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"*The abnihilisation of the etym*": *Finnegans Wake*'s Entanglement in Quantum Ideality*

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Abstract

In 1996, Alan Sokal's (in)famous hoax impugned the credibility of social constructionism. He deceived *Social Text* into publishing his paper, a disjointed collage of continental philosophy and theoretical physics. Sokal's calculated choice of quantum gravity is an attack on contemporary philosophers' and literary critics' tendencies to see quantum physics as *the* scientific support for a new idealism. James Joyce's *Finnegans Wake* was embroiled in Sokal's hoax: on the one hand, the sneak attack Sokal waged against the humanities is evocative of Joyce's parody of the culture war between "Bitchson" and "Winestain" (Joyce 149.17-28); on the other hand, among Sokal's targets of ridicule are two articles on James Joyce and quantum physics. In retrospect, this paper proposes to re-read *Finnegans Wake* through the lens of quantum physics and re-evaluate the legitimacy of injecting idealism into the contemporary scientific theory of *matter*. This paper will trace the conceptual development of modern physics on the basis of Tim Maudlin's and John Polkinghorne's rigorous expositions, expose the epistemological and ontological crises of quantum theory, investigate the philosophical interpretations of subatomic ideality proposed by Elizabeth Grosz and Slavoj Žižek, and finally analyze how James Joyce has meticulously incorporated "quantum theory" and the "most tantumising state of affairs" into the mindscape of *Finnegans Wake* (149.35-36).

Keywords

James Joyce, *Finnegans Wake*, idealism, quantum mechanics, Sokal's hoax

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> [Many physicists] cling to the dogma imposed by the long post-Enlightenment hegemony over the Western intellectual outlook, which can be summarized briefly as follows: that there exists an external world, whose properties are independent of any individual human being and indeed of humanity as a whole; that these properties are encoded in "eternal" physical laws; and that human beings can obtain reliable, albeit imperfect and tentative, knowledge of these laws by hewing to the "objective" procedures and epistemological strictures prescribed by the (so-called) scientific method.
>
> —Alan Sokal
> "Transgressing the Boundaries"

> Talis is a word often abused by many passims (I am working out a quantum theory about it for it is really most tantumising state of affairs).
>
> —James Joyce
> *Finnegans Wake*

> There must be the most elementary traces of ideality along with the materiality of the atom and its components, all the way down and up.
>
> —Elizabeth Grosz
> *The Incorporeal: Ontology, Ethics, and the Limits of Materialism*

Back in 1996, Alan Sokal, an American mathematical physicist at New York University, waged a sneak attack on *Social Text* by implanting a Trojan Horse. He submitted to the journal's *Science Wars* double issue a contrived article—pompously christened "Transgressing the Boundaries: Toward a Transformative Hermeneutics of Quantum Gravity"—and duped the editorial board into publishing his dazzling pastiche of disjointed quotations from such "postmodernist literary theorists" (to borrow Sokal's sweeping generalization) as Lacan, Derrida, and Latour, with the aid of a tactical open sesame: "physical 'reality,' no less than social 'reality,' is at bottom a *social and linguistic construct*" (217; emphasis added). Sokal soon revealed his hoax in *Lingua Franca*, claiming that his "experiment" aimed at exposing an "apparent decline in standards of rigor in certain precincts of the academic humanities" ("A Physicist Experiment" 62). However grandiose Sokal's gesture was, his elaborate hoax, as John Guillory puts it, "shares with other controversies of our time the typical feature of erupting suddenly with the threat of dire consequence, only to disappear quickly and nearly completely from public consciousness" (470).

However, this almost-forgotten episode is embedded in a much larger epistemic struggle that has remained tangled, since Hellenistic philosophy, between various versions of materialisms and idealisms. Continental *anti-realism*, Sokal's primary target of ridicule, has been rooted in Kant's famous Copernican revolution that transformed the mind from a passive knower of the *noumenal realm* to an active agent in the *construction of reality*. The legacy of Kant's transcendental idealism—that "we can never know noumena or things-in-themselves, but only phenomena or things-for-us as partially formed by us" (Braver 22)—has been inherited by such major figures in the continental tradition as Heidegger and Derrida: the former rejects the "Absolute Knowledge as the singular and total self-understanding of the Absolute Subject," whereas the latter infests "the phenomenal realm of subjectivity" with "*linguistic marks*" (Bryant et al. 4; emphasis added). Hence, it is not difficult to detect an *argumentum ad ignorantiam* in Sokal's tactic: instead of defending scientific naturalism (or what speculative materialists would deride as *naïve realism*), he chose to parrot continental anti-realistic discourse and sabotage its integrity with the deliberate insertion of non sequiturs and dysfunctional quotations.[1]

