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Scott C. Taylor

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Introduction

In the wake of Thomas Kuhn's 1962 publication *The Structure of Scientific Revolutions*, the scientific discipline was forced to rethink not only the way it handles research but the greater history of science itself. In the psychoanalytic discipline, many scholars have made use of Kuhn's work to justify shifts in psychoanalytic traditions (Knight, 1985; Mitchell, 1993; Forrester, 2007; Elad-Strenger, 2013). However, few have attempted to point out the relation between Kuhnian science and the psychoanalytic process. Before Kuhn and his descriptions of anomalies and crises that bring about paradigm shifts and scientific revolutions, there were the necessary developmental crises and eventual ego restructurings of the psyche given to us by psychoanalytic psychology. In the discussion that follows we will learn how psychoanalysis, through Kuhn's own psychoanalytic treatment, revolutionized science.

For Thomas Kuhn, the structure of scientific revolutions consists of developmental pattern of normal science, an influx of anomalies, a crisis in normal science, and a resulting paradigm shift. During periods of normal science, great strides are made because questions related to the first principles from which the science bases its inquiries are settled, and as a result all phenomena contrary to the established norms are ignored. Kuhn (1962) calls the phase in which normal science is conducted without questions to its foundations or first principles a period of *puzzle-solving*. The foundation of normal science, as a basic set of concepts and experimental practices, serves as an exemplar or paradigm to successful puzzle-solving (Kuhn,

1962). But when anomalies become too great and shake the science's foundations, scientists become unsettled with their paradigm and search for a greater understanding of the anomalous behavior. No longer can the scientist try to complete the puzzle, as the available pieces no longer seem to fit the puzzle itself. Filled with doubts about how to proceed, a crisis occurs. The puzzle and its pieces need restructuring, and for this reason scientists seek "extraordinary" help, sometimes outside of the science in question. Kuhn states, "The proliferation of competing articulations, the willingness to try anything, the expression of explicit discontent, the recourse to philosophy and debate over fundamentals, all these are *symptoms* of a transition from normal to extraordinary research" (1962, p. 91, emphasis added). Through these symptoms, scientists search the depths of all possible understanding to come to terms with these anomalies, sometimes overhauling all past scientific theory. In so doing, they shift their past understanding of science and the world itself and foster a scientific revolution: a new way to understand ourselves in the world.

When viewed psychoanalytically, this process shares many similarities with those individuals who seek therapy. The individual who sees nothing wrong in a symptom—a neurosis that can be dealt with—goes about her life working around, solving the puzzles of some irregular, perhaps unwanted, behavior. It is only when those behaviors become unsettling, incapable of being given meaning, solved, that a personal crisis may occur.¹ This crisis may lead the individual to seek help and go into analysis, and in a very general way, to inquire about her growing anomalous behavior. Supposing the analysis were successful, in leaving treatment the individual has changed dramatically with a profound shift in how she views herself and the world.

The following is an articulation of why the general developmental process of Kuhn's scientific revolutions and the individual process of psychic restructuring made intelligible to us by psychoanalytic psychology—particularly that of the theoretical writings of psychoanalyst Hans Loewald—may share more commonalities than we presently afford them. Before discussing the developmental and structural relationships between the psychoanalytic and scientific processes, let us begin with a brief intellectual history of Kuhn's relationship between the two.

**Putting It All on the Record:
Kuhn's Indebtedness to Psychoanalysis**

Thanks to a publication by historian of science and former student of Thomas Kuhn, John Forrester (2007), we now know Kuhn grew up in an environment that embraced the psychoanalytic discipline. His grandfather, it is believed, spent some time under the analysis of Alfred Adler in Baltimore; his mother had edited several books by Karen Horney; his paternal aunt, a psychologist in Cincinnati, was associated with the city's psychoanalytic community; and his youngest son became a psychiatrist practicing psychodynamic psychotherapy (Forrester, 2007). Even more telling, during his time at Harvard, Kuhn befriended Joe Weiss, a medical student who after earning his degree sought psychoanalytic training, eventually becoming an administrator at the San Francisco Psychoanalytic Society (Forrester, 2007). Kuhn and Weiss had a lifelong friendship, with their families often meeting for dinners (Forrester, 2007). One can imagine them having deep and penetrating discussions of their respective intellectual interests, sharing and exchanging the ideas that shaped their work and practice. Finally, while teaching at Princeton, Kuhn often met with the members of the Institute for Advanced Psychoanalytic Studies, even giving several talks to the group (Forrester, 2007).

