

Negation and Freedom in the Reaction to Relativity Theory¹

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*A Mr. le Professor Imre Toth
avec beaucoup des affections.*

One of the greatest pleasures I experienced while at the University of Regensburg was the presentation of a lecture course on Albert Einstein with Imre Toth. Through our many discussions then and throughout my stay in Regensburg, Imre vastly expanded my appreciation of Einstein and the wider problems of modern science and philosophy, as well as the plight of the intellectual in this century. One especially significant insight about Einstein that Imre brought to my attention then and that I have cherished ever since is the sense of personal freedom that one gains from even the briefest encounter with Einstein the man. Such freedom, indeed his sense of human dignity in general, contrasted sharply with the often slavish mentality and brutally negative suppression of human freedom manifested by others of Einstein's era and, sadly, even of our own era today. This insight, which has been a source of inspiration to me and, hopefully, to all of our students in Regensburg and beyond, is manifest perhaps most clearly in the public reaction to Einstein and relativity theory during the difficult years following the First World War.

Those were years of remarkable contrasts and frightening upheavals in our understanding of ourselves and of the world in which we live. The world had just witnessed the shocking spectacle of the most culturally advanced nations engaging in trench warfare, starvation blockades, war propaganda, and technological weapons of mass destruction. Now the western world was confronted with profound new changes:

the rise of industrial population centers, the spread of democracy to a defeated and unwilling Germany, the Bolshevik Revolution, and a universal sense that somehow people had lost control of their destinies. Such changes signaled to many, in the words of Spengler's two-volume essay, *Der Untergang des Abendlandes* (The decline of the West). It was a decline that many blamed upon the preeminence of "lifeless" Newtonian mechanism, "soulless" materialism, deterministic thinking, and democratic "mass culture."

Amidst this depressing state of affairs, relativity theory entered into public discourse as a reinforcement for some and as a contradiction for others. The news from London in 1919 that a British solar-eclipse expedition had beautifully confirmed one of the main predictions of Einstein's theory of general relativity spread across a war-weary Europe like a tidal wave. Newspapers across the continent extolled the confirmation of "general relativity," by which they meant the relativity of everything in general. A fascinated public clamored for explanations, and Einstein became an overnight celebrity.

Why was there this sudden public fascination? Certainly it had to do with the cultural upheavals of the period, and with the need of some for a prophet to show the way, but it also had to do with the new world view that relativity theory seemed to convey. Since long before the war, the public had associated truths about human affairs with the truths about nature uncovered by science. At the same time, late nineteenth century mechanical science seemed fully in step with popular notions of religious and moral absolutes. While the public eagerly sought to learn more about the

new relativity theory, beneath the fascination lurked a widespread anxiety. With the old order already in shambles about them, many feared that the triumph of relativity theory meant the triumph of universal "relativism."

Different people reacted differently to this state of affairs. While some rejected relativity theory outright, others, among them most physicists, celebrated relativity theory as the great achievement that it was. But others celebrated it as a negation of the abhorred "mechanism" that they perceived in the mechanical world view of Newtonian physics. As often happens when science seems to pose a threat, some thinkers flee from what they call "lifeless" science into romantic, "spiritual," anti-scientific forms of thinking.² This was especially so in Germany, where relativity theory was used for support by those who espoused ontological relativism. It was also exploited by those anti-scientific neo-romantics who sought a new, nonmechanical explanation of nature in which materialism, "classical" rationality and, especially, determinism and causality would no longer exist, and in which so-called spiritual values and truths would once again gain credence. These were just the features that physicists seemed to present several years later in the Copenhagen interpretation of quantum mechanics, formulated in 1927³. Despite the objections raised by Einstein and many others, ever since then mystics and romantics of various sorts have pointed to quantum indeterminism on the sub-microscopic scale as the scientific basis for the existence of human indeterminism and free will in the everyday world. Such claims are not only misguided but are an unwarranted extrapolation of scientific results into human affairs. Einstein himself strenuously objected to such practices, declaring: "I believe

that the present fashion of applying the axioms of physical science to human life is not only a mistake but has something reprehensible to it."⁴ In reality, anti-scientific relativism and neo-romantic mysticism about determinism and acausality have little to do with relativity or quantum theory and everything to do with the subjective conditions of the people who espouse such notions. The science serves as a metaphor or tool to be exploited for personal and political advantage.