Contrary to Sokal's smug belief that his hoax exposed a continental faction's abuse of mathematics and theoretical physics, he ironically plunged himself into a schizophrenic spectacle wherein two impenetrable echo chambers constantly fail to share a consensus reality. Steeped in scientism, Sokal seems to have overlooked not only the *intendedness* of such abuse—whose very end is to debunk the unmediated transparency of mathematical reasoning—but also the heterogenous panorama of continental materialists and idealists polemicizing over the impossible *Real*. For instance, Slavoj Žižek, in line with Jean-Michel Besnier, sees contemporary scientific naturalism as the uncanny reincarnation of "the most radical *idealist* program of Fichte and Hegel," for "[w]hat science distils as 'objective reality' is becoming more and more an abstract formal structure relying on complex scientific and experimental work" (*Absolute Recoil* 6, 10; emphasis added). In other words, Sokal might be so

[1] However, the frustrating fact that such French intellectuals as Derrida and Latour have lost their sophisticated poise and fired indignant responses to Sokal reveals the underlying power asymmetry in academia between humanities and natural sciences: physicists have an excess of credibility to squander and joke with, whereas philosophers are in a precarious situation wherein their appropriations or critiques of scientific theories—in this case, quantum mechanics—seem to simultaneously give them a theoretical edge yet expose them to ridicule from the likes of Sokal. More explicitly speaking, the Sokal hoax is unsettling because it parodies, to borrow Peter Gratton's metaphor, philosophy's "parody[ing] itself as a kind of academic ventriloquist dummy" (137).

preoccupied with anti-realism's rejection of scientific objectivity that he failed to address a radical faction of materialist philosophers who see idealistic tendencies in natural science's obsession with absolute truth.

In response to Sokal's prank, Jacques Derrida mourns over the ruined "chance of serious reflection" and opines that "[i]t would have been interesting to make a scrupulous study of the so-called scientific 'metaphors'—their role, their status, their effects in the discourses that are under attack" (*Paper Machine* 70). Intriguingly, Derrida, a master of parody himself,[2] seems to shun the fact that the nature of parody is pitting levity against gravity: Sokal's apparent frivolity not only betrays his grave concern over social constructionism's abuse of scientific discourse but also wages war against the former in retribution for the latter's being wronged. However, parodic discourses can be productive rather than parasitic. *Finnegans Wake*, perhaps the most radical parody ever written, fascinates Derrida with two words—"he war" (Joyce 258.12)—and strikes him as "declar[ing] war in tongues [*langues*] and on language and by language" ("Two Words for Joyce" 23), yet Joyce's opaque book that blurs the boundaries between hallucinations and external reality provides Murray Gell-Mann with a surprising solution to his struggle to name his hypothetical fundamental particles in 1963: "Then, in one of my occasional perusals of *Finnegans Wake*, by James Joyce, I came across the word 'quark' in the phrase 'Three quarks for Muster Mark.' . . . In any case, the number three fitted perfectly the way quarks occur in nature" (180-81).

Now that we have touched upon the curious connections among parodies, modern physics, and *Finnegans Wake*, here comes a more pressing question: how is Sokal's hoax *per se* related to James Joyce's later works and their entanglement in quantum ideality? The answer is twofold. The first aspect of the relation may appear tangential: among Sokal's exaggeratedly lengthy endnotes and bibliography hide Keith Booker's "Joyce, Planck, Einstein, and Heisenberg: A Relativistic Quantum Mechanical Discussion of *Ulysses*" and David Overstreet's "Oxymoronic Language and Logic in Quantum Mechanics and James Joyce." Sokal doesn't say much about them other than "[s]ee also Overstreet . . . [and] Booker . . . for examples of cross-fertilization of ideas between relativistic quantum theory and literary criticism" ("Transgressing the Boundaries" 231n2), but he would probably frown at the following statement proposed by Booker: "The equations of quantum mechanics do

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[2] In "Are Parody and Deconstruction Secretly the Same Thing?" Robert Phiddian makes the following observations: "It is clear that deconstruction, especially as Derrida practices it, nests in the structure of the texts and ideas it criticizes. . . . It is not primary thought, always secondary, always 'borrowing all the strategic and economic resources of subversion from the old structure.' And this is precisely what parody does too" (681).

not 'describe' the behavior of an electron in an atom, for example; they *are* the behavior (just as the language of *Ulysses* does not 'tell' what is happening; it *is* what is happening . . ." (582; emphasis in original). This statement falls prey to several aspects of Sokal's ridicule: based on Gary Zukav's shaky New-Age interpretation of quantum mechanics, Booker not merely makes a *category mistake* in claiming that mathematical equations are "things in themselves" (582)—another dubious usage he has dropped in a preceding passage—that behave on their own, but he also draws a forced analogy between the descriptive—or, as Tim Maudlin suggests, "prescriptive" [3] —nature of quantum theory and *Ulysses*'s self-consciously performative narrative. Sokal's inclusion of these two Joyce-related articles in his prank indeed voices discontent with the oft-problematic appropriation of quantum theory in the humanities, as well as with an epistemological tendency to see the Copenhagen Interpretation—namely, that the observer collapses wave functions—as *idealistic* (as will be discussed later). Yet we can't blame Overstreet and Booker for attempting to read quantum mechanics into *Finnegans Wake*, because Professor Jones, Shaun's avatar, brags in his reply to Shem's eleventh riddle in I.vi that he is "working out a quantum theory . . . for it is really most tantumising state of affairs" (Joyce 149.34-36).

