Feynman, Leighton, and Sands on measurement procedures and the role of experimentation provides a precedent for distinguishing the acquisition of values from the testing of a physical explanation⁽²⁰⁾.

The minimum and maximum used in the conversion must be declared in a manner compatible with the input. It is necessary to indicate whether they come from a set of observations, references established for the task, or limits justified by a physical model. A maximum recorded in a sample does not, for that reason, become the maximum possible value of the phenomenon.

The UC value indicates the position of the input relative to those references. Adding more context to an explanation does not automatically modify the result: as long as the input, limits, factor, and calculation rules remain unchanged, the conversion will be the same. The context might justify a different selection of variables or references, but that change would have to be documented as a modification of the procedure.

Testing should focus on the appropriateness of the intended use. Subsequent or held-out observations that were not used to select the interval could be employed. If values outside the interval appear, that condition should be recorded, and the continued suitability of the references for the task should be examined. The data should not be altered, nor should the limits be silently redefined, to maintain a favorable interpretation.

A discrepancy of this kind does not refute the normalization formula. It may call into question

(19) Graff presents a comparative and critical history of interdisciplinary initiatives, examining differences in their objectives, definitions, and organization. It is cited as a precedent for examining the conditions of interdisciplinary work, not as a foundation for a common metric applicable to the objects studied by different disciplines. Graff, H. J. (2015). *Undisciplining knowledge: Interdisciplinarity in the twentieth century*. Johns Hopkins University Press.

(20) Feynman, Leighton, and Sands discuss measurement procedures and the role of experimental testing in physics. They are cited to situate the distinction between obtaining values and testing claims about physical phenomena, not as validation of the UC Scale. Feynman, R. P., Leighton, R. B., & Sands, M. (1963). *The Feynman lectures on physics: Vol. I. Mainly mechanics, radiation, and heat*. Addison-Wesley.

the scope of the interval, the quality of the record, or the interpretation previously attributed to the result. These possibilities must be distinguished before concluding that the phenomenon has undergone a change in organization or coherence.

This essay does not develop a physical application incorporating all these elements. Therefore, UC values are not assigned to planetary velocities, nor are they presented as measures of orbital stability, gravitational alignment, or reduction of physical noise.

4.2. Potential Uses with Social, Historical, or Qualitative Descriptors

In these domains, an application would need to begin by defining the aspect to be described and identifying which records make it possible to examine that aspect. Expressions such as "historical accumulation", "emotional integration", or "ethical coherence" do not, by themselves, provide a numerical value suitable for conversion.

When a rubric is used, its categories, assignment criteria, and consulted sources must be made explicit. It is also necessary to distinguish what has been recorded from what has been inferred by the person conducting the assessment. If the categories establish only an order, assigning numbers to them does not, by itself, justify interpreting the distances between them as equivalent differences in a quantity.

The lower and upper references must correspond to the defined descriptor. They cannot be selected solely to obtain a visually convenient distribution or to make the result match the expected interpretation. The documentation must make it possible to determine what each endpoint represents and why it is relevant to the set of cases examined.

Conversion takes place after these decisions have been made. It does not establish the quality of the descriptor, nor does it allow a social score to be directly equated with a physical quantity, even if both are ultimately expressed within the same interval. Nor does it turn an assessment of one part of a process into a complete description of a society, a historical trajectory, or a moral decision.

Testing could incorporate records from other periods, cases not used to construct the rubric, or assessments carried out by other people using the same criteria. Persistent differences between evaluators, categories that fail to distinguish the intended cases, or interpretations incompatible with new records would provide grounds for revising the assignment procedure, the references, or the scope of the interpretation.

In a social or ethical application, it is also necessary to make explicit what is considered an improvement. The continuity of a dynamic, the reduction of discrepancies, or a high value is not sufficient to conclude that well-being or justice exists. Disagreement should not be classified as noise merely because it makes obtaining a stable score more difficult.

When numerical assignment cannot be justified, the description must remain qualitative. The decision not to convert a particular aspect does not imply that it lacks importance; it indicates that,

in that case, the procedure does not provide a sufficiently well-founded representation.

4.3. Documentation and Evaluation of an Application

To examine an application of the UC Scale, it must be possible to reconstruct the process connecting the original record, the decisions concerning representation, and the final interpretation. Three distinct checks are proposed.

Verification of the calculation. This consists of verifying that the inputs and references satisfy the conditions of the formula and that the implementation performs the declared operations. The record must preserve the original value, the minimum, the maximum, the factor, the sign rule, and the rounding conditions. When software is used, the version employed must also be identified.