The exploitation of relativity theory for individual gain was especially evident in Germany after the Great War. Most of the German public at first found cause to celebrate relativity. After all, amidst military defeat and economic collapse this was a German triumph that even the victorious British could not deny. Yet two other factors were at work: the perceived challenge of relativity theory to traditional meaning and beliefs, and opposition to Einstein himself. In a sense the theories of relativity seemed as incomprehensible to a bewildered public as did the new situation in which they found themselves. Relativity theory became a metaphor for incomprehension in every cultural sphere. One early opponent of relativity theory went so far as to label it "entartete Wissenschaft" (degenerate science), a term later used by the Nazis to stamp out all forms of non-realistic modernist art and culture.

The early opponent quoted above was Paul Weyland, the head of one of the many small proto-Nazi hate groups that sprang from the soil of German upheaval in reaction to the situation in postwar Germany. Many of these groups, such as the "Hakenkreuz-Mehrheit" (swastika majority) in Munich, included in their hatred for democracy and modernity a hatred for Einstein and relativity theory.⁵ The focus on

Einstein was at first mainly political. Since the beginning of World War I, Einstein, a committed pacifist, had stood practically alone among German professors in working for international peace and understanding, and he continued to do so after the war in the context of the League of Nations. British adulation combined with Einstein's support of the German social democracy provoked the ire of antidemocratic hate groups. Most of these, in seeking public support through the identification of scapegoats, turned increasingly anti-Semitic.

In August 1920 Einstein decided to respond in a Berlin newspaper to the attacks on relativity theory orchestrated by Weyland's hate group. Einstein's response only further incensed Weyland's followers, who drew the support of several active scientists, including the prestigious Nobel Prize-winning experimentalist Philipp Lenard. Lenard, who still clung to an out-dated ether theory of electromagnetism and who refused to accept the professional advance of theoretical physics, became an even more violent anti-Semite and opponent of relativity theory after a public debate with Einstein during the Bad Nauheim meeting of German Physical Society in 1920. He was soon joined by another Nobel Prize-winning experimentalist, Johannes Stark, who refused to accept the new quantum theory. A combination of pathological personality traits and professional difficulties drove both of these men to seek a public outlet for their frustrations and a vehicle for personal influence through anti-Semitic attacks on theoretical physics. During the 1920s their writings exhibited remarkably close parallels with Nazi literature of the period⁶.

By tapping the same reservoir of anger, hatred and anxiety that Hitler and his

followers were tapping, Lenard and Stark discovered that they could easily gain the public recognition and support that they felt their profession had denied them. Hitler's rise to power in 1933 provided the supreme opportunity. Lenard and Stark exploited the opportunity to their own advantage by creating a Nazi ideology of physics that they called "deutsche Physik." This amorphous ideology, which has been examined at length by several authors, was aimed, in the words of its founders, at freeing the physics profession from so-called Jewish-Marxist domination through the appointment of themselves and their supporters to influential positions⁷. Needless to say, deutsche Physik, the Nazi dismissal policies, and the influence of men such as Stark and Lenard essentially destroyed the modern German physics profession. Einstein, on a visiting professorship at the California Institute of Technology when Hitler came to power, immediately resigned his Berlin positions and never set foot in Germany again. He tried unsuccessfully to rally democratic nations against the Hitler regime and to mobilize opinion in defense of freedom and human dignity.

German physicists Lenard and Stark had, in essence, exploited the reigning ideology as well as public anxiety over relativity theory to advance their own views and careers at the expense of Einstein and relativity theory. Unfortunately, their behavior was not unique among physicists, nor among intellectuals in general, but it was among the most extreme. Similar instances involving leading physicists occurred in other such diverse political settings as the Soviet Union, the People's Republic of China, and the Anglo-American milieu⁸. Such wide diversity indicates that it is not relativity theory itself that was the main issue, but what these physicists made of the theory in presenting

their distorted image of it to a demanding public in their respective cultural and political environments⁹. If art reflects life, then a deeper insight into the public mood and perceptions of that era can be achieved through a study of the creative arts and literature that produced by it.