Shaun's Professor Jones leads us to the second aspect of the relation between Sokal's hoax and *Finnegans Wake*: the former seems a lackluster re-enactment of a precursor that the latter parodies through Professor Jones's lecture, namely, the science war fueled by the "dime-cash problem" between "Bitchson" and "Winestain" (Joyce 149.17-28). On April 6, 1922, the dispute over the nature of time brought Henri Bergson and Albert Einstein into conversation for the very first time at the *Société française de philosophie,* where the junior physicist responded to the senior philosopher's lengthy exposition of an aspect of time that is neither physical nor psychological with a stark rejection as follows: "*Il n'y a donc pas un temps des philosophes*" (Canales 5). Similar to the public opinion on Sokal's hoax, Bergson was majorly perceived to have lost the debate against Einstein, and his defeat was interpreted as a critical moment "when intellectuals were no longer able to keep up with revolutions in science due to its increasing complexity" (6). Intriguingly, in the

[3] See Maudlin: "What is usually called 'quantum theory' is a recipe or *prescription*, using some somewhat vague terms, for making predictions about data. If we are interested in the nature of the physical world, what we want is instead a theory—a precise articulation of what there is and how the physical world *behaves*, not just in the laboratory but at all places and times" (*Philosophy of Physics: Quantum Theory* 5-6; emphasis added).

tradition of *antiliterature*,[4] Joyce represents Bergson's defeat with a twist. Bitchson is based on the distorted version of Bergson from Wyndham Lewis's polemical *Time and Western Man*, where Lewis erred in contending that Bergson confuses the quantitative and qualitative properties of time (Klawitter 431). Consequently, when Jones (modeled on Lewis) gloats over Bitchson's confusion—"Talis is a word often abused by many passims" (Joyce 149.34)—he is unconsciously exposing his own befuddled thinking like a parrot: "Talis and Talis originally mean the same thing, hit it's: Qualis" (150.13-14). This is why Robert Klawitter invites us to rethink the shared interpretation that "Joyce represents the world as Bergson says it is not, a repetitious, reversible, dialectical flux of the fragments of eternity; a formal, mechanical, determinate, uncreative world" (Klawitter 433). The Wakean parody of Professor Jones's Bitchson as a double negation—which problematizes Wyndham Lewis's problematization of Henri Bergson—enables Joyce to contemplate the Bergsonion "sophology" of multiplicities from a precarious vantage point (Joyce 149.20). Although he could appropriate Bergson's philosophical concepts and remain exempt from potential criticism (for he could ascribe blame to either Bergson or Lewis), he, not unlike Sokal, has missed the opportunity to elucidate "his deepseeing insight" (75.13).

All this "meandertale" about Sokal's hoax and its precursor in the *Wake*—"the t/dime-c(l)ash problem" (a phrase charged with monetary overtones)—has reinforced our earlier observation that a recurrent dispute in such wars between (what C. P. Snow referred to as) "the two cultures" resides in *how to approach reality*. Standard materialism asserts that things-in-themselves exist independently of conscious knowledge, while subjectivist idealism holds onto the Berkeleyan doctrine *esse est percipi* and contends that things exist only when they are known/perceived by a conscious mind. Intriguingly, not merely a number of philosophers (of science) but even theoretical physicists contend that the dogmatic antinomy between materialism and idealism—that is, whether a conscious subject is essential for the actualization of reality—has arrived at a paradoxical synthesis in quantum mechanics. For instance, as Carl Friedrich von Weizsäcker (a fellow physicist of Niels Bohr's) philosophizes in his Göttingen seminars, quantum mechanics entails a quasi-Heideggerian "overcoming" of the subject-object distinction: the experimenter is not so much a "pure 'observer'" of quantum events as a "being-in-the-world," whereas the material

[4] See Klawitter: "To study the rapport between Bergson and Joyce is to discover what Claude Mauriac has called the 'alittérature contemporaine.' Antiliterature [sic] I take to be literature that not only accepts, but seeks to expose rather than cover up, the fictionality of its representations" (430).

world does not stand "in its self-contained autonomy" as a "*Gegenstand*" but "derives its meaning from the *projects* of the scientist" (Mohanty 381; emphasis in original). In a similar vein, Slavoj Žižek—while reinventing dialectical materialism—strives to interpret quantum mechanics through Kant's transcendental idealism, so as to answer the fundamental question as follows: "how is thought possible in a universe of matter, how can it arise out of matter? Like thought, the subject (Self) is also immaterial: its One-ness, its self-identity, is not reducible to its material support" (*Less Than Nothing* 905). At the risk of "confounding ontological and empirical levels," Žižek analogizes the collapse of wave functions to "the subjective act of transcendental synthesis which transforms the chaotic array of sensual impression into 'objective reality,'" arguing that "it is the collapse of the quantum waves in the act of perception which fixes quantum oscillations into a single objective reality" (906).

