

Early Sources for Joyce and the New Physics: the “Wandering Rocks” Manuscript, Dora Marsden, and Magazine Culture

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The bases of our physics seemed to have been put in permanently and for all time. But these bases dissolve! The hour accordingly has struck when our conceptions of physics must necessarily be overhauled. And not only these of physics. There must also ensue a reissuing of all the fundamental values. The entire question of knowledge, truth, and reality must come up for reassessment. Obviously, therefore, a new opportunity has been born for philosophy, for if there is a theory of knowledge which can support itself the effective time for its affirmation is now when all that dead weight of preconception, so overwhelming in Berkeley's time, is relieved by a transmuting sense of instability and self-mistrust appearing in those preconceptions themselves.

— Dora Marsden, “Philosophy: The Science of Signs XV (*continued*)—Two Rival Formulas,” *The Egoist* (April 1918): 51.

There is a substantial body of scholarship comparing James Joyce's later work with branches of contemporary physics such as the relativity theories, quantum mechanics, and wave-particle duality. Most of these studies focus on *Finnegans Wake*¹, since it contains numerous references to Albert Einstein and also embodies the space and time debate of the mid-1920s between Joyce, Wyndham Lewis and Ezra Pound. There is also a fair amount of scholarship on *Ulysses* and physics², which tends to compare the novel's metaphysics with those of Einstein's theories or to address the scientific content of the “Ithaca” episode. While these studies continue to illuminate, the field has not sufficiently addressed (1) the technique of “Wandering Rocks,” which instantiates a non-Newtonian space-time, and (2) the material sources through which contemporary physics made their way into Joyce's work. This article fills in both of those gaps by means of recent methods in the new modernist studies and genetic criticism, which have yet to be applied to scholarship of Joyce and science. “Wandering Rocks” is the earliest incorporation of the new physics, specifically the special theory of relativity, into Joyce's work. A genetic analysis of the manuscript evinces not only Joyce's thought processes as he created relativistic event-structures, but shows relativity to be integral with the discourse of avant-garde magazines he was reading during its conception and development. Thus, “Wandering Rocks” emerges in a material culture where new ideas on astronomy and

physics directly affect philosophical and artistic inquiries into the individual's relationship with the social and physical worlds. The results have broader implications for the study of *Ulysses* as well as the history of literature and science.

“Wandering Rocks” was composed on the cusp of Einstein's popularization in the immediate aftermath of the First World War. Joyce began writing *Ulysses* in 1914, nearly ten years after Einstein published the special theory of relativity in 1905, and continued working on it well after the general theory was published in 1916. Though Einstein's theories were revolutionary within the field of physics, they did not become widely known outside that specialized arena until the end of 1919. On November 6 of that year, Arthur Eddington addressed a joint meeting of the Royal and Royal Astronomical Societies to announce the first experimental substantiation of the general theory of relativity³. On the next day, newspapers transmitted to the general public a shocking set of facts about the universe: an object's rate of time and mass will increase or decrease depending on its velocity; differently moving observers will obtain varying yet equally true measurements of that object's length, width, mass, and velocity; space and time exist on a four-dimensional continuum known as space-time; gravitational attraction is the warping of space-time around bodies, rather than the direct action of forces between them; the universe is in a constant state of expansion; there is no such thing as simultaneity or an absolute chronology; and a minuscule amount of matter can release an enormous amount of energy (embodied in the now-famous equation $E=mc^2$). These notions completely upended the assumptions of Newtonian mechanics, which in the general culture—as implied by the epigraph of this essay—were deemed to be the very basis of civilization itself. Reactions to the new theory varied, but those of an avant-garde bent tended to embrace its revolutionary impact as an opportunity to reevaluate a broad range of humanistic endeavors.

Consistent with that trend, the magazines that were serializing *Ulysses* during the development of “Wandering Rocks”—*The Egoist* and *The Little Review*—exhibited an increasing interest in new physics and astronomy as analogs of their anti-statist views on the individual and social institutions. Frank Budgen, who helped Joyce draft the fair copy manuscript, associates physics with the magazines' philosophical leanings when he states that Father Conmee and the Viceroy represent “the static forces of Church and State, restraining the destructive forces of wandering anarchic individualism”⁴. This direct reference to the individualist-anarchist philosophy of *The Egoist*—“An Individualist Review”—as well as its American sister magazine *The Little Review*—“Making No Compromise With The Public Taste”—shows not only the importance of individualism to Joyce but connects it to the physicality of urban life. In that way, “Wandering Rocks” seems to embody a metaphysical argument about space and time that blends with competing views of the individual's relationship with the social and physical realms. This cross-fertilization of physics with a modernist humanism could certainly have inspired Joyce to base his portrait-in-motion of Dublin on a revolutionary physical model.

Given this context, we should reconsider Joyce's designation of mechanics as the art of “Wandering Rocks.” The term is usually understood to refer ironically to the characters' automatic responses to social authority (they actually exhibit a significant degree of independence in ignoring or half-saluting Conmee and the Cavalcade). However, the episode's astronomy motif and intrusion technique imply mechanics as something beyond the markers of social conformity. The intrusion technique inserts text

from one section of the episode into another, often with changes, in order to suggest the simultaneity of the two separately located events. A handful of scholars has suggested that the technique might have something to do with science. For example, M. Keith Booker describes the stylistic and metaphysical affinities between Joyce and contemporary science, suggesting that “the ‘jerky’ flow of time in 'Wandering Rocks' is exactly the sort of narrative development that might occur if the episode were being related by a series of narrators in different relativistic frames of reference” (582). We can take that suggestion much further if we consider the likelihood that Joyce meant by mechanics the branch of physics that describes an object's change in location over time, which is the primary method of astronomy. Indeed, Budgen describes the episode in terms that refer directly to astronomic mechanics.

According to their directions and velocities their position at any time is noted, for they are all regarded in a twofold sense. They are human souls bound together by psychological ties, as, for example, ties of family, religion, friendship, enmity, citizenship, interest; and they are also bodies, isolated masses of matter moving through space. The viewpoint changes from one sentence to another so that the reader must be continually on the alert to follow the variations of scale and angle. The view constantly changes from a close-up to a bird's-eye view. A character is introduced to us at close-up range, and suddenly, without warning, the movement of another character a mile distant is described. The scale suddenly changes. Bodies become small in relation to the vast space around them. The persons look like moving specks. It is a town seen from the top of a tower. The spiritual attributes of each person remain what they were, but all, as individuals, become small in relation to the city that contains them. (124)

Budgen also reminds us that Bloom's hobby is astronomy, referring to him as a “spacetimehound” (93) and “vendor of spacetime” (97). These recollections from Joyce's temporary amanuensis reveal of the extent to which astronomy and mechanics—in the sense of physics—underpin the design of “Wandering Rocks.” Moreover, the multiple perspectives suggest an Einsteinian, rather than a Newtonian, mechanics, and also one that is more adept at uniting the humanistic dimensions of the episode. Granted, Budgen's recollections were written during the 1930s and possibly project later knowledge (or critical spin) retroactively onto the episode's composition in 1919. Nonetheless, there is a clear sense that astronomic mechanics is integral with the symbolic connections and humanist perspective of the episode.

The Relativistic Space-Time of “Wandering Rocks”

If mechanics is the branch of physics that describes an object's change in location over time, then the intrusion technique of “Wandering Rocks” does just that: the sections track with precise detail the characters' movements around parts of Dublin over discrete periods of time, inserting lines from other sections so as to imply the simultaneity or chronology of the compared events. It is significant that Joyce indicates forces, objects and places as the people of the episode. Rather than focusing primarily on Leopold Bloom or Stephen Dedalus, the subject is Dublin itself, seen equally through most of the peripheral characters by a narrating consciousness that jumps around in space and time. The technique forces the reader to observe through parallax⁵ the events plus the social or psychological factors that bind them. This produces the effect of a centerless universe with a number of local “nows” instead of a universally consistent chronology, which roughly approximates the difference in worldview between Newton's mechanics and the

localized frames of reference espoused by Einstein. Given the astronomy motif that pervades the episode, as well as the dates of its composition, it is tempting to read it as an early application of Einsteinian mechanics in fictional prose.