The visual arts of the early post-World War I years displayed remarkable parallels with the upheavals of the era and the new directions opened by relativity theory and quantum mechanics. As may be seen from an study of philosophical trends awakened by relativity theory, new concerns with the meaning of fundamental concepts and the existence of temporal processes became paramount for people across a wide range of artistic expression. As with anti-scientific ideologies, many of these people presented interpretations of the new science, especially relativity theory, in support of their own unique views. At one extreme, of course, stood the dadaists. Although this school began during the war, it reflected to an extreme the despair and disillusion of those who, in the throes of the war and its aftermath, believed European culture had lost any meaning that it once held. Dadaists reacted in nihilistic, anti-art artistic outbursts. While some artists regarded relativity theory to be "scientific dadaism," dadaists depicted scientists as speaking meaningless gibberish (see illustration) and science as an oppressive system. One dadaist exclaimed: "Science disgusts me as soon as it becomes speculation-cum-system...I loathe fat objectivity and harmony, this science that finds everything in its place. Carry on kids, humanity."¹⁰

Other artistic trends of that era displayed more positive parallels with relativity theory. Such parallels are all the more striking in that, during the first decades, both

sides of the parallel vigorously denied any direct influences on each other, and, in most cases, none seem to exist. One of the most striking parallels (if not connections) occurred in cubism, which, like relativity theory, had roots that extended long before the war. One art historian who tried to draw the connection between cubism and relativity theory more closely received a terse note from Einstein, in which he wrote: "This new artistic 'language' has nothing in common with the Theory of Relativity."¹¹

The parallels existed nonetheless, especially involving the simultaneous discovery in both fields of new conceptions of space, time and observation. Like Newtonian physics, Renaissance painting depicted a single scene existing in a static, absolute space and observed from a single perspective. Cubism burst the bounds of this static representation by introducing multiple perspectives that can be interpreted as simultaneous processes or sequences of events, as the introduction of time as a fourth dimension to the three-dimensional space of traditional painting. Poet Guillaume Apollinaire wrote in 1917: "Today, scientists no longer limit themselves to the three dimensions of Euclid. The painters have been led, quite naturally, one might say by intuition, to preoccupy themselves with the new possibilities of spatial measurements which, in the language of the modern studios, are designed by the term: the fourth dimension."¹²

Post-war literature displayed similar parallels with relativity theory, but here the connections can be made more directly. In both fields a preoccupation with meaning and process are again evident. Indeed, some have attempted to trace the preoccupation with meaninglessness in the works of the absurdist school of fiction--

notably Sartre and Camus--directly to Einstein and Heisenberg. But, like dadaism, the origins of schools such as absurdism lie much deeper in the human experience of a sometimes brutal and bewildering century than in any scientific theory.

Instead, as Gerald Holton has argued, a cultural "resonance" seemed to exist between the new physics and the writers of the new literature¹³. Although most of these writers did not fully understand the new physics, despite their best efforts, they consciously attempted to assimilate what they regarded as the essence of the new physics into their work. Again, meaning and process became paramount, as for example in William Faulkner's famous novel of the American south, *The Sound and the Fury*, where time and process merge into the events of the novel as in a cubist painting.

The cross-fertilization of ideas was evident in poetry as well. Again the initial reaction was open skepticism, if not rejection of relativity theory. Aside from the difficulty in understanding the new physics, the skepticism arose in large part from the anti-humanistic uses that the public was making of Einstein's science. Such skepticism may be seen, for example, in the works of Ezra Pound and Robert Frost, or in e. e. cummings's 1931 satire of relativity theory¹⁴:

Space being (don't forget to remember) Curved
 (and that reminds me who said o yes Frost
 Something there is which isn't fond of walls)

an electromagnetic (now I've lost
 the) Einstein expanded Newton's law preserved
 conTinuum (but we read that beFore)

of Course life being just a Reflex you
 know since Everything is Relative or

to sum it ALL Up god being Dead (not to
mention inTerred)

LONG LIVE that Upwardlooking
Serene Illustrious and Beatific
Lord of Creation, MAN.

Other English and American poets saw in Einstein something quite different: a man who, like themselves, sought and achieved new insights into nature. This led to a new admiration for the man and his theories, and to the positive conviction that his new discoveries should be reflected in their poetry. Among the leaders of this school in the United States were the noted poets Archibald MacLeish, William Carlos Williams, and Louis Zukofsky. Zukofsky apparently was converted to this school after translating into English a biography of Einstein by Einstein's son-in-law.