In order to illuminate why quantum mechanics attracts a faction of philosophers who aspire to rethink Cartesian dualism and how the conception of quantum mechanics at the dawn of the twentieth century has affected the embryogenesis of *Finnegans Wake*, the remainder of this paper will 1. present a compact and comprehensible chronicle of quantum mechanics; 2. address the scientific/philosophical implications of this counterintuitive theory; and 3. analyze how Joyce has incorporated the new-found subatomic world into *Finnegans Wake*.

Quantum Mechanics and Idealism

Before moving on to discuss in what sense quantum theory—the contemporary theory of *matter*—could be interpreted in line with *idealism*, we should beware of philosopher of science Tim Maudlin's warning: the very phrase "quantum theory" is "a misnomer" because "there is no such theory" (*Space and Time* xiii). As counter-intuitive as it may seem, Maudlin justifies his contention as follows:

> A physical theory should contain a physical *ontology*: What the theory postulates to exist as physically real. And it should also contain *dynamics*: laws (either deterministic or probabilistic) describing how these physically real entities behave. In a precise physical theory, both the ontology and the dynamics are represented in sharp mathematical terms. But it is exactly in this sense that the quantum-mechanical prediction-making recipe is not a physical theory. It does not specify what physically exists and how it behaves . . . (*Quantum Theory* 4-5; emphasis in original)

Instead of precisely-defined ontology and dynamics, what physicists have is "a mathematical formalism and some (quite effective) rules of thumb about how to use the formalism to make certain sorts of predictions" (*Space and Time* xiii). Therefore, Maudlin suggests that we should replace "quantum theory" and "interpretation of quantum theory" with "predictive recipe" and "physical theory" respectively (*Quantum Theory* xi). However, for the convenience of our discussion, we will keep the conventional terminology. Aside from impugning the terminology, Maudlin also challenges the popular opinion that physicists are zealous *realists* by revealing the fact that "the physicist in ironworker mode" doesn't care much about "the nature of the physical reality" and that "it is enough to calculate how various experiments should come out" (*Space and Time* xiii). When it comes to the realism versus antirealism debate, he reminds us that "*physical theories* are neither realist nor antirealist. That is, as we used to say, a category mistake" and that it is "*a person's attitude toward a physical theory* that is either realist or antirealist" (*Quantum Theory* xii; emphasis in original).

Paradoxically, despite its lack of precisely defined *ontology* and dynamics, quantum mechanics has been an unprecedented *empirical* success as well as the foundation of such modern technological wonders as the semiconductor industry and the global positioning system. To a certain degree, we could say—though Alan Sokal may object here—that quantum mechanics has been forced into being as a desperate attempt to reconcile physics with empirical reality, at the expense of plunging its mathematical representation of the physical world into an ontological impossibility.

The embryogenesis of quantum mechanics has constantly been driven and plagued by crises. In fact, the first half of the term *quantum mechanics* came from Max Planck's *quanta*, a Latin-derivative that he used to name radiation's "small packets of energy" as a radical response to "the ultraviolet catastrophe." The catastrophe started in 1885 as a trivial anomaly when a Swiss schoolmaster named Johann Balmer discovered that the different frequencies of the light waves involved in the spectrum of hydrogen could be described by a simple mathematical formula (Polkinghorne 5).[5] The catastrophic implication of Balmer's discovery was finally

[5] Balmer's formula—which would become the cornerstone of quantum physics—was revised by Johannes Rydberg as follows:

$$\nu_n = cR\left(\frac{1}{2^2} - \frac{1}{n^2}\right)$$

revealed in 1900, when Lord Rayleigh applied the new techniques of statistical physics to "the problem of how energy is distributed among the different frequencies in the case of black body radiation" (6). The catastrophe escalated because the prediction that "the very highest frequencies run away with everything, piling up unlimited quantities of energy" doesn't correspond with physical reality (7). As a solution to such a catastrophe, Planck's proposal of radiation being "emitted or absorbed from time to time" in *quanta* implies a fundamental contradiction to the hypothesis in classical physics that "radiation oozed continuously in and out of the black body" (7).[6] Therefore, Planck's quanta wasn't taken seriously until Albert Einstein solved the mystery of the photoelectric effect in 1905 by thinking of the beam's intensity as "quanta of light" (which came to be called "photons") (9). Yet Einstein's successful quantum analysis of the photoelectric effect put classical physics in another crisis, for physicists couldn't make sense of light's *paradoxical duality as both wave and particle*. Such a predicament drove physicists' attention from light to atoms.

In 1911, when Ernest Rutherford (whose doppelgänger "Hurtreford" is held responsible for the "*abnihilisation of the etym*" in *Finnegans Wake*) was investigating how positively charged "*a*-particles" behaved when they "impinged on a thin gold film," he was shocked by the fact that some of the particles were "substantially deflected." The only explanation, Rutherford gathered, is that the positive charge of the gold atoms—which would repel the *a*-particles—must all be "concentrated at the centre of the atom" (10). Rutherford's revolutionary "'solar system' model of the atom"—within which negative electrons orbit a positive nucleus—threw classical physics into an abysmal crisis: the electrons encircling the nucleus in an atom "are continually changing their direction of motion" and, according to classical electromagnetic theory, must "radiate away some of their energy" and "spira[l] into collapse towards the centre" as a consequence (11). In 1913, Niels Bohr proposed a solution to making sense of Rutherford's new model of the atom by incorporating Planck's concept of quanta into atoms. Again, the fundamental rupture between classical physics and Bohr's atomic hydrogen model lies in the latter's replacement of the former's "*continuous* possibility by the *discrete* requirement that the radii could only take a series of *distinct values* that one could enumerate (first, second, third, . . .)"