“Wandering Rocks” features astronomy and the frame of reference as both thematic motifs and structural elements. This portrait-in-motion of Dublin is based on the legend of the Wandering Rocks, a lethal maritime danger in the Bosphorus described alternately as *planetai*, rocks that drift randomly about the strait, or as *planktai*, a pair of massive boulders that clash together at the end⁶. *Planetai* is the root of the English word planet, and as such forms the basis for reading the characters in terms of celestial bodies. For example, in section nine M’Coy mentions a book Bloom bought, with plates depicting “the stars and the moon and comets with long tails. Astronomy it was about” (U 10.527-8). In section twelve, Mr. Kernan’s gin-warmed vitals and breath radiated as “[h]is frocktails winked in the bright sunshine to his fat strut” (U 10.761-3), like the tail of a comet. In addition to being described like astronomical bodies, these characters observe the world through frames of reference implied by the constant presentation of optical frames such as mirrors, windows, and doorframes. At the opening of section two, Corny Kelleher went to the doorway and “leaned against the doorcase, looking idly out” at the universe of Dublin (U 10.212). Section eleven opens as “[t]he lacquey by the door of Dillon’s auctionrooms shook his handbell twice again and viewed himself in the chalked mirror of the cabinet” (U 10.642-3). From his own moving position on the stairs Mr. Power sees the back of Long John Fanning; and in the other reference frame of the mirror (also in relative motion) he can see parallaxically the front of Long John Fanning. “From the sidemirrors,” in section eighteen, “two mourning Masters Dignam gaped silently” (U 10.1132-33). These examples engender an aesthetic of framed observation that, together with the astronomy motif, correlate the events of “Wandering Rocks” as if they were being observed from different frames of reference.

One of the most significant consequences of Einstein’s notion of reference frames is that it makes just as much sense to refer motion to one body as to the other, which is known as the principle of relative motion. This is expressed in “Wandering Rocks” with the crumpled throwaway that Bloom jettisoned into the Liffey at lunch time. The throwaway appears for the first time in section four, riding “lightly down the Liffey sailing eastward past hulls and anchorchains” (U 10.294-6). During the throwaway’s third appearance, it is still traveling eastward “by flanks of ships and trawlers, amid an archipelago of corks” (U 10.1096-7). But between these two observations, the second one presents a much different articulation of the throwaway’s movement.

North wall and sir John Rogerson’s quay, with hulls and anchorchains, sailing westward, sailed by a skiff, a crumpled throwaway, rocked on the ferrywash, Elijah is coming. (U 10.752-4)

John Hannay points out that in this passage the grammatical subject comprises the north wall of the Liffey and Sir John Rogerson’s quay, taking “sailing” as its verb (437). That is, the wall and quay sail westward while the throwaway remains “fixed.” The Newtonian notion of space “at rest” is parodied here. According to Einstein’s notions of reference frames and the principle of relative motion, it makes just as much sense to say that the walls of the river sail westward as it does to say the throwaway sails eastward.

The intrusion technique unifies the episode’s events by mimicking the scientific observation method of parallax. When certain of the same lines appear in different

sections of the episode, the reader receives slightly different data, providing a parallax view of the distant event at the time of its occurrence. For example, in section one Father Conmee steps *onto* an outward bound tram *on* Newcomen Bridge (U 10.107-9). A few lines later we observe the same action again, where Father Conmee steps *into* the outward bound tram *at* Newcomen Bridge, with the added information that he takes the tram because he dislikes to “traverse on foot the dingy way past Mud Island” (U 10.113-4). Then in section two, observed from the nearby location of O’Neill’s funeral home, Father Conmee steps *into* specifically the Dollymount tram *on* Newcomen Bridge (U 10.213-4). Different aspects of Father Conmee’s journey—which ground he will traverse and which tram he takes—become known from sections set in different locations in Dublin at about the same time. Also, different appearances of Father Conmee’s movements are generated by the subtle play on prepositions (into/onto the tram, at/on Newcomen bridge), indicating that Joyce is very much interested in the grammar of time and space.

In addition to simultaneity, the intrusion technique also makes chronology a tricky measurement. As in Einstein’s universe, in “Wandering Rocks” there is no single, absolute chronology. A poignant example of this appears in a few intrusions in sections one and two. In section one “Father Conmee passed H. J. O’Neill’s funeral establishment where Corny Kelleher totted figures in the daybook while he chewed a blade of hay. A constable on his beat saluted Father Conmee and Father Conmee saluted the constable” (U 10.96-9). A few lines later Father Conmee steps onto the outward bound tram on Newcomen bridge. In section two there is a different chronology of presentation. First Corny Kelleher chews his blade of hay and tots figures in the daybook, then Father Conmee steps into the outward bound tram, and then the constable speaks with Kelleher.

Section 1

Section 2

- 1a. Father Conmee
- 2a. Corny Kelleher
- 3a. Constable

- 1b. Corny Kelleher
- 2b. Father Conmee
- 3b. Constable

In the separate reference frames of each section, each chronology is valid. In section one the reader is first presented with Father Conmee, then Corny Kelleher, and then Constable 57c. In the second section the first character is Corny Kelleher, then Father Conmee, and then the Constable. The characters’ actions are not identical in each section, yet each chronology is unique and complete in itself, and we see things in a different order based on the frame of reference from which they are observed (Conmee or Kelleher). Another example of questionable chronology is Tom Rochford’s act-counting invention, which goes from turn six to turn four (U 10.483).

Time and space relationships are not the only aspects of relativity that Joyce might have used. Another space-related phenomenon, according to the general theory of relativity, is gravitation. Einstein held that gravitation is not the action of direct force between bodies but the warping of space around them. Joyce seems to have worked out a spatial law of gravitation based on social conventions of status and outward appearance. Dennis J. Maginni, professor of dancing, attracts notice by his loudly colorful dress (U 10.599-600, 10.1238-40). Father Conmee, who has washed his teeth with arecanut paste, is constantly saluted. Thomas Kernan, preening himself in the mirror, notes that “a dressy appearance... bowls them over” (U 10.738-9). And the Cavalcade, conveying the best-dressed people in town with the greatest of pomp and circumstance, attracts the most

attention and salutation. These characters have the ability to make people respond with the same behavior, to pull them into uniform acceleration, as it were. By virtue of their dress and social rank, they call into being the attention of the people around them. Their social and cultural influence causes the physical events of stopping, head-turning, and waving, all of which are rooted in the “fabric” (spatial field) of social convention. While these behaviors can be seen as spatial effect of social hierarchy, it is important to note that the responses exhibit a significant amount of autonomy within that field. Most of them ignore or only half-salute Conmee and the Viceroy. Others are outright mocking, as when “Poddle river hung out in fealty a tongue of liquid sewage” (U 10.1196-7) and Simon Dedalus “stood still in midstreet and brought his hat low” (U 10.1200-1) to cover his open fly, rather than raising it in salute. In that way, wandering becomes not simply moving around, but resistance to the gravitational pull of social forces, engendering a universe marked by a significant amount of individual autonomy.

The importance of the intrusion technique is that it engenders a set of non-privileged frames of reference that relates events in such a way that the reader does not have a comprehensive view of the field at any one time. This is the essential difference from Newtonian mechanics and has been debated by Joyce scholars for some time now. Salvadori and Schwartzman contend that “[d]espite some learned papers on his awareness of Einstein’s relativity theory and even Heisenberg’s indeterminacy principle, Joyce’s mechanics are totally Newtonian with a strong emphasis on the importance of Newton’s gravitational law” (353). This, I believe, is not the case in “Wandering Rocks,” where space and time do not conform to a classically unified mechanics, and where gravitation can be seen as a spatial effect. Whittaker and Jordan note that the Platonic metaphysical model of metempsychosis can be understood to join disparate times in a manner similar to the observational method of Einstein's special theory, but claim that the physics of the narrative remain Newtonian (44). Certainly, Joyce did not adopt one or the other physical model exclusively, but only those aspects that suited his artistic ends. In fact, we can regard the physics in a given section as Newtonian, while the whole episode with its relationships between limited perspectives is Einsteinian. So Booker's suggestion is correct, and the “jerky” flow of time in “Wandering Rocks” is part of a narrative technique that has broader implications than are at first apparent. The movements and timing of the episode are extraordinarily meticulous, yet there are so many chronological and informational discrepancies that they cannot be accidental. It is the limited perspective of spatio-temporal anomalies that makes “Wandering Rocks” a narrative experiment in relativistic mechanics.