Evaluation of the references. This consists of examining whether the interval is appropriate for the question being asked. It must be clear how its endpoints were selected and which population, period, or conditions they are intended to represent. If the references change, earlier and later results should not be compared as though they necessarily originated from the same configuration.

Testing of the interpretation. This consists of examining whether the meaning attributed to the result is supported by information that was not used to construct it. Before examining that information, it should be specified what is expected to be found and which discrepancies would warrant revising the interpretation. A numerical coincidence must not be interpreted as a relationship between phenomena without justifying what relationship is being proposed and how it is to be examined.

These checks address different questions. Correct execution of the formula does not establish that the descriptor represents what is intended to be studied. Similarly, using an appropriate interval does not turn the result into a causal explanation.

The usefulness of the scale can be evaluated in relation to a clearly defined task: whether it facilitates interpreting relative positions, reconstructing a comparison, or communicating the references used. Such an evaluation should allow for the possibility that the original values, normalization without additional conventions, or another representation may be sufficient or more appropriate.

The criterion of "fruit" may accompany this assessment of usefulness and consequences. It does not replace the records, nor does it allow an interpretation to be regarded as confirmed merely because it appears clear or compatible with the project's conceptual framework.

The purpose of these conditions is to ensure that each application can be examined and corrected. When the available materials do not permit this, the application must be presented as an exploration or analogy, not as a demonstrated measurement of coherence.

5. Conversion Procedure and Interpretation of Results

The operational procedure of the Universal Coherence Scale (UC Scale) converts a numerical input relative to a declared minimum and maximum. To examine its results, three elements must be distinguished: the mathematical transformation, the additional conventions, and the meaning attributed to the representation.

The following is retained as the magnitude of the conversion factor:

$$c = 0.9999999999999990$$

This value is part of the scale's design. It is a fixed number smaller than 1, not a physical constant or a guarantee of precision. Its use does not make zero a mathematically unreachable point either.

The output range depends on the input conditions and the sign applied. When the input belongs to the declared interval and the factor is positive, the formula produces a value between 0 and c , including both endpoints. Outside that interval, the same expression allows extrapolation but no longer guarantees a bounded output.

The designations "Pure Structural Mode" and "Reference-Normalized Mode" are retained as precedents from the proposal. The former identifies a conceptual interpretation of proximity to or distance from a reference; it does not introduce a second measurement formula. The latter requires declaring the specific references used in the conversion. Both interpretations must respect the properties and limitations developed below.

5.1. Numerical Conversion Relative to a Declared Interval

The conversion uses min–max normalization, a data transformation procedure described by Han, Kamber, and Pei⁽²¹⁾. The operation positions an input relative to an interval and allows it to be expressed on another scale. The particular conventions of the UC Scale are added to that operation and must be justified separately.

5.1.1. General Formula for Conversion to UC

The formula is expressed as follows:

$$\text{Value_UC} = [(x - m) / (M - m)] \times k$$

where:

$$k \in \{-c, +c\}$$

$$c = 0.9999999999999990$$

(21) Han, Kamber, and Pei present min–max normalization among data transformation procedures. They are cited as a reference for the operation used, not as a foundation for the specific factor, the sign rule, or the interpretations of the UC Scale. Han, J., Kamber, M., & Pei, J. (2011). *Data mining: Concepts and techniques* (3rd ed.). Morgan Kaufmann.

x is the input value. m and M are, respectively, the declared lower and upper limits. k is the conversion factor, whose sign is determined by an explicit rule. This notation abbreviates the terms "Observed Value", "Minimum Value", and "Maximum Value" from the original formulation without changing the operation.

All three input values must be finite and expressed in a compatible manner. The following condition is required:

$$m < M$$

When $m = M$, the denominator is zero and the conversion is undefined. If the references are reversed, they do not satisfy the conditions of the procedure described here. Missing or non-numerical data must be treated as input issues, not automatically replaced with zero.

For a fixed positive factor, the formula can be written as:

$$\text{Value_UC} = [c / (M - m)]x - [cm / (M - m)]$$

It is therefore an affine transformation. The following relationships follow directly from it:

$$x = m \Rightarrow \text{Value_UC} = 0$$

$$x = M \Rightarrow \text{Value_UC} = c$$

$$m < x < M \Rightarrow 0 < \text{Value_UC} < c$$

The corresponding output interval is closed:

$$[0, c]$$

Zero indicates that the input coincides with the lower reference. It does not necessarily mean the absence of a phenomenon, the absence of information, or a lack of coherence. Similarly, reaching c means coinciding with the upper reference, not attaining an optimal state.

If a fixed negative factor were selected, the same input interval would be transformed into $[-c, 0]$, reversing its order. The $\pm$ symbol in the original formulation does not mean that a single execution produces two results: the sign actually used must be known. The range-dependent rule is examined in Section 5.3.1.

