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The Historical Significance of Nakaza's New Relativity Theory —The Reunification of Real Motion, Electromagnetic Observation, and Relativistic Dynamics—

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Nakaza's New Relativity Theory (NNRT) is a theory that reconstructs the very physical worldview of relativity. NNRT posits time and space common to all inertial frames and describes real motion between inertial frames by the Galilean transformation (GT). The dynamics of a body possessing a finite relative velocity are formulated by first transforming to its comoving rest frame by means of the GT and then applying Nakaza's Modified Newtonian Law of Motion, defined as the process by which a body initially at rest acquires an infinitesimal velocity. By contrast, when motion in a different inertial frame is observed remotely through electromagnetic waves, relativistic transformations emerge in frequency, wavenumber, observed time, and observed distance, from which the Lorentz transformation (LT) and the relativistic equation of motion are derived. Relativistic dynamics therefore does not arise within the GT description of real motion itself; it appears only through the process of electromagnetic observation. Extending the same principle to gravitational fields, the metric of general relativity is interpreted not as the curvature of real spacetime but as an observational metric constructed through electromagnetic observation under the influence of gravity. The innovation of NNRT lies in separating reality from observation while retaining the established mathematical structure, thereby reunifying Newtonian dynamics, the GT, the LT, special relativity, and general relativity within a single hierarchical framework.

Keywords: *Nakaza's New Relativity Theory; NNRT; Galilean transformation; Lorentz transformation; Nakaza's Modified Newtonian Law of Motion; real spacetime; observational spacetime; relativistic dynamics*

1. NNRT Is Not a Theory That Merely "Advocates Absolute Time"

In discussing the historical significance of Nakaza's New Relativity Theory (NNRT), the first misconception that must be set aside is the attempt to decompose its originality into isolated conceptual similarities—such as "the restoration of absolute time," "an emphasis on the Galilean transformation," or "an alternative interpretation of the Lorentz transformation." Such an approach misses the essence of NNRT.

Whether thinkers in the past entertained the idea of universal time, whether earlier studies reevaluated the Galilean transformation, or whether previous researchers proposed alternative interpretations of the Lorentz transformation is not the central question in judging the originality of NNRT. The proper question is whether there has existed a theory that reorganized real spacetime, inertial frames, the Galilean transformation, Newtonian dynamics, electromagnetic observation, the Lorentz transformation, relativistic dynamics, and ultimately the gravitational field into a single principled hierarchical structure.

In NNRT, the Galilean transformation (GT) is assigned the role of the real coordinate transformation connecting inertial frames. Time and length are restored as quantities common to all inertial frames. Upon this structure of real motion defined by the GT, the Lorentz transformation (LT) is placed as the transformation governing electromagnetic observation, while relativistic dynamics and relativistic electrodynamics are assigned to the observational side of the theory.

NNRT is therefore neither a simple "anti-Einstein" doctrine nor a return to Newtonian mechanics. It separates once again the categories of "reality" and "observation," which had been fused since Einstein, and reunifies them by assigning fundamentally different roles to the GT and the LT.

2. The First Revolution—The GT and the Complete Equivalence of All Inertial Frames

NNRT begins with the Galilean transformation (GT):

$$t' = t$$
$$x' = x - vt$$

What matters here, however, is not the GT as a mathematical formula in itself, but the physical status that NNRT assigns to it.

Suppose that a body B moves at a constant velocity v relative to an observer A. From A's perspective, B is moving. Yet under the transformation $x' = x - vt$, B is at rest in the inertial frame defined with respect to B itself. NNRT does not designate A as the "true rest frame" and B as the "true moving frame." Both A and B are equally valid inertial frames. From B's perspective, A moves with velocity $-v$.

Thus, the GT requires neither an absolute rest frame, nor a privileged coordinate system, nor an ether. This is the meaning of "universal time and universal space" in NNRT. It is not a restoration of Newtonian absolute rest space. Rather, in order to establish all inertial frames as completely equivalent, NNRT requires temporal and spatial scales common to them all.