In an autobiographical interview at the University of Athens in 1995, Kuhn insisted that there was something that he "*should* put on the record," notably that during the years leading up to and following the completion of his dissertation, he was, "also doing something else" (Kuhn, 2000, p. 280). We are told that around the same time, during his graduate studies in physics at Harvard and at the recommendation of his mother, Kuhn began analysis, without disagreement. We also know that this analysis came out of a concern of his mother's that Kuhn was having difficulties establishing relationships with women (Forrester, 2007). In addition to his dating woes, he tells us of the indecisiveness he had not only toward his research topic but toward his future in the academic profession (Forrester, 2007). His (first) analysis ended around two years later, in 1948, coinciding with the completion of his dissertation and his mar-

riage to his first wife (Forrester, 2007). One may assume that his analysis was, at least, partially successful.

We also know that while he disagreed with psychoanalysis in theory, Kuhn found the technique “interesting as hell” (Kuhn, 2000, p. 280). Looking back, he states:

I think myself, I’d have great trouble documenting this, but I think myself that a lot of what I started doing as a historian, or the level of my ability to do it—“to climb into people’s heads,” is a phrase I use then and now—came out of my experience in psychoanalysis. (Kuhn, 2000, p. 280)

And, as he goes on to say, for this reason he owes his analysis “a tremendous debt.”

Though at times he expresses ambivalent feelings to Freud’s theoretical postulations, we must ask ourselves why Kuhn felt compelled to disclose not only his knowledge of and sympathy toward but his *indebtedness* to the discipline of psychoanalysis? What about Kuhn’s work deserves such a debt?

A Review of the Literature on Kuhn and Psychoanalysis

Before attempting to answer such questions, let us review those few authors whose discussion of Kuhnian science alongside psychoanalysis might lead us in the right direction. As noted in the introduction, there is plenty of literature that makes use of Kuhn’s work to justify historical shifts in psychoanalytic traditions (Knight, 1985; Mitchell, 1993; Forrester, 2007; Elad-Strenger, 2013). Seemingly in opposition to this trend, Spruiell (1983) contends that psychoanalysts, in hopes of achieving the “prestige of science,” too often wrongly apply the loose, often trivialized interpretations of paradigm and scientific revolutions, reducing their meaning to “pretentious clichés.” However, Spruiell (1983) goes on to argue that if psychoanalytic writers take Kuhn’s later, more developed formulation of paradigm as disciplinary matrix², as a constellation of group commitments within a scientific community, then psychoanalysis, with its

training analysis, schools, and conferences, “resembles” such a disciplinary matrix. Here, Spruiell returns to the frequent claim that Kuhn’s model can be appropriated, to some degree, to historical-scientific descriptions of the psychoanalytic movement. Existential psychologist Elad-Strenger’s (2013) argues that his discipline can add to Kuhn’s scientific model by emphasizing the existential significance of paradigms as worldviews. A worldview in Kuhn’s sense is more than just an existential, radically subjective way in which any individual views the world. In the sense that a worldview is a paradigm it carries with it the weight of a normative disciplinary matrix within a normal science, “shared by the members of a given community.” (Kuhn, 1962, p.175). Emphasizing a disciplinary matrix, Elad-Strenger (2013) then gives examples of existential analyses of paradigm changes in cognitive theory and psychoanalysis. With that, Elad-Strenger avoids the risk of perpetuating the very trivialized notion of paradigm that Spruiell (1983) warns against. Nonetheless, Elad-Strenger (2013) makes an effort to expand Kuhn’s version of paradigm as a scientific worldview to include the culture of any individual or community. This expansion runs the risk of either jettisoning objective reality altogether or watering it down so much that science loses its authority to truth claims; thus, going against Elad-Strenger’s own endeavor to heighten existential psychology’s claim to scientific validity by appropriating Kuhnian science with existentially-informed empirical research.