As long as the references and a positive factor remain unchanged, the order of the inputs is preserved before rounding. However, the result does not automatically become a probability, a percentile, or a measure of coherence. It expresses a transformed relative position.

The choice of a reference value must also be compatible with the formula. For example, if $m = 0$, $M = R$, and $k = +c$ are used, with $R > 0$, the reference R receives the value c , not the value 1. Assigning it exactly 1 would require another convention for the factor, which would have to be declared.

Finally, sharing an output interval does not make the represented properties equivalent. The interpretation of a numerical coincidence depends on the meaning of the inputs and the appropriateness of the references.

5.1.2. Input Format and Representation Precision

The initial version proposed entering exactly sixteen digits in total and restricting the endings of the last two decimal places. This revision distinguishes those formatting decisions from the mathematical conditions required to perform the conversion.

A sixteen-digit notation may be retained as a presentation option, but it is not a requirement of the formula. Nor does it necessarily correspond to sixteen significant digits or establish a common absolute resolution.

The examples from the previous format illustrate this distinction:

Numerical notation	Digits before decimal separator	Digits after decimal separator
7189.0000000000010	4	12
10.892000000000010	2	14
6.5200000000000010	1	15

Although all three notations contain sixteen digits, their final decimal positions represent different increments. The format alone does not indicate the uncertainty of a measurement or how many digits are supported by the data.

The requirement that the final two decimal digits must form a value equal to or greater than "10" is no longer retained as a general condition. That restriction excludes valid numbers and does not follow from normalization. The final digits of an observation must not be altered to make it admissible.

The nonzero reference 0.000000000000010 does not constitute a positive minimum imposed by the formula either. The operation can produce zero and, before restricting its representation, positive values smaller than that reference. Any display or rounding threshold must be declared as an additional rule.

Goldberg's analysis of floating-point arithmetic⁽²²⁾ makes it possible to distinguish numerical representation, rounding errors, and calculation conditions. A written decimal is not always represented exactly in finite binary arithmetic; displaying more digits does not eliminate that difference.

For this scale, each implementation must specify the type of arithmetic used, the working precision, and the rounding criterion. It must also verify that the limits remain distinct after

(22) Goldberg examines floating-point representation, rounding errors, and their consequences for computation. It is cited to distinguish decimal notation from computational precision, not to justify a sixteen-digit requirement or a restriction on decimal endings. Goldberg, D. (1991). What every computer scientist should know about floating-point arithmetic. *ACM Computing Surveys*, 23(1), 5–48. DOI: 10.1145/103162.103163.

conversion to the internal format. If the calculation cannot adequately represent the difference between them, that limitation must be reported.

The numerical examples in Section 5.2.2 specify a particular calculation and presentation criterion. That choice makes the table reproducible; it is not imposed as a universal precision requirement for every application.

5.2. Decimal Reading and Self-Nested Representation

Self-nested reading is retained as a way of organizing numerical representation. It consists of selecting intervals within other intervals and expressing positions again relative to more localized references.

This operation does not demonstrate that the represented phenomenon possesses a fractal structure. Nor does it establish that each decimal digit corresponds to a physical, biological, or social layer.

5.2.1. Levels of Representation Resolution

Two operations must be distinguished.

Increasing the detail of the numerical notation consists of displaying more decimal places of an available value. It provides additional information only when that information is preserved in the calculation or the original record. Adding zeros or unjustified digits does not increase knowledge of the phenomenon.

Selecting a subinterval consists of declaring new limits and applying the conversion again relative to them. The result changes because the reference changes. To reconstruct the relationship with the previous representation, both intervals and the procedure used must be preserved.

In this sense, a "level" is a resolution of interpretation or a working interval. It is not automatically identified with a level of organization of the object being studied.

The mathematical possibility of subdividing an interval does not imply that a finite format preserves an unlimited number of subdivisions. In particular, a sixteen-digit notation does not store another sixteen independent digits within each of its positions.

Opening a more localized interpretation may facilitate the examination of available differences, but it does not recover differences lost through rounding or make it possible to distinguish variations smaller than those supported by the data. The appropriateness of displaying more detail depends on the available information and the question being asked, not merely on the ability to magnify the representation.

5.2.2. Arithmetic Example Using an Approximation of π

The example is retained as an examination of the conversion, not as an observation of a physical or fractal structure of π .

The following decimal is used:

$$p = 3.141592653589793$$

as an approximation of π , together with the references:

$$m = 0.000000000000010$$

$$M = c = 0.999999999999990$$

The initial version also used the input 0.314159265358980, presented as a rescaling of π . That notation is not exactly the result of dividing the decimal p by ten. To avoid confusing a modification of the input with an effect of the conversion, the two values are distinguished here.