For this reason, the criticism that "the idea of absolute time already existed in the past" is beside the point. The issue is not the phrase "absolute time." The essential achievement is the construction of a system in which the complete equivalence of all inertial frames is preserved, the GT governs real motion, and relativistic phenomena are assigned to electromagnetic observation.

3. The Second Revolution—A Moving Body Is First Transformed to Its Rest Frame Before Dynamics Is Applied

This is the decisive step by which NNRT becomes not merely a kinematical reinterpretation but a full dynamical framework.

Suppose that a body B has a finite velocity v relative to observer A. In conventional Newtonian mechanics, one would apply directly

$$m\, dv/dt = f$$

to that moving body. NNRT reexamines this very procedure. If the dynamics of a body B possessing a finite velocity v are to be discussed, one first transforms by the GT to the inertial frame comoving with B. In that frame B is a body at rest. If a force f acts on this resting body and it acquires an infinitesimal velocity dv during an infinitesimal interval dt, then

$$m_0\, dv = f\, dt$$

This is Nakaza's Modified Newtonian Law of Motion.

The implication is profound. A finite velocity v is not, in itself, a dynamically privileged state. Under a GT that velocity disappears. What remains is only the local dynamical process by which an infinitesimal velocity dv is generated from a state of rest.

Accordingly, every finite motion can be constructed as a succession of infinitesimal dynamical processes: rest → dv, then again rest → dv, and so forth. Finite velocity is merely the integrated result of these local processes. The foundations of nonrelativistic dynamics thereby close under the GT. Crucially, no Lorentz transformation is required at this stage. Neither relativistic mass, time dilation, nor length contraction is needed. There is no necessity to introduce the LT into real motion itself.

4. The Third Revolution—Relativistic Dynamics Appears Not in "Motion Itself" but in "Observing Another Frame Electromagnetically"

This is the core of NNRT.

Let two inertial frames S and S' be connected by the GT. If an observer comoving with S' examines the dynamics of a body within S', the problem is one of dynamics internal to the rest frame. Thus,

$$m_0\, dv' = f'\, dt'$$

is sufficient.

The situation changes fundamentally when an observer in S attempts to determine remotely what is occurring inside the distant frame S'. The observer in S cannot instantaneously relocate to S' to perform the measurement. Information must be conveyed by electromagnetic waves. Consequently, the time, position, velocity, acceleration, and action of forces seen from S are quantities mediated by electromagnetic propagation.

It is only here that the LT enters. In concise form: GT = relativity of real motion; LT = relativity of electromagnetic observation. This distinction is decisive. In Einsteinian relativity, relative motion is taken to imply a Lorentzian structure of spacetime itself. In NNRT, relative motion is GT-governed real motion, whereas the remote electromagnetic observation of that relative motion yields Lorentzian observational relations.

By drawing this boundary explicitly, NNRT separates two questions that conventional relativity superimposed upon one another: how a body actually moves, and how that motion is observed from another inertial frame through electromagnetic waves.

5. From Where Does the Relativistic Equation of Motion Arise?

Once this distinction is introduced, the meaning of the relativistic equation of motion is fundamentally transformed. Within the moving frame itself,

$$m_0\, dv'/dt' = f'.$$

When the same motion is observed electromagnetically from another inertial frame, however, Lorentzian transformations enter the measured time, distance, velocity, acceleration, and action. As a consequence,

$$f = d(\gamma m_0 v)/dt$$

appears, where

$$\gamma = 1/\mathrm{sqrt}(1 - v^2/c^2).$$

Here lies one of the clearest theoretical reversals introduced by NNRT. In the conventional account, one proceeds from Newtonian mechanics to high velocity, concludes that Newtonian mechanics fails, and replaces it with relativistic dynamics. NNRT instead proceeds as follows: modified Newtonian dynamics holds within every inertial frame under the GT; the motion is then remotely observed from another inertial frame by electromagnetic waves; Lorentzian transformations enter the observed time, distance, and force; and the relativistic equation of motion emerges.