The space and time anomalies and the astronomy motif of “Wandering Rocks” might point to an incorporation of relativity, yet it is important to recognize that the episode was drafted eleven months before Einstein's popularization in the mainstream press. Since the episode makes no direct reference to Einstein, we must ask why such a reading is necessary, given that the technique can be read along the lines of cinematic jump-cut, Bergsonian duration, or parallax alone (which predates Einstein). Thus, a connection will have to be demonstrated by reference to changes in the manuscript that reveal a possible knowledge of the theories. Though the next section reveals some striking information, there is no “smoking gun” in the manuscript to indicate a definitive connection, so we will later look to Joyce's reading for further insight.

A Textual Analysis of “Wandering Rocks”

Textual scholars have always found “Wandering Rocks” to be one of the more enigmatic episodes. Not only did Joyce show no evidence of having thought about it as part of the arc of *Ulysses* prior to May 1918, but there is a near-total lack of *avant-texte* that might provide insight into when, how, and why he did. The episode was serialized during 1919, in the June and July numbers of *The Little Review* and in the December (and final) number of *The Egoist*. At the time of this writing, the only extant pre-publication texts for “Wandering Rocks” are one note sheet, the fair copy draft that is part of the “Rosenbach” manuscript (named after its owner)⁷, and two fragments of an amateur typescript that was composed from it. The printer's placards and page proofs that were used for the first book edition of *Ulysses* are also available. At the back of the Rosenbach MS there appears a statement signed in Joyce's hand, indicating the manner of its composition: “PP. 32-48 were written by my friend Francis Budgen at my dictation from notes during my illness, January-February 1919” (48). Here is a timeline of the episode's development and publication:

- May 1918 or soon after: Conceived.
- May 1918-January 1919: Developed from notebooks to organized notes.
- January-February 1919: Fair copy “Rosenbach” MS completed with help of Frank Budgen.
- February 1919: TS prepared from fair copy MS and sent to Ezra Pound.
- June-July 1919: Serialized in *The Little Review*.
- December 1919: Serialized in *The Egoist* (based on *Little Review* copy).
- August-November 1921: Minor corrections and additions in Joyce's hand on printer's placards and page proofs.
- February 2, 1922: First book publication.

The changes made by Joyce to the 1921 placards and page proofs are mostly handwritten spelling and diction corrections, with the handwritten addition of a few passages that add slang or local color and one that bolsters the astronomy theme.

The Rosenbach MS has several features that suggest Joyce's possible interest in Einsteinian space-time. The passages that are the most relativistic—Conmee stepping into the tram; the series of interactions between him, Corny Kelleher, and the Constable; the three presentations of the throwaway, among others—were written into the left margins or between the lines. This suggests that they were all conceived as a unit. Some marginalia are in Joyce's hand while others are in Budgen's. For example, of the three paragraphs in section one that repeatedly depict Conmee entering the tram, the first two are written in the left margin in Budgen's hand, in pencil, and with no clear indication of where they should fit in the main body of the text, which was written by Joyce in ink. The marginal paragraphs read as follows.

On Newcomen bridge the very reverend John Conmee S.J. of St Francis Xavier's church, upper Gardiner Street stepped on to an outward bound tram.

Off an inward bound tram stepped the reverend Nicholas Dudley C.C. of Saint-Agatha's Church, north William Street, on to Newcomen bridge. (3)

The third paragraph describing Conmee's entrance to the tram was already in the body of the text, penned by Joyce: “At Annesley bridge Father Conmee stepped into an outward

bound tram for he disliked to traverse on foot the dingy way past mud island” (3). In this third in-body paragraph, Annesley is crossed out and replaced with Newcomen in the top left margin, written large in Budgen's hand with a thinner pencil, connected by a long line. This suggests that they went back and added the passages together after the primary draft was written out. The intrusion of this event in section two is already in the main text, penned by Joyce, but a marginal note by Budgen in thick pencil similarly corrects Annesley to Newcomen (7). In the MS, this passage ends the opening paragraph of section two, while in the 1922 Paris and 1986 Gabler editions it constitutes a sole paragraph. Thus, Joyce apparently decided to change Annesley bridge to Newcomen across the various iterations of the event, also adding the information about Mud Island in one and allowing the arranger to play with the chronology. These additions together constitute a heightening of the parallactic observations—the different appearances of an event when observed from different locations—and a complication of the temporal flow of events.

The throwaway segments show a similar manner of implementation, with all three of them being added in the margins. The first throwaway passage is written in the left margin, in Budgen's hand with a thick pencil; a line connects it to the end of section four in the main text, written by Joyce (9). The second passage, in which the throwaway remains fixed while the walls of the Liffey move, is written by Budgen, this time with a pen, in the left margin next to a crossed-out paragraph in the main text (in Joyce's hand) about the two midwives with eleven cockles (24). The third throwaway passage was again written by Budgen in small letters with a thin pen, in the left margin and among the stars that separate sections 16 and 17 (39). The main body of this page, which is in the latter third of the MS, was written by Budgen with a thick pen. Given that the throwaway passages were all added marginally, they were probably conceived together as a particular chain of events that play with the notion of relative motion. Also, since they were added around the same time as the Conmee additions in sections one and two, it is apparent that Joyce decided in a coherent fashion, late in the writing process, to add several different event structures that play with the space and time of the narrative. This suggests that they were conceived at the same time, as a unit, and added probably in February 1919 in such a way as to make the chronological and perspectival aspects of three key event-structures more dependent upon frame of reference and parallax.

What prompted Joyce to emend “Wandering Rocks” in this manner? Given the paucity of early *avant-texte*, it is impossible to say for certain, though the episode was conceived during a period in which Joyce was reconsidering the overall structure of *Ulysses*. In his letters up through May 1918, there is no indication that he was thinking about “Wandering Rocks” at all. In a letter of May 18, 1918, Joyce wrote to Harriet Shaw Weaver about possibilities for whole and fragmentary publication of *Ulysses* by the Egoist Press Ltd., indicating “[i]n all seventeen episodes of which... I have delivered six” (*Letters I* 113). Ronan Crowley has argued convincingly that “Wandering Rocks” was essentially a desk-clearer, a sudden development to pave the way out of the initial style of *Ulysses*. Crowley's suggestions are supported by the lack of notebooks dedicated to the episode—a methodical departure from earlier ones—and what must have been the very quick timing from conception to composition: “Joyce compiled notes on Dublin places and people as a matter of course, not with a 'Wandering Rocks' episode in mind, but once the episode was conceived, the notes were parsimoniously put to that end”⁸. I will add

that another motivation could have been a need for funds. In a letter to Joyce dated November 22, 1918, Ezra Pound asks about the book's schema, implying there could be more money if more chapters were to be added.

Has 'Ulysses' 24 Odyssean books?. I dont want to ask silly questions, and I hope it continues forever, but people are continually asking ME about it and about. Fortunately my ignorance of Bloom's future is complete.

Still, let me know, if you know yourself. I will fork up the remaining £20 of the fifty promised, as soon as I get it from America.

If there are going to be chapters after April, I will try to bone a few quid more out of someone. BUTTTTT Khrrisst knows how or where. (*Letters II* 424)

Given that Joyce was planning a return to Trieste, from which he fled to avoid the war, it is possible that he wrote “Wandering Rocks” not only to fund the move but to reflect the geographic and political shifting that occurred after the Armistice of November 1918. It is not difficult to see how astronomy would be a natural model for symbolizing the cataclysmic events of post-war Europe. Still, there is no biographical evidence to suggest that Joyce would have had Einstein (or even the war) in mind for “Wandering Rocks,” so we must look to his reading for further clues.