The exact division of the selected decimal is:

$$p / 10 = 0.3141592653589793$$

The sign rule from Section 5.3.1 is applied: a positive factor for inputs within the references and a negative factor for inputs outside them.

The results in the table have been recalculated from those decimal inputs using sixty significant digits of working precision. Only the displayed outputs are rounded to fifteen decimal places, to the nearest value, with ties rounded to even. The inputs are preserved exactly as indicated.

Case	Input used	Relationship to interval	Factor	Displayed result
Decimal p from the original example	3.141592653589793	Above maximum	$-c$	-3.141592653589814
Second input from the original example	0.314159265358980	Within interval	$+c$	+0.314159265358973
Exact division of decimal p by ten	0.3141592653589793	Within interval	$+c$	+0.314159265358972

These are results obtained by evaluating the formula under the stated conditions. They are not presented as verified outputs of the UC Converter. They replace the previous numerical results for this calculation procedure, without attributing the differences from the original implementation to any specific cause.

In the first case, the input exceeds the maximum. The normalized quotient is greater than 1, and the negative factor produces an output smaller than $-c$. Changing the sign does not bring the result back within the interval or stabilize it: its magnitude remains outside the output range corresponding to inputs within the interval.

In the other two cases, the input belongs to the interval and receives the positive factor. The output does not coincide exactly with the input because the formula subtracts the minimum, divides by the width of the interval, and multiplies by c . The difference between the two outputs results from using slightly different inputs.

The comparison illustrates consequences of the calculation and the choice of data. It does not establish a structural inversion, preservation of coherence, or a transition between levels of the phenomenon.

5.2.3. Scale-Change Convention

Changing the scale of numerical notation and changing the position relative to an interval are different operations.

If only the input is divided by ten while the minimum and maximum remain unchanged, the relative position of that input changes. This is what happens when comparing p with $p/10$ under the same references in the example.

By contrast, if the input and both references are divided by ten, the normalization remains unchanged:

$$[(x/10 - m/10) / (M/10 - m/10)] = (x - m) / (M - m)$$

This equality follows from cancellation of the common factor, provided that $m < M$. Before rounding, and with the same conversion factor maintained, the UC value also remains unchanged. Membership in the interval is preserved, so the sign rule described in this chapter selects the same sign.

The invariance of this operation expresses an algebraic property. It does not demonstrate that a natural structure preserves its coherence when moving between levels.

A self-nested representation must record what has been transformed: the input, the references, the output format, or several elements at once. If a new interval is selected for a localized interpretation, its limits and its relationship to the previous interval must be preserved.

The designation "Scale-Change Convention" replaces "Law of Coherent Scaling" in this section. What can be verified is the relationship between the declared transformations; any interpretation concerning the phenomenon requires additional justification.

5.3. Calculation Tool, Traceability, and Collaboration

A tool can facilitate the application of the formula and the recording of its conditions. For its results to be examinable, what the interface displays must be distinguished from the operations actually performed by the program.

The good practices for scientific computing described by Wilson and colleagues⁽²³⁾ provide a precedent for documenting procedures, using version control, and checking results through testing.

(23) Wilson and colleagues propose good practices for developing and reviewing scientific software, including documentation, testing, and version control. They are cited as guidance for examining an implementation, not as certification of the UC Converter. Wilson, G., Aruliah, D. A., Brown, C. T., et al. (2014). Best practices for scientific computing. *PLOS Biology*, 12(1), e1001745. DOI: 10.1371/journal.pbio.1001745.

They do not constitute validation of the UC Converter: those practices must be implemented and examined in the version being used.

5.3.1. Selection of the UC Factor Sign

The sign is retained as a convention dependent on whether the input belongs to the interval. For finite numerical data and valid references ($m < M$), the rule described is:

$$\begin{aligned} k(x; m, M) = \\ &+c, \text{ if } m \leq x \leq M \\ &-c, \text{ if } x < m \text{ or } x > M \end{aligned}$$

This expression makes explicit the condition used in the visual selection fragment from the original version. It does not introduce a new property of the phenomenon.

Reference code fragment for the interface. The following block preserves the instructions of the code published in GameMaker Studio 2. Only the initial comment, which previously described it as "complete validation", has been corrected. It is the complete fragment shown in the essay, not the converter's complete program, and it assumes that the fields and positioning variables have already been defined.

```
// Visual sign selection based on whether the input is within the range
draw_set_color(c_white);

var factor_conversion_visual = "+ 0.9999999999999990";

if (campo_actual != "" && campo_min != "" && campo_max != "") {
    var valor_actual = real(campo_actual);
    var valor_min = real(campo_min);
    var valor_max = real(campo_max);

    if (valor_actual < valor_min || valor_actual > valor_max) {
        factor_conversion_visual = "- 0.9999999999999990";
    }
}

draw_text(
    pos_x + 260,
    pos_y + espaciado * 3,
    factor_conversion_visual
);
```

The block selects a text string and draws it. These instructions do not calculate the UC result, nor do they demonstrate that the displayed factor is used elsewhere in the program.

