VIRGINIA WOOLF'S UNCERTAINTY PRINCIPLE OF LANGUAGE

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At this momentous occasion of the first Virginia Woolf symposium in Portugal, I'd like to explore with you some ideas about Woolf's modernism: how her literary experiments, embedded in a particular cultural context, disrupted traditional ways of looking at the world, and how that context invited her to refashion the novel into something new, something novel. I'll discuss briefly early 20th century advances in physics, which reshaped the way we look at the physical world. I'll then discuss one aspect of Woolf's innovative literary techniques, which carries forth that new world view, a new way of looking at the "nature of reality".

Many tradition shattering discoveries, theories, events marked the earliest part of the 20th century, forming the cultural milieu of Virginia Woolf's intellectual and emotional development and continuing to influence our lives today. Though Woolf may not have known or experienced directly some of these influences, resonances of them were 'in the air' and shaped the developing outlook of the century. In Geneva, Ferdinand de Saussure lectures on linguistics, proposing that the word and its referent in the world are not related by any necessary or causal sequence, by "no natural connexion in reality" (69). Saussure's theory with its "new set of relations" between word and object, loosened artistic attachment to representational fiction and made way for some of the great literary experiments of the new century. In Vienna, Sigmund Freud puts forth theories of the unconscious, of dream life, of the forces that shape and inform personality to show a "new set of relations" between inner and outer life. And the Great War, which raged all over Europe and destroyed a generation, broke what had been an accepted connection of goodness and well-being to worldly reward. There seemed to be no explanation for the havoc that human beings wreaked upon themselves.

One of the more influential of the tradition shattering theories of the early twentieth century occurred in physics, changing the way we looked at

the world around us. For two hundred years, Newton's ideas of a mechanistic universe and forces of nature prevailed. Newtonian physics had posited an objective world apart from human consciousness, an obdurate reality ordered on certain principles that could be invoked to observe and measure, plot and predict the machinations of the real. Newton's laws - of motion, of gravity - were constructed from readily observable everyday events, from the visible, verifiable world. The laws implied predictability, for seen objects could be counted on to behave in anticipated ways. But by the beginning of the 20th century, experimentation had shifted to the unseen world of subatomic particles, whose behavior Newton's laws did not begin to explain. Indeed, the single important discovery of particle physics was that the subatomic stuff, if we may call it that, did not function the way the world of ordinarily observable reality did. Whereas Newtonian physics could be counted on to predict results of physical experiments, the developing field of quantum mechanics and the world view it implied could *predict* only the *probability* of results. Since the matter of experiment was millions and millions of invisible, subatomic particles, results would be proposed statistically; one could measure only *tendencies* of groups of particles rather than the behavior of individual photons, for example, or electrons. Such notions of probability, uncertainty, discontinuity soon found their way out from the laboratory into the larger culture. Thus, a new view of reality showed itself in the arts: painting (the broken planes and collaged surfaces of the cubists), music (the symphonies of Stravinsky and Bartok, who eschewed traditional harmonies and rhythm patterns), theatre (the self-conscious, "alienating" works of Artaud, Cocteau, Brecht, and later Ionesco, Beckett), the "ungraceful" contractions and angularity of modern dance, and of course, the language-centered literary works of those we call 'modern' writers. Each of the arts would call attention to its processes of construction, foregrounding paint, notes, theatricality, movement, words. In their new focus on material and creative process the arts reflect the influence of the period's signature theory: Heisenberg's Uncertainty Principle.[1]

Werner Heisenberg formulated his famous principle in 1927, the year Virginia Woolf finishes *To the Lighthouse*, with its central concern of "subject and object and the nature of reality". In this text, as well as in her other novels, Woolf inscribes a worldview that shows conceptual if not actual influence of the scientific discoveries that were part of the cultural matrix of the time. Heisenberg's Uncertainty Principle posits that an observer cannot be certain about physical reality nor know it completely. Further, his principle questions the separateness of that reality from the processes by which we measure it.

Dealing with subatomic particles, Heisenberg's experiments conclude that one cannot know everything about such particles, for in the very act of measuring one aspect of their being - either their velocity or their location - one interferes with other: if one measures the particle's location, one must necessarily impede its velocity; if one measures velocity, the location of the particle cannot be fixed. Here extrapolation and probability arise. Whereas in the realm of large objects, one can see and test and measure and predict, in the realm of the subatomic, of that which all is comprised, one measures evidence of occurrences which themselves cannot be seen. Thus, the act of observation leaves its mark on the very reality it explores; too, the choice of the method of observation determines in some way the outcome of that observation. Years later, Heisenberg writes:

> We can no longer view 'in themselves' the building blocks of matter which were originally thought of as the last objective reality; that they refuse to be fixed in any way in space and time; and that basically we can only make our knowledge of these particles the object of science. The aim of research is thus no longer knowledge of the atoms and their motion 'in themselves', separate from our experimental questioning; rather right from the beginning, we stand in the center of the confrontation between nature and man, of which science, of course, is only a part. The familiar classification of the world into subject and object, inner and outer world, body and soul, somehow no longer quite applies, and indeed leads to difficulties (133).