Dora Marsden, *Physics*, *The Egoist* and *The Little Review*

Joyce's reading from mid-1918 through early 1919 consisted mostly of the periodicals that were serializing or reviewing his work, as well as several contemporary novels, notably *The Rainbow* (1915) by D.H. Lawrence⁹, *The Voyage Out* (1915) by Virginia Woolf, and *Tarr* (1918) by Wyndham Lewis¹⁰. *The Egoist*, at Pound's instigation, had serialized *A Portrait of the Artist as a Young Man*, had published it in book form, and was also about to begin serializing *Ulysses* (though this was delayed until January 1919). The American *Little Review* was also connected with Pound and began serializing *Ulysses* in March 1918. Joyce usually received punctual copies of these magazines from Pound or Harriet Shaw Weaver, and occasionally used his own funds to purchase them. Around this time, Joyce was also reading somewhat regularly the *London Times*¹¹, *Times Literary Supplement*¹², and *The New Statesman*¹³, as well as selected issues of avant-garde magazines such as the British *Future*¹⁴, the French *Mercure de France*¹⁵, and the Italian *Umana*¹⁶, *Il Secolo*¹⁷, and *Nuova Antologia*¹⁸. He was combing these magazines for reviews of *Exiles*, which had been published in London and New York on May 25, 1918, but some of them—especially *The Egoist*—contain pieces dealing with science and other topics pertinent to “Wandering Rocks.” Joyce seems to have owned complete runs of *The Egoist* and *The Little Review*, if not all at once, then at various times during the composition of *Ulysses*. Pound sent him many issues of *The Egoist* from 1914 and *The Little Review* from 1918 until he left Zurich during the Winter of 1919. Joyce wrote John Rodker from Paris on September 29 and November 10, 1920, asking for all copies to date of *The Little Review* containing the serialized *Ulysses* as replacements for the numbers that had been lost in the move from Trieste (*Letters III* 23, 29). Upon leaving Paris in late 1940, Joyce possessed all numbers from March 1918 to September-December 1920, ending with episode 14 of *Ulysses*¹⁹. At that time he also had the February 2, 1914 to September 1, 1915 numbers of *The Egoist*, which contained twenty-five installments of the *Portrait* with several interruptions (Gheerbrant no. 213). From his letters and the biographies, we know that Joyce also possessed the January 15, 1914²⁰; March 1, 1916²¹;

April 1916²²; and March²³, April²⁴, May²⁵, and June²⁶ 1917 numbers of *The Egoist*. However, from various comments in his letters it is also evident that he received the issues from Winter through Fall of 1918 that advertised the impending serialization of *Ulysses*, as well as the 1919 numbers that serialized it.

From Winter 1918 through the end of 1919, both *The Egoist* and *The Little Review* exhibit an increasing editorial interest in new ideas on space and time as they pit the individual against traditional social institutions, state and religious power, and even censorship. In fact, the relativity theories become an essential component of *The Egoist's* philosophical orientation nearly two years before Eddington's address, which probably makes it the first English literary magazine to discuss Einstein. From March 1918 to the magazine's closure in December 1919, Dora Marsden's leading essay series "The Science of Signs" connects relativity with the humanistic anxieties about civilization and philosophy that interest Joyce. Indeed, Marsden's injection of relativity influenced *The Egoist* to side against Newton as a static cultural force, later exemplified in T. S. Eliot's call for the public "to upset its reliance upon Shakespeare, Nelson, Wellington, and Sir Isaac Newton"²⁷. While that kind of argument recalls the static forces against which the individuals contend in "Wandering Rocks," other pieces in both magazines explore alternative relationships in space and time as a means of finding a more liberated modernity.

Thaine Stearns has shown that though Joyce and Marsden never met, they carried out an indirect conversation in print, responding to each other's writings and referring to each other in letters to Harriet Shaw Weaver and Sylvia Beach. Joyce read with interest Marsden's early essays in *The Egoist* and even incorporated some of her ideas into parts of *Ulysses*²⁸. Lidderdale and Nicholson indicate that the first three episodes of *Ulysses* arrived as typescripts at the *Egoist* offices in late February of 1918²⁹. On April 10, 1918, Marsden wrote to Harriet Shaw Weaver criticizing the punctuation of the first sentence of "Proteus":

I have just re-read episode III of "Ulysses." My dear editor go down on your knees & thank your stars for possessing *one* writer of metaphysics who is CLEAR! That's ME!! Joyce is... my word! He's appalling! (quoted in Lidderdale and Nicholson 147, n. 475)

Stearns suggests that Marsden subsequently began responding to the first three episodes of *Ulysses* in her "Science of Signs" column for May 1918. However, it is more likely that the first of her published responses actually came in March 1918, when her series began an increasing emphasis on astronomy and mechanics. She was clearly versed in original science³⁰, which would have connected well with Stephen Dedalus' ruminations on the metaphysics of space and time in "Proteus."

Marsden's column in the March 1918 number of *The Egoist*, titled "The Constitution of the World and the Character of our Scientific Knowledge," is interesting for the way it foregrounds chronology as the primary object of all scientific inquiry. Her description of science as being essentially concerned with the nature of events tacitly identifies it with the specialized branch of mechanics, hinting at some of the perceived uncertainties that characterize contemporary physics.

The task of science is to issue, under symbolic forms, authenticated classifications of the order of succession obtaining at any given stage in the flow of events in the external world. The modern scientist conceives the order of the external world under the vast tide of *groups of events* constantly ebbing and flowing, and revealing in addition unceasing

transmutations among the individual groups which constitute the tide. He notes, however, that the *order* or *sequence* of these transmutations, multiple as the latter are, remains in the supremest degree constant. (33) [Marsden's emphases]

Several aspects of this passage are striking. The anxiety over the multiplicity and “unceasing transmutations” of event-groups is not convincingly concealed by the assertion that their order remains absolutely constant. This is characteristic of the (mistaken) response that many writers would first have upon popularizing relativity at the end of 1919, though there is as yet no direct mention of it here. In addition, the insistence upon the inherent stability of sequence in individual event-groups probably arises from Marsden's long-standing arguments about the inviolable integrity of the self. She thereby extends the magazine's emphasis on pure individualism to the realm of sciences and the physical universe. This humanized picture of the universe seems like the planetary motions of the characters in “Wandering Rocks” and the manner in which they constitute multiple groups of events that transmute but ultimately remain stable. Finally, the tide metaphor used to illustrate her conception of the nature of events, with its constant ebbing and flowing, could have a source in Stephen Dedalus' metaphysical ruminations on the strand in “Proteus,” which Marsden received several weeks prior to publishing this installment.

The likelihood that “Proteus” catalyzed Marsden's turn toward mechanics over the next several issues becomes more convincing if we look at the rhetoric she employs in a later passage about science and metaphysics. She states that modern scientists have exceeded their traditional boundaries by asking humanistic questions, “to render of external events their *reason* and their *why*” (34) [Marsden's emphases].

These interpretations represent guesses based for the most part upon a wide survey of the order of the world's changes and constitute an endeavour to so “read back” certain outstanding but partial characteristics of events: those, for instance, of space, time, substance, and the like: so as to form a theory of the nature of the universe as a whole. It is these scientific “interpretations” so based which form the groundwork of our modern conceptions of the world and the universe. (34)

The notion of interpretively “reading back” the meaning of events onto a unified and whole conception of the universe is like the activity of philosophy (and novel writing). More to the point, in comparing the universe with the tide in the earlier passage on page 33, and in likening observing to reading in the present passage, Marsden uses the same vocabulary as Stephen does in “Proteus” to meditate on space, time, and metaphysics.

Ineluctable modality of the visible: at least that if no more, thought through my eyes. Signatures of all things I am here to read, seaspawn and seawrack, the nearing tide, that rusty boot. Snotgreen, bluesilver, rust: coloured signs. Limits of the diaphane. But he adds: in bodies. Then he was aware of them bodies before of them coloured. How? By knocking his sconce against them, sure. (U 3.1-7)

Shortly after this passage, Stephen ruminates on the sense of hearing as *nacheinander*, perception in time or “one after the other,” and on vision as *nebeneinander*, perception in space or “one next to the other” (U 3.14-19). Later, hearing is also an indicator of space, where Stephen perceives that “[t]he dog's bark ran towards him, stopped, ran back” (U 3.310). Gifford and Seidman tell us that the sources for these philosophical ruminations are Berkeley's essay on vision (one of Marsden's favorites, about which she frequently wrote), Samuel Johnson's refutation of it, and Lessing's *Lacoön*³¹. Wim Van Mierlo has

also argued that Otto Weininger's ideas on ethics, space and time may be a source for this passage³². Thus, the metaphysical lineage of knowledge through sense perception is brought into play here by Stephen as he attempts unsuccessfully to separate time from space in perception, ending up with an ineluctably four-dimensional metaphysics (time and space together). Marsden's view was the same. And if we consider the likelihood that Joyce read her essay in March 1918 or later, then the technique of "Wandering Rocks" can be understood as an extension of the perceptual experiments in "Proteus" occurring in dialogue with Marsden.