In Rydberg's revised formula, " ν_n is the frequency of the *n*th line in the visible hydrogen spectrum (*n* taking the integer values . . .)," and "*c* is the velocity of light and *R* is a constant called the Rydberg" (Polkinghorne 99).

[6] In Planck's model, electromagnetic radiation oscillating *v* per second is emitted in quantized energy *hv* (with *h* being Planck's constant. One could replace *v* by the angular frequency $\omega = 2\pi v$ and derive the formula $\hbar\omega$ ($\hbar = h/2\pi$) (Polkinghorne 100).

(12; emphasis added). In a nutshell, what we now call "old quantum theory" struggled through the alternating phases of crisis/solution and attempted desperately to reconcile Newtonian and Maxwellian physics with Planckian and Einsteinian quantum prescriptions.

Modern quantum theory came into being in the *anni mirabiles* of 1925 and 1926, augmented by the introduction of Heisenberg's matrix mechanics and Schrödinger's wave mechanics. Werner Heisenberg's investigation into the details of atomic spectra led to his revolutionary discovery. *Matrices* differ from *simple numbers* because "they do not commute": simply put, "if A and B are two matrices, the product AB and the product BA are not usually the same" (17). Although this mathematical property of Heisenberg's matrices is of great physical value to quantum mechanics for the simultaneous measurement of quantities, most physicists back then were more acquainted with the mathematical tools associated with wave motion. Soon enough, Erwin Schrödinger—inspired by Louis de Broglie's bold hypothesis that electrons may manifest wavelike properties now that undulating light could behave like particles—arrived at the fundamental equation of quantum mechanics in 1926 through "exploiting an analogy drawn from optics" (19). If particle mechanics "were to prove to be only an approximation to an underlying wave mechanics," Schrödinger speculated, "this wave mechanics might be discoverable by reversing the kind of considerations that had led from wave optics to geometric optics" (19). However, Schrödinger's wave mechanics has long been faced with a persistent question: *waves of what?* Is the electron *itself* spread out in a wavelike fashion? The answer is a resounding *no*. What Schrödinger's equation hints at is *waves of probability*. Conceivably, the probabilistic attribute of quantum mechanics dismayed many pioneers who clung to the deterministic nature of classical physics, including Schrödinger himself.

Schrödinger's troubled legacy remains at the core of quantum mechanics: the counterintuitive assumption of *superposition*. The queer phenomenon of superposition and its radical consequences have become fully manifest in the all-too-famous double slits experiment. A projector of quantum entities discharged a steady current of particles that would impinge on a screen-with-two-slits. Behind the slitted screen was a photographic plate that would register the arrival of the discharged electrons. Now, here comes the tricky part: the projector discharged only a singular electron at any one time, yet the result of the experiment indicates that "the indivisible electron *went through both slits*" (24; emphasis in original). Even trickier, once the experiment was modified by adding a detector near each slit, *two consequences* emerged. On the one hand, the electron would be detected near *either* slit A *or* slit B;

it would be impossible to predict which slit the electron would go through each time, but in the long run the relative probabilities associated with both slits would be 50-50. On the other hand, there would no longer be the interference pattern on the photographic plate: the electrons no longer tended toward the middle point of the plate and ended up distributed evenly between both slits (24-25).

Bohr's (in)famous (and mainstream) Copenhagen Interpretation contends that it is *the intervention of measurement* that collapses quantum superposition and produces the determining effect. Its latent *anthropic* implication has caused much discontent among quantum physicists; for instance, J. S. Bell—whose eponymous theorem proves that quantum mechanics is *incompatible* with Einstein's preferred principle of *local realism*—raised the following sharp questions: "Was the world wave function waiting to jump for thousands of millions of years until a single-celled living creature appeared? Or did it have to wait a little longer for some more highly qualified measurer—with a Ph.D.?" (117). In the face of the cosmos-in-itself, some quantum physicists see—albeit not necessarily approvingly—ontological indeterminacy, whereas others cling on the epistemological principle of *hidden variables*. Quantum mechanics was traumatized by the ultraviolet catastrophe at birth and remains steeped in uncertainty more than a century later, not to mention that the physical ontology of quantum mechanics *cum* theory of relativity is still being haunted by intrinsic incompatibility and has yet to be superseded by the quantum theory of gravity (Wüthrich 266).

Now that we have spent ample textual space revealing the developmental chronicle and controversies of quantum mechanics (of which Sokal would probably approve), the pressing question is this: why would contemporary philosophers be tempted to read idealistic tendencies into quantum mechanics? The most intuitive explanation, of course, is that the observer, according to the Copenhagen Interpretation, has the power to collapse the wave function and condition physical reality. However, this rather naïve answer is problematic. On the one hand, the Copenhagen Interpretation—though qualified as an epistemic theory in that it sees quantum mechanics as a framework that provides knowledge of phenomena—is just a derivative appendix. On the other hand, the observer isn't necessarily sentient or organic, and the process of measurement is executed by mechanical apparatuses.