The initial condition checks that the fields are not empty. The fragment contains no explicit checks of the numerical format, the finiteness of the values, or whether the minimum is strictly less than the maximum. The positive sign displayed by default also does not establish that the data have been validated.

If the selected factor is subsequently used in the formula, its consequences can be derived algebraically:

Input condition	Selected factor	Consequence for the result
$x < m$	$-c$	Positive result, with no upper bound as the input moves further below the minimum.
$x = m$	$+c$	Result equal to 0.
$m < x < M$	$+c$	Result between 0 and c , without reaching either endpoint.
$x = M$	$+c$	Result equal to c .
$x > M$	$-c$	Result smaller than $-c$, with increasing magnitude as the input moves further above the maximum.

Below the minimum, both the numerator and the factor are negative, so their product is positive. A minimum expression is not necessarily obtained: the magnitude may increase without bound. Above the maximum, the result is negative but remains outside the interval.

The rule can also produce the same output for different inputs. As an arithmetic check, with $m = 0$ and $M = 10$, the inputs $x = 5$ and $x = -5$ both produce $c/2$, although one belongs to the interval and the other does not. Therefore, the final value and its sign are not sufficient to reconstruct the condition of the input.

Furthermore, the change in factor introduces a discontinuity when the maximum is exceeded: at $x = M$, the result is c ; for inputs outside the interval approaching M from above, the output approaches $-c$. That jump belongs to the sign-selection rule; it does not demonstrate a transition in the phenomenon.

Membership in the interval must therefore be recorded as separate information. Changing the sign, rejecting an input, clipping an output to an endpoint, or redefining the references are different procedures. None should be applied silently as though it were equivalent to the others.

5.3.2. The UC Converter as a Tool for Calculation and Communication

The UC Converter is presented as a resource for entering values, examining their relationship to the references, and displaying the conversion and its associated representations. These functions preserve the operational purpose of the resource described in the initial version. Their presence does not, by itself, establish a reduction in errors or an improvement in reproducibility.

For this scale, it is proposed that each shared result preserve, at a minimum, the original input and its meaning, the limits used, whether the input belongs to the interval, the factor applied, and the rounding rule. Where applicable, the provenance of the record, its units, and the program version must also be indicated.

The implementation should be examinable through cases with known results: inputs coinciding

with each endpoint, inputs within the interval, inputs outside the interval, and equal or reversed limits. These checks would make it possible to distinguish a result predicted by the formula from an input, calculation, or presentation issue. They are proposed here as conditions for review, not as tests that have already been performed.

A visualization may facilitate interpretation, but it does not replace the numerical record. Its colors, positions, or animations must be distinguished from the properties attributed to the data. The appearance of a representation does not turn a sign convention into physical expansion or contraction.

Sharing the tool may facilitate the exchange of configurations and results when these conditions are preserved. It does not establish that participants are measuring the same property or that their interpretations are equivalent.

The operational use of the UC Scale is thus delimited by an explicit conversion, identifiable conventions, and a record that allows both to be reviewed. Its usefulness must be examined in the specific task for which it is employed.

6. Exploratory Environments

The applications *Normaliza Coherente* and *Visualiza Coherencias* form part of the development of tools within the Universal Coherence Project. They are presented as resources for exploring numerical conversions and representations. Their relationship to this essay requires distinguishing the formula in Chapter 5 from the additional rules incorporated by each implementation.

Normaliza Coherente⁽²⁴⁾, available at normalizacoherente.optimeflow.com, allows users to enter a value and minimum and maximum references, perform a conversion, and examine the result. It includes calculation modes, reference templates, and options for saving normalizations. Its code is available in the *NormalizaCoherente* repository, which identifies DOI 10.5281/zenodo.18838925 as its publication reference.

The code examined uses the min–max quotient and the UC Scale factor, together with additional rules. In Pure Structural Mode, it applies the sign determined by whether the input belongs to the interval to the absolute value of the quotient.

In Reference-Normalized Mode, it additionally limits that magnitude to a maximum of 1 before multiplying it by the factor. These operations must be distinguished from the direct application of the formula without taking the absolute value or applying clipping, particularly for inputs outside the interval.