The Little Review issue of the same month, which was the first to serialize *Ulysses* with the "Telemachus" episode, features several items that deal with astronomy, space and time. Jessie Dismorr's "Matinee" is an iconoclastic poetic prose piece in which the narrator considers how "[herself] and the universe are two entities" (31).

The secret of my success is a knowledge of the limitedness of time.

Economy is scientific: I understand the best outlay of intention.

Within this crazy shell, an efficient machinery mints satisfactions.

...

The static cannot claim my approval. I live in the act of departure.

Eternity is for those who can dispose of an amplitude of time.

Pattern is enough. I pray you, do not mention the soul.

Give me detail and the ardent ceremonial of commonplaces that means nothing.

Oh, the ennui of inconceivable space! My travelling spirit will taste too soon of emptiness.

I thrill to the microscope. I plunder the close-packed cells and burrows of life. (31)

The perspective performs some of the same operations that Budgen identified in "Wandering Rocks," ranging from close-up to birds-eye view, from cosmic to microscopic, and various other angles. More importantly, the narrator paints herself as an interplanetary wanderer who maximizes the limitations of time and space, with a disposition that is overtly scientific yet opposed to stasis and material determinism. Dismorr's piece is immediately followed by Ezra Pound's "The Classics 'Escape'," which deals with state power and censorship. Then, late in the issue, the Reader Critic section features an odd item titled "Astronomy," by X., which quotes an announcement in *The Evening Standard* interspersed with cheeky commentary about the erection of a telescope on Mount Wilson that will solve some of the mysteries of the universe. Among its wonders, the new telescope will be able:

"(b) To bring no fewer than 100,000,000 new suns into the observer's ken."

On s'encanaille.

"(c) To advance materially the solution of the mystery of the origin of the universe by determining still further the nature of the gassy nebluae [sic], which science is generally agreed, are unborn world—suns and planets visibly in the making"

They will doubtless tie the Pleiades in a bow-knot and loose the bands of Orion.

(59)

The author's final commentary laments, "O world, thou Socratic star, the gods and fairies have left thee"(59). In both the Dismorr and X. pieces there is a theme of the individual against the static forces of the universe, with a mixed attitude that is both wary of demystifying the universe by science and energized by scientific marvel at it. As well, the Greek connection in the final comment would not have been lost on Joyce. The conjunction of these three items makes sense if we consider that "Wandering Rocks" pits

the citizens as individuals against the mechanical forces of state and religion (they fail to salute properly and read things that both would disapprove of), as well as the physical universe. These pieces establish a discourse not only within *The Little Review* but also with Marsden's article this month in *The Egoist*. Thus, there is editorial interest in the conjunction of these topics in both magazines, perhaps because they share Pound and other contributors in common.

In the April 1918 number of *The Egoist*, several pieces make even more overt connections between humanistic concerns and astronomy, including what is probably the first reference (albeit an indirect one) to Einstein's theories in an English literary magazine. Marsden's essay, "Two Rival Formulas," makes the case for the centrality of astronomy in the history of science and European thought, emphasizing a continuity between ancient and modern astronomers. In a striking paragraph later in the essay, she proposes the new uncertainties of science as an opportunity to reinvent philosophy, beginning her lifelong argument that science should essentially be the handmaiden of philosophic inquiry.

So the centuries have rolled on and science and philosophy have pursued their increasingly divergent ways, with the latter feebly endeavouring to exert an opposing authority. But now it seems a time has come when a strange new doubt has overtaken science. Thanks to its own unceasing endeavours, out of its own works have sprung effects which strip its established conceptions bare of their assurance. Those very conceptions of time and space upon which Newton founded modern physics find themselves called in question, and in spite of the discounting by those qualified to judge of the effects which such a condition of affairs must have upon the scientific outlook, it is certain that these effects must be too great to be at present even conceivable. (51)

In citing the upending of the foundational, Newtonian conceptions of time and space, Marsden is referring to Einstein's special theory of relativity. She clearly recognizes that the theory's full ramifications within the discipline of physics are not yet known, which is consistent with the field's specialists. However, she will also connect the known ramifications of the relativity theories, and therefore of astronomy, to the need for a total revaluation (*à la* Nietzsche) of all human values. Hence, the physical universe and its scientific investigation become critical components of humanistic inquiry. One cannot overemphasize the extent to which the new physics becomes drafted into the cause of a larger program of modernist revaluation in this magazine devoted to the individualist philosophy of Nietzsche.

Indeed, two paragraphs later Marsden makes the case for a science-driven revaluation of values even more explicitly, in a way that will sound much like the press coverage of Eddington's address more than a year and a half hence. The epigraph of this article bears repeating:

The bases of our physics seemed to have been put in permanently and for all time. But these bases dissolve! The hour accordingly has struck when our conceptions of physics must necessarily be overhauled. And not only these of physics. There must also ensue a reissuing of all the fundamental values. The entire question of knowledge, truth, and reality must come up for reassessment. Obviously, therefore, a new opportunity has been born for philosophy, for if there is a theory of knowledge which can support itself the effective time for its affirmation is now when all that dead weight of preconception, so overwhelming in Berkeley's time, is relieved by a transmuting sense of instability and self-mistrust appearing in those preconceptions themselves. (51)

What she regards as the new uncertainties of science, “a transmuting sense of instability and self-mistrust,” seem to her a liberating opportunity for a new epistemology and metaphysics. The rhetoric employed in this segment continues the previous installment's response to “Proteus” and its Berkeleyan ruminations. For the next twenty months her essays will directly address the question of how new scientific uncertainties affect notions of reality, truth, knowledge and the role of language. These explorations, overtly grounded in new developments in astronomy and physics (specifically mechanics), perform the same operations Joyce will execute in the content and structure of “Wandering Rocks,” namely a concentrated focus on the nature of events.

In addition to Marsden's references to the Einsteinian revolution in physics, the April 1918 number features some content that establishes a discourse about the science of space and time in literature. Marianne Moore's poem “Black Earth,” immediately following Marsden's essay, ends with some gorgeous imagery comparing the majesty of an elephant to that of time, matter, and electricity (55). The poem is in turn juxtaposed with May Sinclair's study of Dorothy Richardson's novels, which foregrounds the representation of time, space, and inner experience in novel form. The essay reviews *Pointed Roofs*, *Backwater*, and *Honeycomb* for their treatment of time and reality through the use of stream-of-consciousness narrative and the abandoning of generic novel form. She ultimately compares Richardson's techniques to Joyce: “Miss Richardson has not plunged deeper than Mr. James Joyce in his *Portrait of the Artist as a Young Man*” (57).

They say that they have no beginning and no middle and no end, and that to have form a novel must have an end and a beginning and a middle. We have come to words that in more primitive times would have been blows on this subject. There is a certain plausibility in what they say, but it depends on what constitutes a beginning and a middle and an end. In this series there is no drama, no situation, no set scene. Nothing happens. It is just life going on and on. It is Miriam Henderson's stream of consciousness going on and on. And in neither is there any grossly discernible beginning or middle or end.

In identifying herself with this life, which is Miriam's stream of consciousness, Miss Richardson produces her effect of being the first, of getting closer to reality than any of our novelists who are trying so desperately to get close. No attitude or gesture of her own is allowed to come between her and her effect. Whatever her sources and her raw material, she is concerned and we ought to be concerned solely with the finished result, the work of art. (58)

Sinclair's focus on the stream of consciousness as getting close to actual time, which in reality is an undifferentiated stream, highlights narrative as an arbitrary demarcation. Richardson's technical experiments remove conventional markers, thereby arriving at a closer version of reality. Though the technique is praised for being new, the novel is still regarded as the primary genre of realism and in that sense continues much of the pre-war discourse in *The Egoist* that considers it an essentially scientific medium. Obviously, Joyce was making his own headway with the stream of consciousness technique, which as Sinclair indicates inherently questions the nature of events. But “Wandering Rocks” takes that questioning even further by presenting many beginnings, middles, and ends, sometimes multiple and varying iterations of the same ones. Hence, the close arrangement of Marsden, Moore and Sinclair shows a deliberate editorial focus on philosophical questions of time and space, highlighting the different manners in which various genres and disciplines address them.

Even more interesting is that Sinclair's piece on Richardson appeared in *The Little*

Review under the same title and in the same month. The version published in the American magazine is longer and more iconoclastic in tone, while its analyses are more explicit about realism, idealism and the formerly hard distinction between objectivity and subjectivity in literature. More importantly, it is more detailed, makes more use of examples, and the section on event and order is far more considered.