Elizabeth Grosz presents a more sophisticated reasoning in suggesting that quantum mechanics offers us a framework to replace the old dualistic distinction with a new ideality immanent in subatomic materiality: "[t]here must be the most elementary traces of ideality along with the materiality of the atom and its components, all the way down and up" (251). In line with Ruyerian primary consciousness, Grosz claims that the atom is "Spinozan"—because "[i]t performs itself, its identity or consciousness such that it directs the atom's actions"—and "free," because "it acts according to its own modes of self-regulation, according to its own ends, which even the most advanced physicists are only now beginning to understand" (222). However, such a line of reasoning isn't entirely convincing either, for, as we have seen earlier in the double-slit experiment, the subatomic particles' action is manipulated by the mysterious intervention of measurement rather than perfectly autonomous. Even if we accept the less mainstream quantum hypothesis of hidden variables and assume that we could never get access to the internal clock specifying when a subatomic particle will decay, we simply get transported from the quantum universe of contingency back to the Newtonian universe of determinism. Either way, there is no condition of possibility for ideality and freedom.

A more radical answer is proposed by Žižek, whose "universe privileges the structures and dynamics of quantum physics, denies all sociopolitical foresight to historical materialism, and depicts libidinal economies as revolving around the enigmatic 'x' of a primal emptiness" (Johnston xii). Not unlike Quentin Meillassoux's speculative realism that "intends to fulfill Kant's Copernican revolution of the mind by proposing a radical anti-anthropocentrism . . . through mathematics" (Dolphijn and Tuin 88),[7] Žižek's project of reinventing dialectical materialism assembles his "variant of compatibilism through distinctive combinations of references to German idealism, Freudian-Lacanian psychoanalysis, quantum physics, neurobiology, and cognitive science" (Johnston 7). Different from those who emphasize the counterintuitive property of quantum behaviors, Žižek locates the "spookiness" of quantum physics not in "its radical heterogeneity with regard to our common sense" but in "its uncanny resemblance to what we consider specifically human" (*Less Than Nothing* 920). The uncanny resemblance between quantum and human attributes may be more than metaphorical, in the sense that subatomic particles are neither *things-in-themselves* nor *things-for-us* out there, but rather the grotesque synthesis of *things-in-us* as the material infrastructure from which ideality emerges. David Bohm's model of quantum consciousness—which he himself sees as an overcoming of Cartesian dualism—may help illustrate this idea: "mind and matter are abstractions from the universal flux," and "both are to be regarded as different and relatively autonomous orders within the one whole movement" (68). Although this line of reasoning hints at a danger of retrogressing to

[7] However, Žižek does point out that Meillassoux "pays a fateful price for his suspension of the transcendental dimension—the price of a regression to a 'naïve' ontology of spheres or levels in the style of Nicolai Hartmann: material reality, life, thought" (*Less Than Nothing* 905).

reductionist physicalism, it nonetheless forces us to think through the contemporary neurological hypothesis that "electrical potentials" in neuronal activity "is correlated with conscious experience," as well as the consequential implication that human mental activity is subject to the physical laws of quantum mechanics and hence that consciousness may literally be the collapsed state of unconscious wave functions (Edelman and Tononi 153). In this vein, Žižek's idealism *cum* quantum mechanics leads us back to *Finnegans Wake*, Joyce's linguistic simulacrum of a quantum brain.

The *Wake*'s Entanglement in "*Three quarks*"

Finnegans Wake is a perplexing textual machine wherein hundreds of thousands of portmanteaux keep bifurcating into dialectical doubles: HCE versus ALP, Celtic panpsychism versus technologically-generated spectacles, anthropocentric mythology versus post-human ecology, and human un/consciousness versus the quantum universe. Yet all these binaries ultimately become folded into the singularity of Joyce's holographic chaosmos. We could readily historicize the parallelism between quantum physics and the *Wake*: the development of the former coincided with the writing process of the latter, which spanned the years 1923-1939. The scientific breakthroughs in probing the abyss of the infinitely small drew the media's attention, and Joyce, not unlike Anna Livia Plurabelle, "enjoyed more than anything these secret workings of natures" (615.13-14) and incorporated the ontological and epistemological implications of the subatomic realm into his work (Duszenko 272).