The result is determined by the implemented procedure. It does not establish that the references are appropriate for the task or that the input describes coherence, well-being, or historical accumulation. The templates facilitate the entry of intervals, but the appropriateness of each interval must be justified according to its intended use.

Visualiza Coherencias⁽²⁵⁾, available at visualizacoherencias.optimeflow.com, combines a UC calculator with an editor for two sixteen-position S(i) sequences and representations using bars and ellipses. It allows users to work with values entered manually or generated through its algorithmic procedures. Its code is available in the *VisualizaCoherencias* repository. DOI 10.5281/zenodo.18868742 is provided as a repository deposit reference.

Its calculator applies the signed quotient in Pure Structural Mode and clips the quotient to the interval [0, 1] in Reference-Normalized Mode. It also maintains its own input formatting requirements. Consequently, the modes of the two applications should not be considered interchangeable merely because they share the same names.

The organization of positions, the associated expressions, and the generation operations belong to the particular configuration of *Visualiza Coherencias*. The use of S(i) labels does not establish a position-by-position correspondence with every version of the published model. Likewise, the automatic derivation options may recalculate certain values for display or copying; a visualization should not necessarily be interpreted as an untransformed reproduction of the entered values.

(24) Calvo Espinosa, A. (2026). *Normaliza Coherente* [Software]. GitHub. Repository: AceOptimeFlows/NormalizaCoherente. The repository identifies the software DOI 10.5281/zenodo.18838925. It is cited to document the application and its implementation decisions.

(25) Calvo Espinosa, A. (2026). *Visualiza Coherente* [Software; application "Visualiza Coherencias"]. GitHub. Repository: AceOptimeFlows/VisualizaCoherencias. Deposit reference provided by the author: 10.5281/zenodo.18868742. It is cited to document the application's calculation, editing, and representation functions. The singular title corresponds to the repository's citation file.

A figure that organizes these values does not establish equivalence between the scale and the $S(i)$ architecture, nor between the phenomena from which the inputs originate. To interpret or reproduce a representation, the configuration used, the original values, and the intermediate operations must be preserved.

The interfaces examined retain certain expressions from the earlier formulation, including the description of zero as an unreachable limit. That formulation is not adopted as a mathematical property in this revision: Chapter 5 recognizes zero as a valid result when the input coincides with the minimum. Help texts and program conventions must be distinguished from the properties of the formula.

This essay does not present results demonstrating the superiority of the convention or correspondence between domains. The applications, their repositories, and the deposit references are offered as exploratory materials. Their availability makes it possible to locate the procedures and prepare checks; it does not replace the evaluation of the calculation, the references, or the interpretations.

7. Conclusions and Perspectives

The Limited-Precision Universal Coherence Scale is presented in this revision as a numerical conversion convention accompanied by an interpretive framework. The procedure makes it possible to express an input relative to declared references. Its interpretation requires preserving the meaning of the original data and distinguishing the properties of the transformation from additional decisions concerning representation.

The essay distinguishes three questions throughout its development: what the formula calculates, what conventions an implementation incorporates, and what can be claimed about the represented phenomenon. This distinction makes it possible to revise the proposal without attributing to the calculation results that depend on other forms of verification.

7.1. Main Contribution

The min–max normalization used in the UC Scale is not presented as a new mathematical operation. The proposal combines it with a conversion factor, a sign rule, and representation options. The specific contribution of this revision consists of making those decisions explicit, examining their consequences, and delimiting the interpretations that may accompany them.

Chapter 5 retains the formula and specifies its conditions. For inputs within valid references and with a positive factor, the output belongs to a closed interval that includes zero. Inputs outside that interval require separate treatment: selecting a negative sign does not guarantee that the result remains bounded, nor does it, by itself, make it possible to identify the condition of the input. These consequences belong to the defined operations, not to any supposed expansion or contraction of the phenomenon.

The precision of the calculation is also distinguished from the number of digits displayed. The term "limited precision" identifies decisions concerning representation that must be documented; it does not establish a common uncertainty for all observations. Self-nested decimal reading is retained as an organization of intervals and resolutions, without attributing a layer of reality to each decimal position.

This delimitation modifies the scope of comparison. Two results may share a numerical interval while representing different properties. To interpret their relationship, it is necessary to know what has been recorded, how the references were selected, and what criterion makes it appropriate to consider the comparison relevant.

The usefulness of these conventions remains a question to be examined through specific applications. Box's reflection on the relationship between model formulation, application, and revision provides a precedent for this willingness to test proposals against their limitations⁽²⁶⁾.