The moments of Miriam's consciousness pass one by one, or overlapping, moments tense with vibration, moments drawn out fine, almost to snapping point. On one page Miss Richardson seems to be accounting for every minute of Miriam's time. On another she passes over events that might be considered decisive with the merest slur of reference. She is not concerned with the strict order of events in time. (7)

As an example, Sinclair draws on the opening of chapter three in *Honeycomb* that details Miriam's piano practice, stating that

if you want to know on what day she is practising you have to read on and back again. It doesn't matter. It is Miriam's consciousness that is going backwards and forwards in time. The time it goes in is unimportant. (7-8)

In this version Sinclair addresses the overlapping or interlacing of time, in other words of non-seriality, in addition to the seriality of the stream of consciousness. This heterochronicity, which is not referred to in the *Egoist* version, is actually closer to Einstein's special theory, though most likely does not derive from it. Regardless, the overlapping technique requires the reader to press ahead and then return in order to figure out the chronology of Miriam's piano practice, which is a trait it holds in common with the intrusion technique of "Wandering Rocks."

Other pieces in this number of *The Little Review* also explore the overlapping of time in urban space with astronomic overtones. An article by Ezra Pound titled "Reflexions" provides a quote from Jules Romains about the individual vs. the state in social and city life. While that conflict constitutes the core theme of "Wandering Rocks," what is more interesting is that Romains compares the city inhabitants to astronomic bodies, advocating the scientific observation of social connections for a new humanistic appreciation. Such observations "uphold the laws of a science which struggles manfully to be scientific" (28). And once we realize that fact, then "we must know the groups that englobe us, not by observation from without, but by an organic consciousness" (28). The characters of "Wandering Rocks" are similarly "englobed" in groups by the parallactic observations of the narrator and the intrusion technique, which makes connections based on a scientific model to create a more whole and unified collation of the social and individual orders. Thus, Pound's piece continues the discourse of the individual in the city, with the social and interpersonal connections arrayed in terms of astronomic bodies that began in the March 1918 number.

Later in this same issue, Ben Hecht's³³ prose-poem, "Fragments," makes a powerful connection between the spirit of the modern city and the astronomic universe that is similar to Pound's excerpt from Romains. It also continues the theme of overlapping time from Sinclair's essay. Hecht's piece could almost certainly be a source for "Wandering Rocks," as Joyce would have seen it beginning on the same page where the installment of "Nestor" ends. "Fragments" is a vivid account of the motions of city life, the "fragments of the monstrous multiple" "about which there is some weird phrase which has never been born" (48, 46).

There is something about the whole shouting, sweeping interlacing arrangement of eyes

and masonry-lettered store windows and moving feet which accompanies me like an unborn dream.
The man walking here. The woman walking there. The crowd.
The old horse and the cab which rushes by and carries away the oval-tinted face.
They become a part of my thought.
Multiplied by a million they shift and move within my brain, the simple and insufferable parts of chaos. (46)

While this passage and others like it capture the multiplicitous, “interlacing arrangement” of the city in a manner similar to “Wandering Rocks,” the latter portion of the piece portrays the oncoming of night, “[t]he Madonna of the spaces” (48).

What is the eternal unknown with its bogeymen compared to this vaster and more perfect physical oblivion?
The monstrous detachment of each tiny thing about me from myself is greater than the spaces of the stars. (48)

For the narrator of Hecht's piece, the “multiple mechanism of this unknown” (48) has allurements that “challenge more than the mystery of sun rising or stars shining” (49). The sensibility of urban living described here is one of physical detachment in which the subject feels infinitesimal and insignificant as if in relation to the cosmos. The hostile environment of the city, also a theme of “Wandering Rocks,” is compared metaphorically to that of the cosmos. Thus, the April 1918 number of *The Little Review* arranges a variety of materials from Sinclair, Pound and Hecht that explore the experience of modernity by blending the city and astronomy with experimental uses of space and time. In that way, perhaps through the Pound connection, *The Egoist* is invested in the same connections during that month.

“Fragments” is followed in the May 1918 *Little Review* with another city piece by Hecht, titled “Nocturne,” which again immediately follows Joyce's installment (this month, “Proteus”). It continues the notion of the city as hostile environment and makes many astronomic comparisons.

On this night I walked with my thoughts full of the grimaces of the little greedy half-dead become now no [sic] preposterously silent. Through the little empty labyrinths of stone the centuries sighed their desolation. Yellow and lonely advertisements burned here and there above invisible roofs, and I observed that the buildings which were so important by day, the great perforated [sic] rectangles of stone, the streets that fulfilled the mighty functions of traffic, lay under the stars like some gloomy, useless [sic] toyland. The city was an anachronism in the night. Silence with its dark and enigmatic face stared at the sky. The moon made inanimate blue fire-flies of the windows. (46)

Several aspects of this passage are consistent with “Wandering Rocks,” particularly the emphasis on the labyrinth, which is one of the keywords in Joyce's schema, and the geometric rendering of its topography. The notion of the city as an anachronistic field is exactly what Joyce achieves through the narrative technique in “Wandering Rocks,” though his rendering of Dublin is perhaps less alienated than Hecht's scene. Still, Joyce and Hecht both use astronomy to evoke the physicality of being, using astronomic metaphor to portray the vanity of civilization as emblemized in the city. This desolate view becomes more pronounced in both magazines as the end of the war nears.

The May 1918 *Egoist* introduces a new association of science with both literature and criticism, which will last until the magazine's closure. A column by T. S. Aptyeryx (actually T. S. Eliot) called “Observations” equates the crises of Western Civilization with

“journalese,” which “cannot either in allegories or in direct speech think clearly” (69). Picking up Marsden's philosophical arguments, his solution states that “[w]hat we want is to disturb and alarm the public: to upset its reliance upon Shakespeare, Nelson, Wellington, and Sir Isaac Newton; to point out that at any moment the relation of a modern Englishman to Shakespeare may be discovered to be that of a modern Greek to Æschylus” (69). It is significant that Eliot blasts Newton as one of the stagnating influences of Western Civilization, as it echoes the central conflict of “Wandering Rocks” and bolsters the magazine's preference for new physical theories. Eliot goes further in the June-July number, where he insists that “[a] poet like a scientist, is contributing toward the organic development of culture,” and that he likewise must “know the work of his predecessors or of men writing in other languages”³⁴. Eliot's pattern of comparing literature and criticism to science culminates—with the magazine's culmination—in the famous essay “Tradition and the Individual Talent.” Many of Eliot's pieces in *The Egoist* develop the notion that literature, science, and civilization are all in need of continual renovation for the avoidance of stasis and stagnation. The continual motion and Greek basis of “Wandering Rocks” can be seen to answer that need.

Other selections from Marsden's essays in the June-July through November-December issues show an overall awareness of Einsteinian mechanics, which she applies to her arguments about “salving” civilization by making a new one along the lines of individualism. In the August number she claims that “the physicist is revealing all forms, those of mass equally with those of free forces,” citing the “mass of evidence recently forthcoming relative to the disintegration and constitution of the atom”³⁵. The notion that a minuscule amount of matter contains a massive amount of energy was put forth by Einstein in the now-famous equation $E=mc^2$. In the same essay she also argues against simultaneity, especially in astronomic events, which is another tenet of Einstein's special theory (92). She additionally reminds her readers that “the generalizing mind does not live and work in a featureless vacuum but in a world presenting geometrical forms and motor-forces of very pronouncedly individualised character” (93). This statement continues her characterization of the new-physical universe as marked by individualized attributes, an element in common with her view of humanity and something that has foregrounded in “Wandering Rocks.” In the September 1918 number she refers to several aspects relating to the “baffling effects of space”³⁶ in relativity, including the denial of a fourth dimension (which she seems to confuse as a fourth dimension of space rather than of time, as Einstein held) (103); positing that there is no ether (the absence of an ether was part of the hypothetical framework of Einstein's theory) (104); and the notion of gravity as the “warp of the universe athwart which space must interweave itself according as it can” (104). Though Marsden was clearly enthralled by the new physics, she sometimes found the immensity of the universe and its philosophical possibilities to be overwhelming, “to render the novice almost giddy and faint” (“Organic Determination” 91).

All of this sometimes led her, like other contributors to these two magazines, to the feeling that humanity is insignificant in light of the new astronomic understanding.