What can be taken away from the above studies to help us better understand what left Kuhn so indebted to psychoanalysis? I contend that it is in the following two points. I agree with Elad-Strenger (2013) that a shift in paradigms can be perceived as an existential threat to one’s worldview, and I take the author’s general claim that psychodynamic processes can shed light on Kuhn’s developmental process of scientific change as the article’s strongest point. However, neither Elad-Strenger (2013) or Spruiell (1983) directly addresses how psychoanalysis has influenced Kuhn himself or his work. Spruiell emphasizes his wish to understand such an influence in the opening statement to his own study:

This is not the place to consider, in any sufficient detail, the discipline of psychoanalysis in the light of the work of T.S. Kuhn. Nor is it the place to attempt to understand Kuhn's work in the light of psychoanalytic understandings. Either endeavor would be worthy. (1983, p.353)

In this essay, I attempt such an endeavor.

Of all of the literature on the relation between Kuhnian science and psychoanalysis, only Forrester (2007) provides a sustained investigation of the influence of psychoanalysis on Kuhn. But even though he makes us aware of the historical significance that psychoanalysis played on Thomas Kuhn the man, Forrester believes that psychoanalysis had not made a lasting effect on Thomas Kuhn's work. After a detailed historical account of Kuhn's early encounter with psychoanalysis, Forrester nonetheless states:

There is still the question, did psychoanalysis have any enduring direct intellectual influence on Kuhn, independent of the transformation in his life in the period 1946–48 which was both personal and intellectual? The answer, almost certainly, is no. Despite his continuing to move in psychoanalytic milieus in both California and Princeton, there is little evidence of an influence on him of the order of his reading of Aristotle, the classic historians of science (Koyre, Maier, and so on), or of the unquantifiable influence of Fleck or Polanyi. As an individualist and mentalist, Kuhn of course looked to psychology of some sort to back up his account of crisis and revolutionary science; but it was Piaget and Kant, Bruner and Postman rather than theorists of the unconscious to whom he turned. Yet at one point, probably in the early 1950s, Kuhn was, with the encouragement of Weiss, at least considering using Freud as one of the case histories in the Conant general education course at Harvard, but eventually he told Weiss "that Conant did not like Freud" [...] I do not think one can make much of this attempt to bring Freud within the compass of the sciences with which Kuhn was concerned, nor is there any evidence that psychoanalytic thinking played any role in

the development of his own ideas, despite the fact that he would place emphasis on unconscious “preconceptions” or “prejudices” in science in the Lowell lectures of 1951 and later [...] Psychoanalysis considered as a theoretical system or useful set of research tools peters out. (Forrester, 2007, p. 789)

I find this highly doubtful, especially given Kuhn’s autobiographical comments mentioned above, which Forrester cites anecdotally but does not elaborate on. While Forrester’s claim may superficially ring true, my claim is the opposite: Thomas Kuhn’s structure of scientific revolutions is an implicit acknowledgment of psychoanalytic processes and an unconscious attempt at giving psychoanalytic credence to the development of scientific knowledge itself.

It is important to note the distinction between Forrester’s (2007) psychoanalytic account of Kuhn and my own. For Forrester, Kuhn’s psychoanalytic heritage lie in his lasting psychological orientation as demonstrated by his ability to “climb inside people’s heads.” What Forrester takes Kuhn to mean here is Kuhn’s psychoanalytic treatment provided him the psychological tools necessary to climb inside the heads of those authors he was reading. For Forrester, psychoanalytic treatment made Kuhn a better historian, being able to climb into the heads of revolutionary scientific authors, including his own. As Forrester notes, psychoanalysis “made Kuhn into the sort of historian he undoubtedly became—a historian who absolutely requires a one-on-one relationship of understanding with those historical texts he set out to understand, passing via the ‘head’ of the author or authors of the text” (2007, p. 789). To better understand this “individualistic and psychological method,” as Forrester (2007, p. 789) puts it, of climbing into the heads of others it is best to highlight Kuhn’s lifelong emphasis on the experience of his Aristotle epiphany. Whether hinted at in his early works (Kuhn, 1962, pp. 122–23) described in detail later in life (Kuhn, 1987, pp. 16–7), reiterated time and again to his own family, or emphasized in interviews (Forrester, 2007), this experience no doubt had a lasting influence on not only how he read, but how he thought. In “What are Scientific Revolutions?,” Kuhn reflects in detail his epiphany

while reading Aristotle's *Physics* for the occasion of gathering class material for non-scientists. He writes:

I approached Aristotle's text with the Newtonian mechanics I had previously read clearly in mind [...] But I found [the *Physics*] bothersome because, as I was reading him, Aristotle appeared not only ignorant of mechanics, but a dreadfully bad physical scientist as well [...] These conclusions were unlikely [...] Feeling that way, I continued to puzzle over the text, and my suspicions ultimately proved well-founded. I was sitting at my desk with the text of Aristotle's *Physics* open in front of me and with a four-colored pencil in my hand. Looking up, I gazed abstractedly out the window of my room—the visual image is one I still retain. *Suddenly the fragments in my head sorted themselves out in a new way*, and fell into place together. My jaw dropped, for all at once Aristotle seemed a very good physicist indeed, but of a sort I'd never dreamed possible. Statements that had previously seemed egregious mistakes, now seemed at worst near misses within a powerful and generally successful tradition. That sort of experience—the pieces suddenly sorting themselves out and coming together in a new way—is the first general characteristic of revolutionary change.³ (Kuhn, 1987, pp. 16–17, emphasis added)

Like that of a gestalt switch⁴, but in reverse from Newtonian mechanics to Aristotelian physics, a revolutionary science made sense to him. Notice Kuhn reiterates my point of emphasis, as if his psyche were restructured: “fragments in [his] head sorted themselves out in a new way.” Bearing in mind what we know of Kuhnian science, this is not simply a new way of reading a classical author, but a shift into a new worldview, a revolutionary change. It is also important to add that during the time of this epiphany, Kuhn was in analysis (Forrester, 2007). Reflecting on Kuhn's epiphany, Forrester poignantly writes of him: “science was first and foremost a work of the individual mind” (2007, p. 789). This point, let us not forget, can also be made for the physicist Thomas Kuhn.

Though I agree with Forrester that Kuhn's psychoanalytic treatment made him a better historian—for it is a fact that he did complete his dissertation by the end of his first analysis—I contend that there is much more to Kuhn's psychoanalytic heritage. Whereas Forrester's essay emphasizes how Kuhn's encounter with psychoanalysis influenced how Kuhn read texts, my account will emphasize how Kuhn's encounter with psychoanalysis influenced what he wrote. It seems Forrester pays little mind to the fact that Kuhn's *The Structure of Scientific Revolutions* is an attempt not only to give a better reading of scientific revolutionary authors, but more importantly, to rewrite what we call scientific knowledge, or more precisely, to rethink the reality of both ourselves and our world. Contrary to Forrester's assumptions, Kuhn's encounter with and influence by psychoanalytic psychology lasted much longer than did his dissertation years of 1946–48. This was a lifelong debt to psychoanalysis. It changed Kuhn as a person and shifted his worldview. Everything he wrote after reflected this.

To be sure, and in agreement with Forrester (2007) that any attempt at an analysis of Kuhn without dream or fantasy content is superficial and useless, my intent is not to give an analysis of Thomas Kuhn but to offer an account of his work as an unconscious wish to give a parallel description of the personal, that is to say, the psychical, revolutions that occurred during his time spent on the couch with his increased understanding of the history of scientific revolutions, which preoccupied his research during the same period of deep psychological reflection. With all pun intended, Kuhn had no escape but to couch the two ideas in some proximity to each other. It is for this reason that in disavowing the influence of psychoanalysis on his work, Kuhn had “great trouble documenting this.” Moreover, it is true that Kuhn had some understanding, and gave some validity to the unconscious, for in fact he describes himself as “an anxious, neurotic” who doesn't bite his nails but knows not why he doesn't bite his nails (Kuhn, 2000, p. 321). And, as Forrester (2007) notes, it is precisely this knowing that there are unknown reasons for his lack of self-identifying behaviors that declares a personal acknowledgment, not merely in theory, of unconscious processes.