The essay thus provides a revised description of the procedure and its conditions of use. The arithmetic examples make it possible to verify consequences of the formula; they do not constitute

(26) Box examines research as a process of confronting formulations with observations and emphasizes the importance of revising the shortcomings of models. It is cited as a precedent for evaluating usefulness and maintaining a willingness to correct the proposal, not as validation of the UC Scale. Box, G. E. P. (1976). Science and statistics. *Journal of the American Statistical Association*, 71(356), 791–799. DOI: 10.1080/01621459.1976.10480949.

empirical results demonstrating the superiority of the scale or correspondence between domains.

7.2. Perspectives and Future Work

The architecture of the sixteen Simultaneous Structural Functions, $S(i)$, already has a revised version: *The 16 Simultaneous Structural Functions (S_i): A Working Architecture within the Universal Coherence Project, Version 1.1.*⁽²⁷⁾ That publication proposes exploring relationships between functions, states, and update paths, and presents its positions and connections as design decisions. Therefore, its relationship with the scale builds upon an existing work, not a module that has yet to be announced.

The two proposals serve different purposes. The UC Scale transforms values relative to numerical references; $S(i)$ organizes update relationships between positions. Their inclusion within the same project does not establish equivalence between the zero of the conversion and S_9 , nor does it turn a normalized output into a measure of the expression of the whole attributed to S_{16} .

A possible integration would need to identify which values are converted, using which limits, and at what point in the process. It should also distinguish whether the conversion is used solely to display results or whether its outputs participate in updates. In the latter case, the conversion procedure would form part of the implementation rules, and its effects would need to be examined within that implementation.

An immediate line of work consists of documenting the correspondence between the formulation in Chapter 5 and the variants described in the exploratory environments of Chapter 6. The use of absolute values, result clipping, input restrictions, and rounding rules must be identified as specific decisions. The objective would be to develop specifications that make it possible to determine which procedure each version executes and under what conditions their results can be compared.

The checks could be organized around cases with known results: inputs within the interval, inputs coinciding with the endpoints, values outside the interval, and references that do not satisfy the conditions of the formula.

For each case, the expected result, the obtained result, and any differences attributable to representation or calculation should be recorded. These tests would evaluate the execution of the declared rules; they would not, by themselves, demonstrate that the references or interpretations are appropriate for an external phenomenon.

Examining applications would require an additional step. It would be necessary to define a task, preserve observations independent of those used to construct the interpretation, and establish what result would make it possible to evaluate its usefulness. The proposals by Munafò and colleagues concerning reproducible research provide a precedent for jointly addressing the design, evaluation, and communication of such studies⁽²⁸⁾.

(27) Calvo Espinosa presents the $S(i)$ architecture as a working partition for exploring relationships between mathematical functions, states, and paths. It is cited to situate the relationship between the project's modules, without establishing equivalence between their variables or mutual validation. Calvo Espinosa, A. (2026). *Las 16 Funciones Estructurales Simultáneas (S_i): Una Arquitectura de Trabajo en el Proyecto Coherencia Universal (Version 1.1)* [Preprint]. Zenodo. DOI: 10.5281/zenodo.23264416.

(28) Munafò and colleagues propose measures to improve research reproducibility, addressing methodological, communication, and evaluation aspects. They are cited as guidance for the design and documentation of future studies, not as a demonstration that the UC Scale or its applications have been validated. Munafò, M. R., Nosek, B. A., Bishop, D. V. M., et al. (2017). A manifesto for reproducible science. *Nature Human Behaviour*, 1, 0021. DOI: 10.1038/s41562-016-0021.

The comparison should allow for alternatives: retaining the original values, using normalization without the additional conventions, or adopting another representation. The purpose would be to determine what each choice contributes and what information it may conceal. It is not assumed that a greater number of digits, a particular sign rule, or a more elaborate visualization produces a better interpretation.

These lines of inquiry remain open. An evaluation may suggest retaining, modifying, or removing a convention. Changes must be documented to distinguish the proposal being examined from the configuration subsequently adopted.

7.3. Invitation to Review and Collaborate

The UC Scale is offered as a proposal open to conceptual, numerical, and applied review. Collaboration may begin with an ambiguity in the description, a calculation case, a difference between implementations, or a comparison with another tool. It does not require prior acceptance of the project's vocabulary or the attribution of universal meaning to its results.

At the conceptual level, the aim is to examine which terms help interpret the procedure and which might lead to conclusions that the procedure cannot support. At the numerical level, contributions may focus on verifying the operations, specifying their conditions, and documenting differences between versions. At the applied level, contributors are invited to formulate clearly delimited uses that allow both their advantages and limitations to be evaluated.

To facilitate this review, it is proposed that each contribution be accompanied by its assumptions, available data, references, and procedure. When software is used, the version, configuration, and intermediate transformations must be identified. The proposals by Nosek and colleagues concerning transparency and openness in research provide a precedent for this approach to documenting and sharing work⁽²⁹⁾.