Joyce exposes his intended juxtaposition between his avant-gardist literary experiment with quantum physics in the following news broadcast in the *Wake*:

> *The abnihilisation of the etym by the grisning of the grosning of the grinder of the grunder of the first lord of Hurtreford expolodotonates through Parsuralia with an ivanmorinthorrorumble fragoromboassity amidwhiches general uttermosts confussion are perceivable moletons skaping with mulicules while coventry plumpkins fairlygosmotherthemselves in the Landaunelegants of Pinkadindy. Similar scenatas are projectilised from Hullulullu, Bawlawayo, empyreal Raum and mordern Atems.* (353.22-29; italics in original)

Tellingly enough, this much-quoted passage alludes to the "splitting of the atom"—Democritus's "indivisible" *atomos*—by Ernest Rutherford in Manchester. Joyce's Rutherford was decomposed and recomposed into "*Hurtreford*," which puns on "*heurter*," a French verb meaning *to strike.* The true radicalness about Joyce's literary representation of quantum mechanics lies in the fact that he throws us into a textual simulacrum of the subatomic world where we could no longer rely on everyday syntactic/Newtonian laws to cope with a flux of unactualized potentialities. In other words, each encounter with a Wakean portmanteau resembles a measurement that collapses the wave function. For instance, "The abnihilisation of the etym" may simultaneously unfold into the following multiplicities: annihilation / *ab-nihil-ation* (*ab nihilo*: from nothing) / nihilation (*nihilo*: I reduce to nothing; to nihilate = to negate = to encase in a shell of non-being) + of the + atom / etymon (true sense) / Adam. Combining these textual particles, we may derive a number of heterogeneous interpretations: nuclear fission and subsequent release of radiant energy (according to Einstein's famous formula of mass-energy equivalence $E=mc^2$); atoms coming into being from nothing; (God's) logos coming from the void; the (conscious) negation of logos; annihilation of Adam; creating Adam out of nothing. If we repeat this labor of exegesis by splitting each Wakean portmanteau into multiple mutually incompatible morphemes, we will find ourselves engulfed in an ever-bifurcating narrative (similar to ever-multiplying parallel universes in the Many-Worlds Interpretation of quantum mechanics) and "*projectilised*" from "*empyreal Raum*"—namely, Imperial Rome as empirical space ("raum" = space in German)—into an anti-empirical space-time continuum.

Metaphor and analogy, as Elizabeth Leane puts it, "carry a heavy load in popularizations of quantum mechanics, as in the absence of mathematics these are the only means to explain its concepts to the non-scientist, and these concepts do not always have a literal, non-mathematical interpretation" (420). In line with our exegesis of "*abnihilisation of the etym*," it is indeed tempting to (re)produce the following statements by reading quantum mechanics into the *Wake* through *analogical* thinking:

1. Similar to a mathematically represented cosmos through the looking glass of quantum mechanics, the Wakean chaosmos remains rather stable and comprehensible on a macroscopic level (just like our everyday Newtonian world): *Finnegans Wake* still features a narrative structure that orbits the Earwickers—comprising the Father HCE, the mother ALP, and the trio of their children Shem the Penman, Shaun the Postman and Issy the schizophrenic daughter—and gossips about HCE's misdeed. However, on a microscopic level, the illusion of stability evaporates, and "[e]ach twin son is half of the father, as though HCE were a subatomic quanta of action

which spontaneously decayed into two parts only to recombine" (Overstreet 54).

2. Like Schrödinger's cat, "Bygmester Finnegans" is *both* dead *and* alive in the quantum state of superposition. Similarly, within "the cropse of our seedfather" is pure virtuality (Joyce 55.8), for "cropse" functions as a fecund corpse that contains the concentrated energy of crops.
3. The ubiquitous acronym HCE—"the sameold gamebold adomic structure . . . *h*ighly *c*harged with *e*lectrons" (615.6-7; emphasis added)—indicates the (sub)atomic structure intrinsic to sentient beings, inorganic objects, and the space-time in which all things exist: Humphrey Chimpden Earwicker, Howth Castle and Environs, so on and so forth (Duszenko 275).
4. Wakean textual particles behave in quantum entanglement—which Einstein mocks as "spooky action at a distance"—in that the pieces of information contained in one portmanteau are essential for the determination of other textual particles far removed from it. For instance, Rutherford's experiment of atom fission in 1919 "*by the grisning of the grosning of the grinder of the grunder*" is grafted on to its contemporary catastrophe of the Russian Revolution through the first Tsar of Russia Ivan the Terrible (reincarnating as "*ivanmorinthorrorumble*"), because "*grosning*" puns on "Ivan Grozny," who murdered those who breathed (as "*mordern Atems*" puns on "morden atem," meaning "murder breath" in German). The implication of terrible massacre also hints back at the weaponization of nuclear power in Joyce's posthumous future: "*Attabom, attabom, attabombomboom!*" (Joyce 103.2; italics in original).

Similar examples of analogical analysis can go on and on. However, they wouldn't take us very far, because such a mode of reasoning is highly susceptible to category mistakes (as we have seen earlier in Keith Booker's case). A more productive alternative for our comparative study of the *Wake* and quantum mechanics *cum* idealism is to return to Professor Jones's lecture on his "quantum theory" and the unfinished war between "Bitchson" and "Winestain."