Even more revealing is Kuhn's implicit acknowledgement of defensive unconscious processes as a necessary condition through a pre-crisis phase in the scientist's eventual formulation of revolutionary science where "a minor breakdown of the paradigm and the very first blurring of its rules for normal science" remains "largely unconscious" (Kuhn, 1962, p. 86). Understood through the lens of psychoanalytic psychology, Kuhn is describing the need for unconscious resistance to the existential threat that the scientist may be on the verge of discovering a new paradigm that reinvents his views of himself, his work, and the world which he is investigating. I gather that this is what Kuhn meant when he remarked in response to critic and fellow philosopher of science, Sir Karl Popper, regarding the distinction between normal science and revolutions: "Frameworks must be lived with and explored before they can be broken" (Kuhn, 1965, p. 242; Kuhn, 2000, p. 136).

Overcoming Scientific Resistances: Restructuring of Self and World in the Work of Thomas Kuhn and Hans Loewald

It is best to begin where there is common ground. Though, perhaps, not with its theory, Kuhn as we have mentioned, did agree with the technique of psychoanalysis. We also know that the cornerstones of psychoanalytic technique are acknowledging and coming to terms with transference and resistance. Since transference is in principle a form of resistance, and since we are now aware that resistance plays at least some role in Kuhn's understanding of the development of scientific revolutions, let us proceed with an emphasis on resistance.

Resistance, Freud once said, is that "which finally brings [analytic] work to a halt" (1950 [1892–1899], p. 266). Put simply, with resistance we cannot achieve clarity, we cannot inquire fully. That said, resistance is also an indicator and a "powerfully" (1905 [1901], p. 117). It points to the unconscious force that remains repressed. In *Inhibitions, Symptoms and Anxiety* Freud (1926 [1925]) distinguishes several ways that resistance manifests itself. For the sake of clarity, let us focus on the resistances of the ego.

Resistances of the ego occur in an effort to maintain the ego's structural hold. Pointing out a pattern in one's behavior meets resistance when the behavioral pattern is deemed, whether unconsciously or not, an insult or possible injury to one's ego, what Freud called "a psychological blow." In directing someone's attention to an anomalous behavior of thinking or acting, the analyst is met with resistance unless of course the ego can handle it; that is, unless it is not perceived as a blow to the ego.⁵ Considered in terms of analytic treatment, it is only when the analyst feels the analysand has developed enough insight to maintain his or her ego-syntonicity that there can be an account of the anomalous behavior. In other words, it is only through the arduous process of working-through that the anomalous behavior that "brings work to a halt" can be overcome, and some will say, sublimated. This is a standard account of the psychoanalytic process, of course, but the point is to understand resistance as a response to the threat of *restructuring* the ego. To respond with resistance is to dodge a blow that will shake one's very psychological foundations.

This call to understand the change in anomalous behavior as a change in the psychic structure itself was first articulated by psychoanalyst Hans Loewald (1951) in his groundbreaking article "Ego and Reality." In it, Loewald gave a reinterpretation of the psychological origins of ego and reality.⁶ Differing from Freudian tradition, Loewald postulated that we do not begin with an ego and a threatening outside world. Rather, we begin with one unifying whole—primary narcissism.⁷ Only with lifelong discrepancies from our environment can we gradually separate something like an ego from the external world, and an ego from an id and a superego (Loewald, 1951). Greater levels of organization, both psychically and externally, occur with greater levels of integration and differentiation with both outside and internal influences, creating a dynamic psychic structure and reality (Loewald, 1951). Thus, for Loewald (1951), there is an integral relation between the structural changes of our ego and the modified reality which accompanies them. Understood in this way, a change in anomalous behavior is not only a change in the psychic structure, it is also a change in the ways in which we experience the behavior of our world.

So, what does this all mean for our discussion of resistances? For Loewald resistance as a form of defense, is a mishandled or “faulty” integration of the external world (1952, p. 27). Once the behavior that causes resistance is worked-through, for Loewald, it ultimately means that the ego and its external world are made anew, restructured, achieving a higher level of integration and differentiation. In other words, overcoming resistance is a psychical revolution.