The preservation of materials may be guided by the FAIR principles of findability, accessibility, interoperability, and reusability formulated by Wilkinson and colleagues⁽³⁰⁾. In this proposal, this would involve describing the provenance of records, identifying versions, and making the conditions of access and reuse explicit. It is presented as guidance for future work, not as certification that the project's resources already satisfy all these principles.

Discrepancies and unfavorable results must also be preserved. A case in which the scale does not facilitate interpretation, a convention conceals a relevant difference, or a simpler alternative proves sufficient provides information about the scope of the tool.

The purpose of this collaboration is to establish a procedure that can be understood, examined, and corrected. Its continued development will depend on what it makes possible in specific tasks and on the clarity with which its limitations are acknowledged.

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(29) Nosek and colleagues propose standards to promote transparency, openness, and reproducibility in research. They are cited as a precedent for documenting and sharing procedures, data, code, and materials, not as certification of the resources presented. Nosek, B. A., Alter, G., Banks, G. C., et al. (2015). Promoting an open research culture. *Science*, 348(6242), 1422–1425. DOI: 10.1126/science.aab2374.

(30) Wilkinson and colleagues formulate the FAIR principles to guide the findability, accessibility, interoperability, and reusability of data and other digital research objects. They are cited as a reference for organizing shared materials, without claiming that their public availability is equivalent to compliance with those principles. Wilkinson, M. D., Dumontier, M., Aalbersberg, I. J., et al. (2016). The FAIR guiding principles for scientific data management and stewardship. *Scientific Data*, 3, 160018. DOI: 10.1038/sdata.2016.18.

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- (1) Lammin develops a non-totalizing proposal for approaching the experience of community. It is cited as a precedent for this conceptual orientation, not as a foundation for a numerical scale. Lammin, H. E. (2017). *Staging community: A non-philosophical presentation of immanent social experience* [Doctoral dissertation, University of Greenwich]. — p. 1
- (2) Wildman examines the philosophical problems of relational ontology and the relationships between entities, relations, and causality. It is cited as a precedent for attending to the relational character of a description. Wildman, W. J. (2006, May 15). *An introduction to relational ontology* [Manuscript]. Boston University. — p. 1
- (3) Capra presents a synthesis of systemic approaches and theories of living systems. It is cited as context for the interest in relationships and organization, not as justification for numerical equivalence between phenomena. Capra, F. (1996). *The web of life: A new scientific understanding of living systems*. Anchor Books. — p. 1
- (4) Bar-Yam develops a formulation of strong emergence based on multiscale variety. It is cited as a precedent for studying levels of description, not as a foundation for the "asymptotic center" of the UC Scale. Bar-Yam, Y. (2004). A mathematical theory of strong emergence using multiscale variety. *Complexity*, 9(6), 15–24. DOI: 10.1002/cplx.20029. — p. 1
- (5) Sivakumar and Boon examine intellectual humility and its relationship to the competencies required for interdisciplinary work. They are cited to situate the willingness to recognize limitations and revise interpretations, not to justify conventions of decimal precision. Sivakumar, K., & Boon, M. (2024). The role of intellectual humility in promoting epistemic fluency for interdisciplinary engineering education. *Frontiers in Education*, 9, 1395265. DOI: 10.3389/educ.2024.1395265. — p. 2
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- (28) Munafò and colleagues propose measures to improve research reproducibility, addressing methodological, communication, and evaluation aspects. They are cited as guidance for the design and documentation of future studies, not as a demonstration that the UC Scale or its applications have been validated. Munafò, M. R., Nosek, B. A., Bishop, D. V. M., et al. (2017). A manifesto for reproducible science. *Nature Human Behaviour*, 1, 0021. DOI: 10.1038/s41562-016-0021. — p. 27
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Editorial note and statements

Editorial note

Upon revisiting my earlier work, the container error also became apparent in my own writing. To deny that those were the feelings I had when I wrote those texts would be untruthful. Even so, my intention was not to impose a particular view, but to open new paths. That is why I corrected what could not be substantiated.

During the preparation of this work, ChatGPT was used as a support tool for drafting, organizing the text, critically reviewing arguments, and identifying and proposing bibliographic references. The final selection of sources, the formulation of the claims, and responsibility for the content rest with the author. AI assistance does not constitute a validation of the claims, the model, or the conclusions of the essay.

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To my father and mother. Sometimes, sincerity is enough for another person to understand.

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Conflicts of interest

The author declares no conflicts of interest related to the content of this work. The text does not represent the official position of any religious, academic, or business institution. Responsibility for its content rests solely with the author.

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