What did these poets make of Einstein and relativity theory? The most obvious answer is displayed by the most obvious feature of any poem, its measure. Williams and many others equated the relativity of physical measurements with the relativity of poetic measure. All sorts of experiments with verse, structure and meter, already underway at the time, continued to expand, rendering for many the form of a poem indistinguishable from its content. Zukofsky, for example, arduously attempted in the many versions of his poem *A* to render the poem a type of mathematical equation.

At the same time, admiration and fascination, not negation, seemed to characterize the poetic response in America to Einstein the man. Williams, a New Jersey physician, wrote a poetic tribute to Einstein in celebration of Einstein's first visit

to the United States in 1921 titled "St. Francis Einstein of the Daffodils." But perhaps the greatest tribute to the man and the most exhaustive poetic exploration of his work was MacLeish's *Einstein*, published in 1929. The main idea to emerge from his long and well-crafted poem is the loneliness of modern man as epitomized by the modern scientist who has outstripped the rest of humankind in penetrating to the deepest truths of nature's laws. Yet throughout the poem, Einstein, isolated yet knowing, is confronted with himself and the realization that, despite his singular genius, nature will never succumb entirely to his knowing mind. In a sense the negation is brought full circle and the constant tension between physics and poetry is resolved in the favor of the latter, for, while celebrating Einstein, MacLeish also celebrates the limits of his science in the living truths of nature. In hindsight there is an ironic accuracy to his portrayal of Einstein's life-long search for ultimate understanding of nature. Toward the end of the poem the great but lonely Einstein, now well advanced in years, tries once again to penetrate to what he himself later said he had realized as a child: "Something deeply hidden had to be behind things."¹⁵ "Einstein enters," writes MacLeish in the last lines of the epic,¹⁶

Like a foam
His flesh is withered and his shriveling
And ashy bones are scattered on the dark.
But still the dark denies him. Still withstands
The dust his penetration and flings back
Himself to answer him.

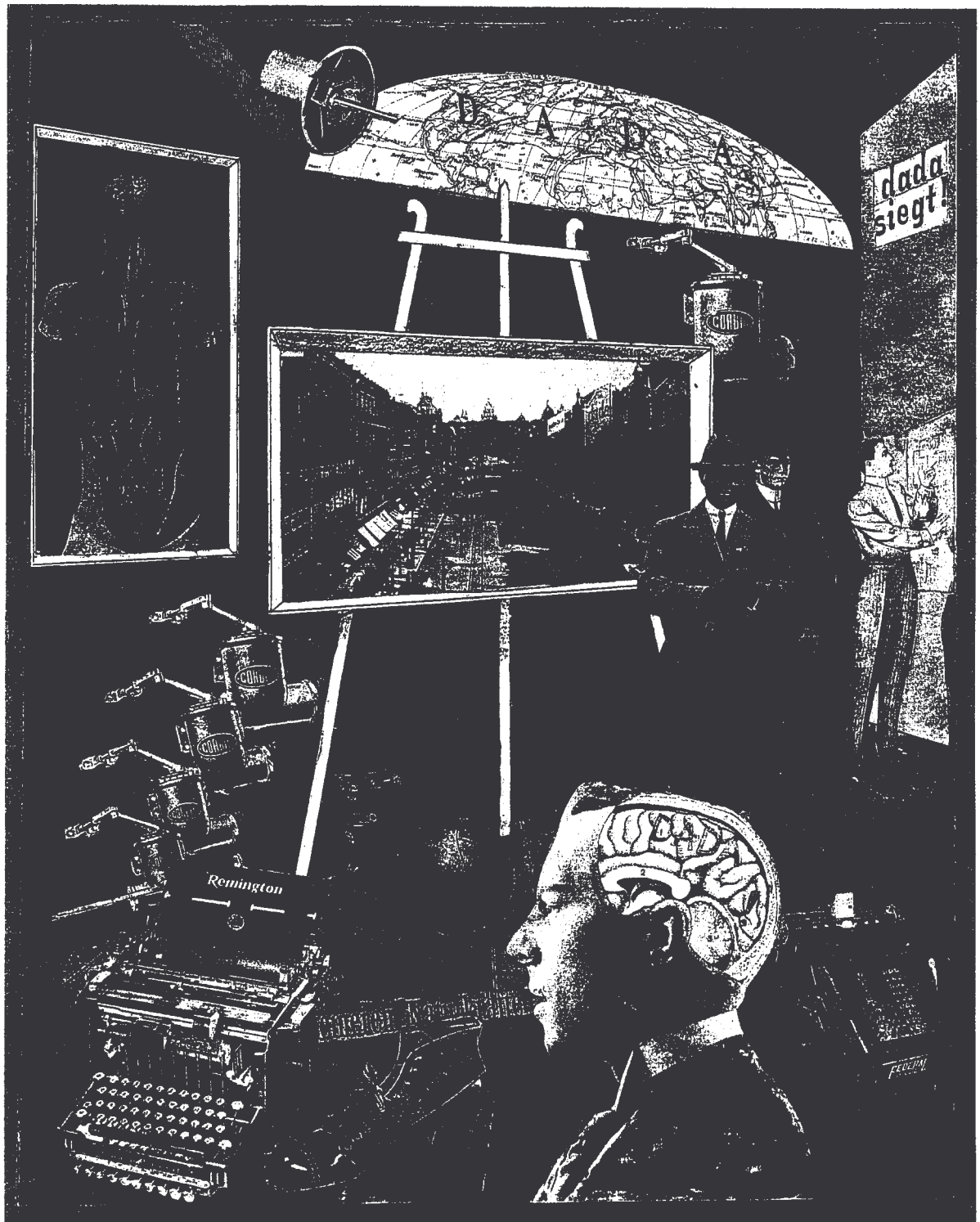
Which seems to keep
Something inviolate. A living something.