The ludicrous crux of the "dime-cash problem" between "Bitchson" and "Winestain," as we have seen, is the confusion about "quality and tality" (149.29-30), which points to the Latin phrases "qualis . . . talis . . ." (as . . . so . . .) or "talis . . . qualis" (such . . . as). "Talis is a word often abused by many passims," because it is used without a clear referent or as a substitute for rigorous thinking (149.34). If we couple the linguistic abuses of (pre)determiners and pronouns with the dispute between Bergson and Einstein concerning time, viz. whether time could be *mathematized* and *spatialized*, the connection between their clash and quantum theory will become fully manifest: Einstein believed that the genuine nature of time could only be revealed and understood by mathematical equations, whereas Bergson contended that the mathematical representation of time would reduce its qualitative multiplicities into quantized unreality. In retrospect, we realize Bergson's discontent actually found an echo in the catastrophic moment when classical physicists were forced to replace the concept of the continuity of the light wave with the discrete quantized movement of particles (as is clearly exemplified in Balmer's formula, wherein *n* only takes *integer values*). Einstein never approved of Bergson's philosophical concept of *duration*, because "in Minkowski space-time, there is no such objective simultaneity for the clocks to reflect" (Maudlin, *Space and Time* 90). Fate, it seems, is not without a sense of irony: the limitation of mathematical representation was ruthlessly exposed four decades after the duo's unpleasant encounter in Paris: in 1964, John Bell's theorem undid the Einstein-Podolsky-Rosen Paradox's attempt to discredit quantum mechanics' description of physical *reality*. Of course, Joyce didn't live long enough to see Einstein's rupture with quantum physics, but he accurately registers a future science war between the theory of relativity and quantum mechanics.

Here is the final question: how does the *Wake*'s formalistic entanglement in quantum mechanics point to *idealism*? The answer lies in a rethinking of Grosz's concept of atomic ideality: she seems to not only overlook the fact that "contingency as mere indetermination is far from being freedom as full-blown self-determination" (Johnston 170), but also repeats Daniel Dennett's mistake of *naturalizing freedom*, as has been exposed by Žižek:

> . . . there is no direct link or even a sign of equation between (human) freedom and quantum indeterminacy: simple intuition tells us that if an occurrence depends on pure chance, if there is no causality in which to ground it, this in no way makes it an act of freedom. Freedom is not the absence of causality, it occurs not when there is no causality, but when my free will is the cause of an event or decision—when something happens not without cause, but because I wanted it to happen. On the opposite side, Dennett proceeds all too quickly in naturalizing freedom, that is, in equating it with inner necessity, with the deployment of an inner potential: an organism is "free" when no external obstacles prevent it from realizing its inner inclinations—

> again, simple intuition tells us that this is not what we mean by freedom. (*Less Than Nothing* 915)

On the contrary, quantum physics, Žižek argues, "enables us to avoid not only the twin strategies of the vulgar-materialist naturalization of man and the obscurantist spiritualization of nature, but also the more 'modern,' 'deconstructionist' version according to which 'nature' is a discursive construct" ("Lacan with Quantum Physics" 282). The ultimate uncanniness about the quantum universe is that "[q]uantum processes are closer to the human universe of language than anything one finds 'in nature' . . . yet this very closeness . . . makes them incomparably stranger than anything one encounters in 'nature'" (283). In other words, quantum processes, like the human unconscious, defy observation and causality. Einstein is widely credited with the following witticism against quantum mechanics: "Insanity is doing the same thing over and over and expecting different results." Intriguingly, the trope of insanity that haunts quantum mechanics also pertains to Joyce's writing project of *Finnegans Wake*: "Perhaps it is insanity. One will be able to judge in a century" (qtd. in Ellmann 590).

If *Finnegans Wake*—entangled in a quantum virtuality and the human unconscious—gravitates towards the *abysmal* black hole of insanity, how could ideality ever be derived? Joyce's application of *mise-en-abîme* to blurring the boundaries between the knowable and the unknown may be a radical synthesis of antithetical "dogmad" ideologies (158.3), as is revealed in the following Wakean passage, wherein Jarl van Hoother's "two little jiminies" Hilary and Tristopher—from the story of Brangäne-turned-*Prank*quean and her encounter with the three reincarnations of King Mark (21.11)—reappear as a fugue in disguise:

> The hilariohoot of Pegger's Windup cumjustled as neatly with the tristitone of the Wet Pinter's as were they *isce et ille* equals of opposites, evolved by a onesame power of nature or of spirit, *iste*, as the sole condition and means of its himundher manifestation and polarised for reunion by the symphysis of their antipathies. (92.6-11)

Here, Joyce decomposes and recomposes Samuel Taylor Coleridge's summary of Giordano Bruno's theory: "Every power in Nature and in Spirit *must evolve an opposite, as the sole means and condition of its manifestation:* and all opposition is a tendency to Re-union. This is the universal Law of Polarity or essential Dualism" (Coleridge 94; emphasis in original). Epitomized in the dialectical relation between "hilariohoot" and "tristitone" (punning on Bruno's motto "*In tristitia hilaris hilaritate tristis*")—a "cumjustled symphysis" that culminates in a community of contrasts—Joyce's chaosmos embraces the unknowable *things-in-us*, namely, the unconscious mind that behaves like spectral subatomic particles, as long as "riverrun, past Eve and Adam's" like a flux of virtuality that runs *past even atoms*.

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