Further still, what does this all mean for Kuhnian science? Those who are familiar with Kuhn’s work know he was very perceptive regarding the issue of resistance, specifically as “professionalization leads [...] to an immense restriction of the scientist’s vision and to a considerable resistance to paradigm change” (Kuhn, 1962, p. 64). Indeed, he spent the greater part of a chapter in *The Structure of Scientific Revolutions* discussing resistance. For Kuhn, the resistance to greater observations of scientific discrepancies—or what is commonly called anomalies—is a resistance to the scientists’ structure of reality, for all they have known thus far is a worldview that does not permit the seriousness of the accounted anomalies. It is worth noting that Forrester (2007) says nothing of Kuhn’s preoccupation with resistance in his work. Moreover, as mentioned in Kuhn’s own words above, this resistance is “largely unconscious.”

When describing the resistance to anomalies and their eventual influence on paradigm shifts, Kuhn notes the common characteristics of all “discoveries from which new sorts of phenomena emerge” (1962, p. 62). Interestingly enough, the characteristics that Kuhn gives to discoveries may also be said of the psychoanalytic process required of the working-through of individual discoveries. The characteristics that he lists include the following: “the previous awareness of anomaly, the gradual and simultaneous emergence of both observational and conceptual recognition, and the consequent change of paradigm categories and procedures often accompanied by resistance” (Kuhn, 1962, p. 62). What’s more, when Kuhn talks here of resistances and discoveries he is talking generally. Indeed, he states that “there is even evidence that these same characteristics are built into the nature of the perceptual process itself” (Kuhn, 1962, p. 62). It is almost as if he is attempting a theoretical description of psychoanalytic technique of the

interpretative working-through of transference neurosis. Now we are far beyond a simple discussion of historical or sociological descriptions of scientific discovery. Still more, to make his point of unconscious resistance to discovery, though he does not talk in terms of unconscious behaviors, Kuhn makes use of a published psychological experiment. In the experiment, several playing cards were presented to participants. Some decks were normal, others were made anomalous with such deviations as a red six of spades or a black four of hearts. To put it briefly, the study showed that the participants were resistant—and what seems to be unconsciously resistant—to perceiving these cards as abnormal. They were identified as a black four of hearts, but they were unidentified as anomalous. To note, the journal from which this psychological experiment was published is called the *Journal of Personality*. We may surmise that Kuhn had some interest in personal development and the ways in which our psychological defenses impede on that development.

In concluding his chapter on resistance to anomalies, Kuhn states that whether in science or in psychological experiments, the resistance in both trades “reflect[s] the nature of the mind” (Kuhn 1962, p. 64). Once again, we find in Kuhn’s work a latent preoccupation with the mind and its vicissitudes. In fact, in 1951, around the same period of his analysis, Kuhn was invited to deliver the Lowell Lectures in Boston. The title of his lecture series was “A Quest for Physical Theory.” In it, Kuhn proposes, with the advent of a crisis, a dynamic interpretation of psyche and world. In the lecture “Coherence and scientific vision” he states, “[A] crisis, by the recognition of an inadequacy in the older world, *transforms experience as well as the mental category in terms of which we deal with experience*” (as cited in Marcum, 2005, p. 33, emphasis added). In positing such theoretical postulations of the mind and world, Kuhn may have just as well titled his lecture series “A Quest for Psychological Theory.” For in understanding a notion like this, one must have some grasp of the change that comes in one’s own psyche when what it is that one is experiencing changes. For what else can Kuhn mean by “transforming mental categories” than something like a mutable structure of the mind? Furthermore, this transforming of mental categories occurs concurrently with a transformation in one’s worldly experiences.

In this early lecture, Kuhn gives an account of the necessary condition of scientific predispositions for scientific progress, where the “behavioral world” of the scientist accounts for half of all scientific discoveries.⁸ After describing several perceptual experiments from psychology, examples which were later to be found in Kuhn’s *Structure of Scientific Revolutions*, including the experiment from *The Journal of Personality* noted above, he concludes that “the world of our perception is not uniquely determined by sensory stimuli but is a joint product of external stimulation and of an activity which we perform in organizing them” (as cited in Marcum, 2005, p. 33). In such an account we recognize an affinity in the structural ideas between Loewald’s description of psychic restructuring as a dynamic change in both ego and reality, and in Kuhn’s account of the structure of scientific revolutions as a refutation of the static image of scientific discovery.