Notes

1. Portions of this article are excerpted from my earlier work, *Einstein and our world* (Atlantic Highlands, NJ, 1995).
2. George Mosse, *The crisis of German ideology: Intellectual origins of the Third Reich* (New York, 1964); Georg Lukas, *Die Zerstörung der Vernunft* (Berlin, 1954); Paul Forman, "Weimar culture, causality and quantum theory, 1918-1927," *HSPS*, 3 (1971), 1-115.
3. Forman, note 2.
4. Einstein, "Epilogue: A socratic dialogue," in Max Planck, *Where is Science Going?* (New York, 1932).
5. D. Cassidy, *Uncertainty: The life and science of Werner Heisenberg* (New York, 1992), 107-108.
6. Alan Beyerchen, *Scientists under Hitler* (New Haven, 1977), 96.
7. Andreas Kleinert, "Lenard, Stark und die Kaiser-Wilhelm-Gesellschaft," *Physikalische Blätter*, 36 (1980), 35-43; Mark Walker, *Nazi science: Myth, truth, and the German atomic bomb* (New York, 1995).
8. Loren Graham, "The reception of Einstein's ideas: Two examples from contrasting political cultures," in *Albert Einstein: Historical and cultural perspectives, the centennial symposium in Jerusalem*, Gerald Holton and Yehuda Elkana, eds. (Princeton, 1982), 107-136.
9. Philipp Frank, *Albert Einstein: His life and times* (New York, 1947), 416-418.
10. Quoted by Eugen Weber, ed., *Paths to the present* (New York, 1960), 251.
11. Quoted by Gerald Holton, "Einstein's influence on the culture of our time," in Holton, *Einstein, history, and other passions: The rebellion against science at the end of the twentieth century* (Reading, Mass., 1995), 125-145, on 131.
12. Quoted by Weber, note 10, 237.
13. Holton, note 11.
14. Quoted by Carol Donley, "'Springtime of the mind': Poetic responses to Einstein and relativity," in *Einstein and the humanities*, Dennis P. Ryan, ed. (New York, 1987),

15. Einstein, "Autobiographical notes," in *Albert Einstein: Philosopher-scientist*, vol. 1, Paul Arthur Schilpp, ed. (reprint LaSalle, Ill., 1969), 9.

16. Archibald MacLeish, *Collected poems, 1917-1982* (Boston, 1985), 144.



Raoul Hausmann, Dada Siegt, 1920