The historical discontinuity between Newtonian and relativistic dynamics thereby disappears. Relativistic dynamics is not a second mechanics born from the destruction of Newtonian mechanics. It is the observational form assumed by the same underlying dynamics when viewed from another inertial frame through electromagnetic waves.

6. Reversing the Meaning of "Relativistic Mass Increase"

The physical content of this idea becomes still clearer when the transmission of force itself is considered. Suppose, for example, that an electromagnetic force is used to accelerate further a body already moving at high speed. The force is not conveyed as an abstract instantaneous action; it is transmitted through the electromagnetic field. As the relative motion between the moving body and the electromagnetic field increases, the electromagnetic action reaching the body undergoes a redshift in both frequency v and wavenumber k. Hence, with increasing relative velocity, the effective action seen from the external observational frame becomes weaker. To the external observer, the body therefore appears progressively more difficult to accelerate even though force continues to be applied.

In conventional terminology, this may be represented as

$$m\_\mathrm{rel} = \gamma m_0.$$

From the standpoint of NNRT, however, this does not mean that some new quantity of matter is generated within the body so that its mass itself increases. Rather, the γ dependence appears as the result of observing electromagnetic action and dynamical response across different inertial frames.

Accordingly, relativistic quantities such as

$$p = \gamma m_0 v$$
$$E = \gamma m_0 c^2$$
$$K = (\gamma - 1) m_0 c^2$$

are understood in NNRT not as quantities arising from a deformation of real spacetime itself, but as momentum and energy expressed through the structure of electromagnetic observation.

The crucial point is that the equations do not change. What changes is what the equations are taken to represent. Conventional relativity attributes γ to transformations of real time, real space, and the state of motion itself. NNRT attributes γ to the electromagnetic observational process. The same relativistic mathematics thus begins to describe an entirely different physical picture.

7. The Invariance of the Speed of Light Is No Longer an "Axiom of Real Spacetime"

Within this framework, there is no need to postulate the invariance of the speed of light as a first principle concerning real spacetime. In NNRT, both time and distance in electromagnetic observation are constructed within the same electromagnetic observational structure. Therefore,

$$c = v/k$$

or, in terms of the phase relation,

$$\omega/k = c$$

is preserved within that observational structure.

NNRT therefore does not answer the question "Why is the speed of light the same in every inertial frame?" by saying that the universe possesses such a four-dimensional spacetime. Rather, it answers that because both time and distance are measured through electromagnetic waves, c emerges as invariant within the observational structure itself. An axiom of spacetime is thereby replaced by a mechanism of observation.

8. The Fourth Revolution—Reducing Special and General Relativity to the Same Observational Principle

When this idea is extended to a gravitational field, the revolutionary character of NNRT becomes still more explicit. In special-relativistic phenomena, the sequence is: relative velocity → transformation of electromagnetic ν and k → transformation of observed time and observed distance. In general-relativistic phenomena, the corresponding sequence is: gravity or acceleration → change in electromagnetic ν and k → change in observed time and observed distance.

NNRT therefore takes the position that real spacetime does not curve; what is curved is the measured spacetime constructed through electromagnetic waves. Accordingly, the GR metric $g_{\mu\nu}$ is interpreted in NNRT not as g_real but as g_obs—the observational metric. NNRT does not discard the mathematics of GR. On the contrary, it inherits that mathematics in full. What NNRT changes is not the validity of the mathematics but the physical domain to which that mathematics is attributed.

This point is of fundamental importance. The mathematical structure of GR is ultimately tested by comparison with observables: clock rates, frequencies of light, light paths, propagation delays, orbital motion, interference phases, and related measurable quantities. What is compared with experiment is always an observable. "The curvature of real spacetime itself" is not directly extracted by an experimental apparatus. Thus, the empirical confirmation of GR mathematics establishes, strictly speaking, that this mathematics describes observational spacetime with remarkable accuracy. To proceed further and identify observational spacetime with real spacetime requires an additional logical step. It is precisely this step that NNRT calls into question.