Heisenberg's formulation sounds remarkably like the worldview of Woolf, who used her own uncertainty principle of language to inscribe her sense of the interconnectedness among all realms of being, the unknowability of that which lies "just on the other side of language", a belief in the constructive powers of language, and the notion that when one locates meaning precisely one kills language's vitality ("Craftsmanship", CE-II 251) - in Heisenbergian terms, as one fixes a specific 'location' of meaning one stops the 'motion' of language. Her uncertainty principle of language - with its disrupted syntax, ambiguous referents, apparent contradictions, destabilizing contingencies, space-creating ellipses, transformational metaphors, reversed causality and sequence, and "fanciful" juxtapositions - speaks to her own reliance on the constructs of readerly imagination to develop a matrix of understanding with the text. It is here in the shared moment of meaning-making between reader and text, and among silences, ambiguities and discontinuities, that Woolf's literary expressions enact the centering thesis evolved from the new physics

as articulated by Heisenberg: that the observer and the observed co-create meaningful, intelligible systems of signification. The worldview implies that we participate in creating our sense of reality and raises questions about subject/object and the nature of that reality.

With the readily detectable relation of Heisenberg's Uncertainty Principle to Woolf's work, I'd like to spend a moment with Einstein's Special Theory of Relativity, proposed in 1905. With the name 'relativity' one might think that Einstein's was a theory of subjectivity; rather it is a physical theory about the absolute nature of physical reality. The two major principles of the special theory of relativity are (1) the constancy of the speed of light, no matter the motion of the measurer, and (2) the principle of relativity, which says that all laws of nature are identical in all frames of reference that move uniformly in relation to one another (Einstein and Infield 177). This theory takes into account both the constant and absolute nature of the phenomena of physical reality but as well considers the human observational perspective in creating conclusions about those phenomena. Several conceptual results of the special theory of relativity bear on our reading of Woolf. First, an object in motion contracts in the direction of its motion until at the speed of light the object disappears. The observation that the speed of light in experiments measures always 186000ft/second no matter the speed of the measurer in relation to the light source, flies in the face of common sense, which says that the speed of the measurer is added to or subtracted from the speed of light. This means that the measuring instruments in one frame of reference contract as the measurer's velocity increases. Unlikely as it seems, the effect of such contraction is that moving clocks run more slowly as their velocity increases, that there is no universal measure of time, and that measurement of time changes depending upon the frame of reference and velocity of the measurer (Einstein and Infield 177-192). Second, the famous $E=MC^2$ equation results from the special theory of relativity. The equation states that energy and mass are versions of one another; that even the tiniest particle of mass has within it exorbitant amounts of energy, the discovery of which made possible the hydrogen bomb. (I've often wondered at what seemed the imperative to actually create the bomb, and why it could not exist forever as possibility.)

But earlier than the explosions in Los Alamos and far less deadly, we have *To The Lighthouse*, and an explosion worth looking at in Lily Briscoe's mind. It is a bit awkward to ask an audience in such a presentation to follow a word by word analysis, but it is here in the moment of the particular word, the literary particle as it were, that Woolf's great creative imagination demonstrates itself.

Too easily can her sentences be read for what we think they mean, and the persistent ambiguity and transformational qualities of her language normalized or read as dreamy meanderings or direct representations of inner states of mind. Indeed, her literary "experiments" (quite a scientific term actually) are read often as esoteric studies disconnected from the realities of the actual world, yet they deeply resonate with the metaphysical implications of the then new century's revolutionary scientific theories. The passage under study today challenges our conventional notions of the way reality works, presenting in language an analogue of the physical reality posited by the hardest of sciences of her day. This passage is not unique in its projection of a worldview but rather is representative of the kind of ideas we find throughout Woolf's work.

The first sentences of *To The Lighthouse* locate the text well within the discourse of early 20th century physics. Mrs. Ramsay, whose language is permeated with contingencies, says to James, who is looking forward to tomorrow's trip to the lighthouse, that they'll go, "yes, of course, if it's fine tomorrow" (3). Mr. Ramsay is certain that the weather will not hold up: "But it won't be fine" (4). ("How does he know what tomorrow's weather will be", I wrote many years ago in the margin of the book.) Probability again meets predictability as Mrs. Ramsay adds, "but it may be fine - I expect it will be fine" (4). While this first conversation locates Mr. and Mrs. Ramsay's developing worldviews as related to a larger theme of the old and new physics, the book's structure reflects Einstein's specific concept of the contraction and dilation of time. Parts One and Three of *To the Lighthouse* together constitute 9/10 of the text, yet each portion covers a mere several hours of a single day; Part Two, "Time Passes" constitutes less than 1/10 of the text and covers 10 years in the lives of the characters. In the first and third sections, time extends, slows down. In the center portion, time speeds up quickly whisking by 10 years of life, with one of the book's most humanly significant events - Mrs. Ramsay's death - happening midsentence, parenthetically and in the already-past.