Hans Loewald and Thomas Kuhn on Essential Tensions to Development and Advancements in Objectivity

Much has been said of the standard criticism of Thomas Kuhn as a relativist. Beginning with the 1970 publication of *Criticism and the Growth of Knowledge*, a collection of symposium papers in response to Kuhn’s controversial book, the literature in this area is certainly not lacking. What I wish to illustrate in this section is how both Kuhn and Loewald forcefully defend the need for greater forms of objectivity, though emphasizing the upshot of an inescapable unconscious on the individual. Consequently, both thinkers are responding to the reduction of foundations into rigid forms of subjectivism and objectivism. In contrast, both thinkers rearticulate the boundaries between inner and outer experience in such a way that each thinker begins to loosen the stifling hold these rigid forms have on the advancement of objectivity in their respective disciplines. As such, renewal in greater levels of subjectivity and objectivity call for a thoroughgoing fallibilistic epistemology. While it is not within the scope of this paper to articulate the kind of fallibilistic epistemology that the two thinkers share,⁹ it is enough

to note that Kuhn and Loewald alike could not articulate their process-oriented, open systems developmental theories without assuming a deep fallibility in both the individual and the world she inhabits. Though Kuhn and Loewald do not put their epistemological beliefs in strictly fallibilistic terms, I contend that both endeavor to bring out the experimental mind in all of us. I do not intend to defend their arguments here, though I do agree with them. My intent is to juxtapose the two thinkers as a necessary correlate of contemporaneous, mutually influential revolutions in scientific thinking. In the background lie what the later Loewald (1988) intuited: with the birth of psychoanalysis, all sciences must reevaluate the boundaries between the subjective and objective in their theories of nature, which returns us fittingly to why Thomas Kuhn, the man and scientist, intuits a “tremendous debt” to psychoanalysis.

Whitebook (2004) identifies Loewald as an early proponent of contemporary psychoanalytic theories of epistemology that criticize not the objectivity, but rigid objectivism of modern science. An epistemological vision that Kuhn’s science shares.

Kuhn notes in the “Essential Tension” that “the successful scientist must simultaneously display the characteristics of the traditionalist and of the iconoclast” (1959, p. 227). Deemed a radical conservative by Whitebook (2004) whose comprehensive and original work is only second to Freud in its wholeness (Chodorow, 2003, p. 898), Loewald no doubt displays the characteristics of “traditionalist and iconoclast”—traits which Thomas Kuhn also displays. Characteristic of his entire corpus, Loewald excavated, dusted off, and refined many of Freud’s glossed over yet significant remarks, thereby reformulating the discrepancies such remarks have on Freud’s metapsychology in such a way that the conception is integrated on a higher, more encompassing level of psychological understanding. Conserving the language of classical Freudian psychoanalysis, Loewald found the need for a radical reformulation of psychoanalytic epistemology.

One way in which this reformulation can be seen is in Loewald’s refashioning of Freud’s theory on tension reduction. As Whitebook (2004) reminds us, for Freud the singular goal of the psychic apparatus is the reduction of tension—a return

to equilibrium. It was not until his reticent remarks in “The Economic Problem of Masochism” of “pleasurable tensions and the unpleasurable relaxation of tensions” that Freud acknowledged the necessity of increased tension in processes aiming at satisfaction (1924, p. 160). Unlike Freud’s stimulus reduction model, Loewald’s interpretation of individual psychical development occurs along the same lines as Kuhn’s scientific development in that the corresponding building up and binding of tension-raising energy is recognized as a progressively integrative developmental force (Loewald, 1960, p. 239, see also Lear, 2003).