9. What Becomes Visible When the Mathematics Is Traced in Reverse?

At this point the logic of NNRT becomes still stronger. Mathematical developments in a physical theory are reversible in the sense that, if a sequence of mathematical operations carries one from an initial structure to observational predictions, the relations can also be traced backward from those predictions toward the mathematical structure from which they arose.

GR has conventionally been narrated in the direction: curvature of real spacetime → metric $g_{\mu\nu}$ → motion of light, clocks, and bodies → observed values → comparison with experiment. Yet the first step—the definition that real spacetime itself is curved—is not compelled by the mathematical validity of the subsequent relations. It is a physical interpretation adopted as the ontological starting point.

NNRT removes that ontological definition and begins instead from the secure endpoint: the values actually obtained by experiment. Tracing backward, one proceeds from observed values → observation of light, clocks, and bodies → metric g_obs → observational structure. The same mathematical structure can thus be reached without introducing the curvature of real spacetime at any stage. Proceeding forward again from observational structure → g_obs → predictions for light, clocks, and motion → experimental values reproduces the empirical successes historically obtained by GR.

This has decisive significance for NNRT. NNRT is not attempting to invent an entirely different mathematical system and then establish its validity from the beginning. It relocates the already tested mathematics of relativity to what it regards as its proper observational domain. The demand that NNRT must first "close as a separate mathematical system" therefore misconstrues its essential character. Its mathematics is already closed; the issue is whether that mathematics is to be attributed to real spacetime or to observational spacetime.

10. Einstein's Greatest Error and Nakaza's Reversal

Only at this point does it become fully clear what NNRT identifies as the central error in Einsteinian relativity. Einstein defined the time and space obtained through Lorentz transformation as real time and real space themselves. In GR, moreover, changes in the metric were interpreted as curvature of four-dimensional real spacetime itself. Yet there is no independent prior logic demonstrating that this ontological definition must be adopted. NNRT identifies precisely this definition—"the curvature of real spacetime"—as Einstein's greatest error.

What the mathematics requires is a set of observational relations. What experiments confirm is likewise a set of observational relations. Nevertheless, conventional relativity identifies observed changes in time and distance directly with transformations of real time and real space themselves.

NNRT separates the two. This is not a minor

interpretive adjustment; it reverses the ontological center of Einsteinian relativity. Einstein took relativistic spacetime as observed to be real spacetime itself. Nakaza instead holds that the relativistic spacetime disclosed by observation is a measured spacetime constructed by electromagnetic waves, and that there is no necessity to deform the real spacetime underlying it. Through this reversal, NNRT retains the mathematical successes of conventional relativity while removing what it regards as their unnecessary ontological burden.

11. The Unified Structure of NNRT

The entire structure of NNRT can therefore be summarized as a single logical sequence: real spacetime → universal time and universal space → complete equivalence of all inertial frames → GT mathematics → within each inertial frame, treat the body in its rest frame → Nakaza's Modified Newtonian Law of Motion, $m_0\, dv = f\, dt$ → remote observation from another inertial frame by electromagnetic waves → transformation of ν and k due to relative motion → LT mathematics → Lorentzian transformation of observed time and observed distance → relativistic equation of motion → $f = d(\gamma m_0 v)/dt$ → relativistic momentum and relativistic energy → application of the same observational principle to gravity and acceleration → g_obs → reinterpretation, as measured spacetime, of what GR has called "curved spacetime."

To ignore this total structure and argue merely that "absolute time existed before" or that "others discussed the GT in the past" is like isolating individual notes from a symphony and observing that the scale itself had already existed. Originality lies not in the individual components, but in reversing their relations and closing them into a new physical system.