But I'd like to focus on a passage that demonstrates Woolf's comfort with the Einsteinian notion that energy and matter are versions of one another. The well-known passage begins with Lily's remembering Andrew Ramsay's comment about his father's philosophic interest: "subject and object and the nature of reality" (23). To Lily's response that she'd no idea of what that meant, Andrew suggested that she "think of a kitchen table then when you're not there" (23). Andrew had defined his father's work in traditionally dualistic terms. Whether expressed as 'subject' and 'object' or 'mind and matter' this dualism posits a Newtonian distinction between consciousness and things. But the example

Andrew gave Lily, which was supposed to have helped her understand this abstract concept, implied that the prime center of reality is the mind, for he said "Think of a kitchen table then when you're not there" and not simply "a kitchen table when you're not there." Such an interpretation tempts us to read the subsequent passage as an excursion of subjectivity, corroborating the general notion that Woolf is a stream of consciousness writer.

Yet Woolf disdained 'realist' writing, whether objectively or subjectively oriented. The psychological writer of her time, shifting focus from outer to inner landscape, gave no respite to the illusion of the representability of the real, as Raymond Williams notes (92). No matter that the meanderings of the stream of consciousness had replaced the meanderings of the River Floss; the object of representation had shifted, the mode of representation had not. Woolf's rejection of stream-of-consciousness technique reflects her impatience with the subject-centered view of reality it implies, no more valid than the objective view as the "coherent, authentic source of the interpretation of the meaning of reality" (Weedon 6). Woolf's literary experiments - her word equations - ask us to question entirely the notion of ontologic or epistemologic hegemony as they acknowledge a more holistic vision of unsignified impersonal nature persisting in relation to the human experience and construction of that 'nature'.

Lily's memory of Andrew begins a section of thought integrated with a scene of occurrences in the actual world. Lily sits on the lawn next to Mr. Bankes. She tries to come to some conclusion as to how a person decides if the feeling one has about another is liking or disliking: "How did one judge people, think of them? How did one add up this and that and conclude that it was liking one felt, or disliking? And to those words, what meaning attached, after all?" (24). The ensuing passage is quite complex, multiply located in and outside of Lily, and demonstrates Woolf's vision of reality harmonious with the theories of the new physics.

Lily continues thinking about Mr. Bankes and Mr. Ramsay until her thoughts were dancing "up and down like a company of gnats, each separate, but all marvellously controlled in an invisible elastic net" (25). This description of mind energy could be as well a description of the electron cloud of the atom as understood by quantum physics, where energy is absorbed and emitted in discrete packets of energy - quanta - as electrons move from one atomic level to another all while remaining within the atomic "net". Thoughts that were earlier as solid as things irrevocably fixed for eternity are now barely corporeal, evermoving particles of life connected in some continuous, everchanging relationship. Finally, Lily's thought "which had spun quicker and quicker

exploded of its own intensity; she felt released; a shot went off close at hand and there came from its fragments, frightened, effusive, tumultuous, a flock of starlings" (25). Lily's thought has been gaining speed and momentum until now it explodes from the magnitude of its own energy and force, as she experiences the release of and from intense mental energy. And then she hears "close at hand" the slower moving sound of an explosion. As she was attempting earlier to follow her own thought, she now hears the sound of the explosion of that thought, again undergoing mental activity and experiencing simultaneously awareness of that activity. The single phrase, "a shot went off close at hand" seems to describe the process of the explosion of Lily's thought moving from in her to outside her. The shot seems also to have occurred in the external world, evidenced by the scattering of a flock of birds. Perhaps the birds have heard the explosion of Lily's thought or the explosion of Lily's thought has become metaphorically externalized as an actual shot. Or perhaps the shot created the flock of birds from its fragments, so that the fragments of the shot have become, are the starlings. Woolf supplies the reader with merciful objective corroboration that indeed it's a real shot in the real world that causes real birds to scatter as Lily Briscoe and Mr. Bankes look up and observe "that the flock of starlings, which Jasper had routed with his gun, had settled on the tops of the elm trees" (25). Nevertheless the sequence itself, with its multiple possibilities of meaning, enact Einstein's conversion equation of energy and matter, the creative potential of thought and the multiple manifestations of possibility. The passage effects a transformation of mind energy, thought, to sensorial phenomenon, sound, and finally to objective particle, fragment. Or, more challenging to our conventional construction of reality, the possibility that thought has caused an effect on the objective world.

My analysis suggests that we'd be well advised to read Woolf literally rather than attempt to "normalize" her language of uncertainty, as we think she cannot possibly mean what she seems to be saying. I think here of Poe who said there was a world of difference between an ambiguous presentation and the presentation of ambiguity. It would turn out then that Virginia Woolf, clearly not a realist of the Newtonian kind, was a realist of the new sort. Both visionary and grounded, she constructed in literary language ambiguous, contingent yet meaningful analogues of the way the new physicists understood our world to work.

NOTES

1. Regarding the following discussion, I make no claim of being a trained physicist deeply intimate with the subject about which I speak, but simply a good reader who understands some basic science that Woolf probably knew and understood: " 'I respect you (she addressed silently him [Mr. Bankes] in person) in every atom'" (TTL 24).

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