As an instance of what is meant there are the facts of astronomy. It is not too much to say that the human mind is literally bullied by the wealth of astronomical phenomena. When men read of some new telescope which is able to bring at a stroke a hundred million new suns into their ken³⁷, although this instrument is man-made, they remain unmistakably depressed. What is its meaning? It is the sense of the existing powerlessness of the spatial

power to bring men into anything approaching intimate connexion and contact with the new substantial elements. Man's universe has so swiftly expanded that he is overwhelmed with his impotence to overrun and reduce it. The intellect is no longer able to hold an even rein over the necks of the forces it commands. The result is strain and discouragement. ("Space and Substance" 105)

Her antidote is the symbol, which has the ability to connect the human mind not only with reality, but with the past stores of time that are no longer present. By the November-December issue, just when Joyce would likely have been making his final collations for "Wandering Rocks," Marsden was able to synthesize all of her foregoing thoughts on the new physics and its ramifications into "the salvaging power of signs," with which "such sciences as mathematics, chemistry, and physics... [revive] with transforming effect the details of a story already once told..."³⁸ Einstein's physics, with its multiple limited perspectives and flexible time, was a primary source for her metaphysics that sought a renewed outlet for liberty. "Wandering Rocks" employs the same principles as Joyce sought a new direction both for *Ulysses* and humanity.

Conclusion

By the time "Wandering Rocks" emerges in the June and July 1919 numbers of *The Little Review*, it participates fully in the discourse of urban physics, astronomic metaphor, and avant-garde politics of modernist magazine culture. Joyce's exploration of the nature of events almost certainly derives from the variety of pieces he found there. While this article has taken pains to show the presence of Einsteinian mechanics in "Wandering Rocks," it must be asked just what that means. It remains doubtful that Joyce would have incorporated aspects of the relativity theories with the knowledge that Einstein was their author. Rather, relativity seems to have trickled, via Dora Marsden, into the English language magazines that Joyce read as they serialized *Ulysses*, and from there entered his work as he borrowed or unconsciously absorbed them. New information, including undiscovered *avant-texte* of "Wandering Rocks," might yet arise to shed light on Joyce's relationship with physics.

Still, at the time he finished drafting the episode, his direct knowledge of the new physics was not far off. By 1921 he actively sought to shape his public image in association with Einstein, asking Valery Larbaud to mention him in his lecture at Shakespeare & Company and urging Eliot to further his comparisons in criticism, resulting in the essay "Ulysses, Order, and Myth." Einstein continued to be a source for *Work In Progress* as the principle for unifying Shaun and Shem as embodiments of space, time, and other human attributes. The humanistic appeal of the new physics helped to shape a large portion of modernist culture, including Joyce's books.

- 1 John Bishop, "Vico's 'Night of Darkness': The New Science and Finnegans Wake," *James Joyce: A Collection of Critical Essays*, Ed. Mary T. Reynolds, New Jersey: Prentice-Hall, 1993: 180-95; Marcel Brion, "The Idea of Time in the Work of James Joyce," Trans. Robert Sage, *Our Exagmination Round His Factification for Incamination of Work In Progress*, 2nd Ed. London: Faber and Faber, 1961: 23-33; Harry Burrell, "Chemistry and Physics in Finnegans Wake," *Joyce Studies Annual* 7 (1996): 192-218; Harry Burrell, "Chemistry and Physics in Finnegans Wake, Part II," *Joyce Studies Annual* 8 (1997): 185-206; Luca Crispi, "The Mechanics of Creativity: A Generic Study of James Joyce's Finnegans Wake II.2," *DAI* 61:12 (2001): 4768; Edward J. Cronin, "'Science Bites the Dust'. An Analysis of FW: 415.15-19," *A Wake Newslitter: Studies in James Joyce's Finnegans Wake* 15 (1978): 24-7; Andrzej Duszenko, "The Joyce of Science: New Physics in Finnegans Wake," *DAI* 51:3 (1990): 861A; Andrzej Duszenko, "The Joyce of Science: Quantum Physics in Finnegans Wake," *Irish University Review: A Journal of Irish Studies* 24:2 (1994): 272-82; Andrzej Duszenko, "The Relativity Theory in Finnegans Wake," *James Joyce Quarterly* 32:1 (1994 Fall): 61-70; Michael Emanuel Goldberg, "Moving Bodies: James Joyce and the 'Newphysics'," Diss. U of Illinois Urbana-Champaign, 2000; Michael Langdon, "Some Reflections of Physics in Finnegans Wake," *James Joyce Quarterly* 17 (1980): 359-77; Margot Norris, *The Decentered Universe of Finnegans Wake: A Structuralist Analysis*, Baltimore: Johns Hopkins UP, 1976; David Overstreet, "Oxymoronic Language and Logic in Quantum Mechanics and James Joyce," *Sub-stance* 28 (1980): 37-59; Elliot Paul, "Mr. Joyce's Treatment of Plot," *Our Exagmination Round His Factification for Incamination of Work In Progress*, 2nd Ed. London: Faber and Faber, 1961: 129-37; S. B. Purdy, "Let's Hear What Science Has to Say: Finnegans Wake and the Gnosis of Science," *The Seventh of Joyce*, Ed. Bernard Benstock. Bloomington: Indiana UP, 1982; Thomas Jackson Rice, *Joyce, Chaos, and Complexity*, Urbana: U of Illinois P, 1997; Dirk Vanderbeke, "Physics, Rhetoric, and the Language of Finnegans Wake," *The Languages of Joyce: Selected Papers from the 11th International James Joyce Symposium*, Venice, 12-18 June 1988, Eds. Rose Maria Bolletieri Bosinelli, C. Marengo Vaglio and Chr. van Boheemen, Philadelphia: Benjamins, 1992: 249-64. Further quotations will be cited parenthetically in the text.
- 2 M. Keith Booker, "Joyce, Planck, Einstein, and Heisenberg: A Relativistic Quantum Mechanical Discussion," *James Joyce Quarterly* 27:3 (1990): 577-586; Joseph A. Buttigieg, "The Struggle against Meta (Phantasma)-Physics: Nietzsche, Joyce and the 'Excess of History'," *Boundary 2: An International Journal of Literature and Culture* 9:3 (1981): 187-207; Avrom Fleishman, "Science in Ithaca," *Wisconsin Studies in Contemporary Literature* 8:3 (1967): 377-91; Alan J. Friedman, "Ulysses and Modern Science," *The Seventh of Joyce*, Ed. Bernard Benstock, Bloomington: Indiana UP, 1982: 198-206; Michael Partrick Gillespie, "(Meta)physics and 'the Portals of Discovery': Literary Criticism and the New Physics," *James Joyce Quarterly* 34:4 (1997): 597-612; John Hannay, "The Throwaway of 'Wandering Rocks'," *James Joyce Quarterly* 17 (1980): 437; Ihab Hassan, "Joyce and the Gnosis of Modern Science," *The Seventh of Joyce*, Ed. Bernard Benstock, Bloomington: Indiana UP, 1982: 185-190; Alan David Perlis, "The Newtonian Nightmare of Ulysses," *The Seventh of Joyce*, Ed. Bernard Benstock, Bloomington: Indiana UP, 1982: 191-197; David W. Robinson, "Stephen Dedalus' Physics Lesson," *James Joyce Quarterly* 24:3 (1987): 359-360; Mario Salvadori and Myron Schwartzman, "Musemathematics: The Literary Use of Science and Mathematics in Joyce's Ulysses," *James Joyce Quarterly* 29 (1992): 339-55; Stephen Whittaker and Francis X. Jordan, "The Three Whistles and the Aesthetic of Mediation: Modern Physics and Platonic Metaphysics in Joyce's Ulysses," *James Joyce Quarterly* 33:1 (1995): 27-47. Further quotations will be cited parenthetically in the text.
- 3 See note v below for an explanation of the experiment and its import.
- 4 Frank Budgen, *James Joyce and the Making of Ulysses*, Bloomington: Indiana UP, 1973: 121. Further quotations will be cited parenthetically in the text.
- 5 Parallax is the apparent displacement of an object when viewed from two or more points. An everyday example of parallax is in human stereoscopic vision. If you look at an object and place a hand over one eye, and then place that hand over the other eye, the object will appear to jump to the left or right. As well, you will probably see more of the left or right side of the object depending on which eye is viewing it at a given time. Parallax is a standard observation technique in astronomy, as scientists often collate data obtained from different telescopes at the same time of day. During the solar eclipse of May 29, 1919, Eddington obtained measurements of the locations of two stars beyond the Sun from one telescope at the South Pole and another on the Equator. The data were different enough to conclude that the light rays emanating from the stars traveled in curvilinear paths through the warped space around the Sun, suggesting the verity of Einstein's general theory of relativity. Full details can be read in Eddington's *Report on the Relativity Theory of Gravitation*, originally published in 1920 but recently reprinted in 2006 by Dover Publications, Inc. of Mineola, NY.
- 6 Jason and the Argonauts are perhaps the best known heroes to have surmounted this danger, suffering only minimal damage to the stern of the Argo, which in Joyce's epic has its analog in the presentation of "Almidano Artifoni's sturdy trousers swallowed by a closing door" that culminates the episode (U 10.1281-2). In the *Odyssey*, the goddess Circe tells Odysseus he may contend either with Scylla and Charybis or with the Wandering Rocks. Though Odysseus opts for the former, Joyce also decided to include the latter.
- 7 James Joyce, *Ulysses: A Facsimile of the Manuscript*, Vol. 1, New York: Octagon Books, 1975. The "Wandering Rocks" MS will be cited by its own page numbers.
- 8 "'The Hand that Wrote Ulysses' and the *Avant-Texte* of 'Wandering Rocks,'" *Genetic Joyce Studies* 7 (Spring 2007): <<http://www.geneticjoycestudies.org/GJS7/GJS7crowley.html>>.
- 9 Joyce requests a copy in a letter to James B. Pinker of June 9, 1918 (*Letters I* 114-115).
- 10 Joyce acknowledges receiving the latter two in a letter to Harriet Shaw Weaver of July 29, 1918 (*Letters I* 115-116).
- 11 Letter to Harriet Shaw Weaver, October 26, 1918 (*Letters I* 120-121).
- 12 Postcard to James B. Pinker, August 21, 1918 (*Letters II* 419).
- 13 Richard Ellmann, *James Joyce*, New York: OUP, 1983: 443 and letter to Harriet Shaw Weaver of July 29, 1918 (*Letters I* 115-116).
- 14 Joyce read Pound's articles in the May and November 1918 numbers. Forrest Read, *Pound/Joyce: The Letters of Ezra Pound to James Joyce, with Pound's Essays on Joyce*, New York: New Directions, 1970: 133-141, 141-143.
- 15 Letter to Harriet Shaw Weaver, October 26, 1918 (*Letters I* 120-121).
- 16 Ellmann 443.
- 17 Letter to Harriet Shaw Weaver, July 29, 1918 (*Letters I* 115-116).
- 18 Letters to Harriet Shaw Weaver of July 29, 1918 and October 16, 1918 (*Letters I* 115-116, 120-121).