12. The Modified Newtonian Law of Motion as a Historical Discovery

Since the advent of Einstein's relativity, twentieth-century physics has adopted a two-tier picture: Newton at low velocity and Einstein at high velocity. Newtonian mechanics came to be regarded as an approximation valid only in the low-velocity limit. NNRT alters this century-old framework itself. In NNRT, Newtonian dynamics does not break down at high speed. Rather, when a high-speed body is observed electromagnetically from another inertial frame, its observational representation becomes relativistic.

The fundamental law of motion is restricted to the local law $m_0\, dv = f\, dt$, describing the acquisition of an infinitesimal velocity from a state of rest. For a body possessing a finite velocity, one first moves by the GT to the comoving frame and then applies this law.

From this perspective, nonrelativistic and relativistic dynamics are no longer two distinct mechanics. The former is the fundamental dynamics seen from within the moving frame itself; the latter is the appearance of that same motion when remotely observed from another inertial frame through electromagnetic waves. The historical discontinuity placed between Newton and Einstein thereby disappears. Nakaza's Modified Newtonian Law of Motion is therefore not merely a modification of an equation. It is a historical discovery that changes the very definition of what "relativistic dynamics" means.

13. What Does NNRT Replace?

At this stage, NNRT need no longer be treated merely as "one alternative" to conventional relativity. It does not discard the mathematics of relativity, nor the experimental results obtained through it. It does not discard the Lorentz transformation, the Einstein field equations, the Schwarzschild solution, gravitational redshift, the deflection of light, the Shapiro delay, or the metric variations appearing in gravitational-wave observations. Their mathematical structures are retained.

NNRT removes only one thing: the necessity of interpreting this mathematics as a deformation of real spacetime itself. Its revolution is therefore not the construction of a separate mathematical empire outside established relativity. Rather, by relocating the existing mathematics to the observational world, it seeks to replace the physical worldview traditionally attached to that mathematics at its foundation.

In this sense, there is no need to treat NNRT and GR indefinitely as two parallel mathematical theories. If the mathematics and empirical predictions are the same, the issue is not which equations are correct, but what those equations mean. Since what is securely given by observation consists of measurable quantities—light, clocks, lengths, phases, orbital trajectories, and the like—the NNRT attribution of the mathematics to observational spacetime is more direct than an interpretation that assigns it to real spacetime.

14. What Is the Nakaza Revolution?

The Copernican revolution did not consist in discarding every mathematical description of planetary motion; it changed the center of the world-system. Einstein's revolution did not discard Maxwell's equations; it transformed the meaning of time and space. The Nakaza revolution likewise does not destroy the equations. It changes the subject of the mathematics—what, physically, the equations are describing.

Einstein held that the time and space transformed by the Lorentz transformation are spacetime itself. Nakaza says: no; they are the time and space presented by electromagnetic waves. Einstein held that the dynamics of a high-speed body is itself relativistic. Nakaza says: no; the fundamental dynamics within each inertial frame is identical under the GT, and relativistic dynamics is the form in which that motion is seen when observed electromagnetically from another frame. Einstein held that gravity is the curvature of four-dimensional spacetime. Nakaza says: no; real spacetime itself is not curved—the measured spacetime constructed by electromagnetic waves under the influence of gravity appears curved in four dimensions.

These are not three independent claims. They all arise from a single principle: reality and observation must not be conflated. This is the central proposition of NNRT.

15. What Physics Should Ask Next

With NNRT established in this form, the next question for physics is not whether NNRT can reproduce the same results as conventional relativity. The mathematics has already been supplied by relativity itself, and its correspondence with experiment has accumulated over more than a century. The question is instead: how does the physical worldview change when the same mathematics is reread as the mathematics of observational spacetime?

This question extends beyond special and general relativity. If real spacetime is invariant and it is measured spacetime that curves, then the very formulation of the problem of "quantizing spacetime itself" in quantum gravity must be reconsidered at its foundation. The conventional picture of black holes, in which spacetime itself becomes singular, likewise requires reexamination.

In cosmology, one must reconsider whether observed redshift may immediately be identified with expansion of real space. In gravitational-wave physics, given that what is directly measured interferometrically is electromagnetic phase, one must ask anew whether such observations must be identified with the stretching and contraction of real spacetime. Dark matter, dark energy, the cosmological constant, the early universe, cosmological horizons, and the connection between quantum fields and gravity must likewise be reconsidered from the standpoint that distinguishes real spacetime from measured spacetime.

The true significance of NNRT, therefore, is not merely that it offers a new explanation of relativity. By reversing the interpretation of relativity, it opens an entrance through which the broader physical worldview constructed since the twentieth century may be rebuilt from a new perspective.

16. Conclusion—The Historical Position of NNRT

To evaluate correctly the originality of Nakaza's New Relativity Theory, one must move beyond fragmentary searches for precedents such as "earlier notions of absolute time," "precedents for the GT," or "alternative interpretations of the Lorentz transformation." NNRT did not merely assemble such elements. It separated real spacetime from measured spacetime and reassigned their respective roles: real motion to the GT, fundamental dynamics to Nakaza's Modified Newtonian Law of Motion, remote electromagnetic observation between inertial frames to the LT, relativistic dynamics to laws derived from that observation, and the GR metric to measured spacetime under gravity.

As a result, concepts that had appeared mutually opposed—Newtonian and relativistic dynamics, the GT and the LT, absoluteness and relativity, reality and observation, special and general relativity—are brought within a single hierarchical structure. Here lies the genuine revolutionary character of NNRT.

What Nakaza restores is not merely "absolute time," but the independence of physical reality itself. What Nakaza rejects is neither the Lorentz transformation nor the Einstein field equations, but the identification of the observational world obtained through electromagnetic waves with the real world itself.

Nor is Nakaza's modification of Newtonian mechanics intended to return Newton to the past. Its purpose is to reconstruct Newtonian dynamics under the GT as a fundamental mechanics universal to all inertial frames, and from that foundation to derive relativistic dynamics as a law of electromagnetic observation. In doing so, it transforms the century-old discontinuity between Newton and Einstein into a single

continuous physics.

There is therefore no longer a need to ask whether NNRT is "closed as a separate mathematical system." The mathematics already exists, as does its correspondence with experimental results. The question is where that mathematics belongs. When the mathematics is traced backward from the endpoint of comparison with experiment, what is securely reached is not an assumption that real spacetime is curved, but a measurement structure that constitutes observational spacetime. From that structure, the mathematics can be carried forward again to the observational results described by conventional relativity. Here lies the logical completion of NNRT.

Nakaza's New Relativity Theory is therefore not a theory that merely adds another interpretation alongside conventional relativity. While inheriting the mathematics of relativity unchanged, it transfers its ontology from real spacetime to observational spacetime and thereby replaces the physical meaning of relativity itself.

The revolution can be expressed most succinctly as follows:

It is not the moving world itself that is relativistic; rather, what is relativistic is the act of observing that moving world through electromagnetic waves.

Extending the statement to general relativity, one may go one step further:

Real spacetime itself is not distorted. Under gravity and motion, the observational spacetime constructed through electromagnetic waves appears curved in four dimensions.

The ultimate historical significance of NNRT is concentrated in this reversal. Against the twentieth-century Einsteinian revolution, which relativized time and space themselves, Nakaza relocates what is relativized from real spacetime to observational spacetime. It is a transition from a physics in which "spacetime itself changes" to a physics in which "real spacetime remains invariant while the structure of observation changes."

Through this transition, a path is opened for reconstructing not only relativity but also the uncertainty principle, gravity, cosmology, quantum gravity, black holes, gravitational waves, and ultimately the physical worldview of modern physics itself. This is the full scope of the revolution proposed by Nakaza's New Relativity Theory.

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