- 19 Bernard Gheerbrant, *James Joyce, sa vie, son oeuvre, son rayonnement*, Paris: La Hune, 1949. This book is not paginated; its entries are numbered. Further quotations will be cited parenthetically in the text.
- 20 *Letters II* 395, *Letters III* 32, Ellmann 400.
- 21 *Letters II* 377.
- 22 *Letters II* 377.
- 23 Ellmann 414.
- 24 *Letters I* 102.
- 25 *Letters I* 103.
- 26 *Letters I* 103.
- 27 “Observations,” *The Egoist* 5:5 (May 1918): 69.
- 28 Thaine Stearns, “‘Woman of No Appearance’: James Joyce, Dora Marsden, and Competitive Pilfering,” *Twentieth Century Literature* 48:4 (Winter 2002): 461-486.
- 29 Jane Lidderdale and Mary Nicholson, *Dear Miss Weaver*, New York: Viking, 1970: 146. Further quotations will be cited parenthetically in the text.
- 30 In the material that follows, Marsden's discussion of Einsteinian mechanics before it had been popularized constitutes strong evidence that she was well acquainted with original scientific literature. The most likely source was her former mentor at the University of Manchester, Samuel Alexander, a metaphysician and mathematician very knowledgeable in science. Later, in 1920, he published *Space, Time, and Deity*, a theory of metaphysics that takes into account the relativity theories after they were expounded in Eddington's address. Dora kept up a correspondence with Alexander for much of her life, and he later read and provided feedback on a draft of *The Definition of the Godhead*, though more research into her papers is needed to establish the extent and timing of her knowledge. Among her papers for *The Egoist* at Princeton University is a letter (Box 4, folder 4A) that suggests not only a continual correspondence with Alexander during the war, but the potentially revolutionary impact of certain kinds of science.

“Dalton Hall,
Victoria Park,
Manchester.

9/11/16.

My dear Margaret,

Now that I have got settled down—more or less—in Manchester & have a little leisure for reading & study, I should be so grateful if you would let me have some more copies of the “Egoist.” I am very anxious to get on with those articles on “Lingual Psychology” by Dora Marsden which I had just begun when an unkind Fate packed up my caravan for me & drove me forth an Ishmael to emulate the actions of a mutual friend of ours, to go to & fro in the world, & wander up & down in it! But, to ascend from the ridiculous to the sublime, I think the articles in question are great, although my knowledge of them is not sufficiently great to make criticism very valuable as yet. But the little I have read interested me immensely. I have always had the fear that to wander in the Elysian fields with Locke & Berkeley, with Kant & Leibnitz & all the other Immortals was like to prove after all but a weary chain of interlocked circles, whilst I also cherish the fear that many psychologists—not least myself (!)—are in danger of becoming as “scientific” as the rest of the wise fools of this utilitarian age. But “Lingual Psychology” seems to me likely to prove a brilliant connecting link between many hitherto isolated conceptions; anyhow, I'd be grateful for the opportunity of further acquaintance with the articles, so trot 'em along! I want to shew them to Graham too; we've had many a “scrap” over Philosophy & Psychology, & I know he'd be interested to see that something good can come out of Nazareth after all! I wonder if Prof. Alexander has seen them—I must ask him what he thinks about the daring way in which she “tells off” certain reverend gentlemen!

Yours,
Burly.

_____ [line slanting up to the right]”

It is not yet known who Margaret or Burly were, but the letter refers to John William Graham, a mathematician and principle of Dalton Hall at Owens College before its incorporation into the University of Manchester. At the very least, the letter indicates that Alexander kept up with his former pupil's efforts. During the mid-1920s, when Marsden was working on *The Definition of the Godhead*, she asked Harriet Shaw Weaver to acquire original scientific materials on chemistry, electricity, and other physical disciplines. The exchange sparked Weaver's own personal interest in space-time, which for a time was to be put to fruition as an appendix to one of Dora's later book projects, though it was never published.

- 31 Don Gifford and Robert J. Seidman, *Ulysses Annotated: Notes for James Joyce's Ulysses*, Berkeley: U of California P, 1988: 44, 45.
- 32 “The Subject Notebook: A Nexus in the Composition History of *Ulysses*—A Preliminary Analysis,” *Genetic Joyce Studies* 7 (Spring 2007): <<http://geneticjoycestudies.org/GJS7/GJS7mierlo.html>>.
- 33 Hecht was an American novelist and short story writer, journalist, and award-winning screenwriter originally based in Chicago. He was sent to Berlin at the end of WWI to cover the revolutionary events in Germany (1918-1919). He knew Margaret Anderson personally and contributed to *The Little Review* as well as *The Smart Set*, which Joyce also knew. Murry Beja informed me during the 2009 North American James Joyce Conference in Buffalo that Hecht wrote the 1927 film *Underworld* in which one of the chief villains was the gangster “Buck” Mulligan, played by Fred Kohler.
- 34 “Contemporanea,” *The Egoist* 5:6 (June-July 1918): 84.
- 35 “Our Philosophy of the 'Real' (*continued*) III. The Organic Determination of Our Science of Mechanics,” 5:7 (August 1918): 91. Further quotations will be cited parenthetically in the text.
- 36 “Our Philosophy of the 'Real' (*continued*) IV. Space and Substance,” *The Egoist* 5:8 (September 1918): 102. Further quotations will be cited parenthetically in the text.

37 Apparently a reference to the piece "Astronomy" by X. in the March 1918 *Little Review*. See above.

38 "Philosophy: The Science of Signs XVII. Truth I. Its Objective," *The Egoist* 5:10 (November-December 1918): 127. Marsden's ellipsis.