Though classical Freudian thought strived to paint the new “science” of psychoanalysis as derived from the natural science of his time, Loewald reminds us that such a defense of his new “science” belies his novel understanding of the de-centered human. As such, Freud’s Copernican Revolution would not be much of a revolution if we stick to the same old arguments natural science had to offer when Freud’s new science was conceived. In fact, in light of new developments in the psychoanalytic literature of pre-oedipal psychic organization, including his own work, Loewald argues that Freud’s defense of his new science as grounded in natural science ought to be understood as a pathological defense. Willing to forgo previously held theories with the arrival of strongly argued new ones, Loewald writes the following regarding the revised view of nature in psychoanalytic theory:

The traditional theory of nature is changing, and with that change the theory of knowledge of nature is changing. Nature is no long simply an object of observation and domination by a human conscious mind, a subject, but an all-embracing activity of which man, and the human mind in its unconscious and sometimes conscious aspects, is one element or configuration, albeit of uttermost importance to that human mind. By virtue of the unison and reverberation with the rest of nature we gain what understanding of nature, including our own, we possess. Rather than descending, as happened initial phase of psychoanalysis, from the objectivity of subjective consciousness to the unconscious, we now ascend from id to ego. (1988, p. 50)

Ever the subtle iconoclast, Loewald goes on to make the grand claim that:

in traditional natural science, too, the objectivity achieved in human consciousness was *projected* onto the universe and to what we call, then, physical material reality, and that this nature, so structured by us was now perceived as ultimate reality, in the same vein as the “ultimate reality” of metaphysics, mythology, and religion. (1988, p. 50)

In other words, as Lear so aptly put it in his interpretation of Loewald’s epistemology, “Even in the sciences the concept of objectivity is essentially subjective; as I shape myself as a scientist, I must ask, What are the norms of inquiry, discovery, and communication that make my research objective?” (2003, p. 45). That is, “What counts as scientific is the activity of a scientist who behaves appropriately as such?” (Lear, 2003, p. 44). Whether psychoanalyst or scientist, the practitioner appropriates a “subjective use of objectivity” whereby she admits to and takes stock of her active participation in structuring objectivity (Lear, 2003, p. 38) rather than an “objectivity of subjective consciousness to unconsciousness” (Loewald, 1988, p. 50).¹⁰ That is to say, it is through one’s continued restructuring of one’s projected account of reality that the scientist maintains a thorough-going fallibilistic epistemology. To put my claim as explicitly as possible, I have been arguing that Kuhn’s indebtedness to psychoanalysis was in his reflective ability to achieve such an activity of the scientist—to ascend from the scientific practitioner’s id to his ego, and to make this process a part of scientific discovery itself. And though we have Loewald to thank for making this activity clear to us, Kuhn himself on many occasions noted the fallibilistic approach necessary for not only scientific revolutions but normal science.

The implicit fallibilism in Kuhnian science is suggested when Kuhn states, “we may [...] have to relinquish the notion, explicit or implicit, that changes of paradigms carry scientists and those who learn from them closer and closer to the truth” (1962, p. 170). Kuhn is acutely aware that scientific theories, like the experiments of the scientific practitioner, must be held lightly, accepting the inevitability of uncertainty, ambiguity, and

revision that comes with scientific progress. Again, in his closing remarks in *The Structure of Scientific Revolutions*, Kuhn stresses the illimitable nature of scientific progress: “nothing that has been or will be said makes [the developmental process of science] a process of evolution *toward* anything” (1962, p. 170–171). Considered in this way, both for Loewald and Kuhn, science is without absolute foundations and tends to no essential ends. Instead, scientific progress is a non-cumulative, developmental enterprise, whose primary aim is not to acquire knowledge but to continually reorganize it.

It is of primary importance to Kuhn as well that we rid ourselves of our Cartesian epistemological assumptions: “What I have been opposing in this book is therefore the attempt, traditional since Descartes but not before, to analyze perception as an interpretive process, as an unconscious version of what we do after we have perceived” (1962, p. 195, see also pp. 41, 121, 126–127). What Kuhn is saying here, and elsewhere, is that first we perceive in the broadest possible sense. Specifically, we perceive conscious and unconscious feelings and sensory data of both past and present experience, then we interpret that perception (Kuhn, 1974, p. 308–309). This is what he means when he states in his 1969 postscript to *Structure*, “interpretation begins where perception ends” (Kuhn, 1962, p.198). Ten years earlier Kuhn noted that the interpretative work of:

new theories and, to an increasing extent, novel discoveries in the mature sciences are not born *de novo*. On the contrary, they emerge from old theories and within a matrix of old beliefs about the phenomena that the world does and *does not* contain. (1959, p. 234)

Recognizing that the interpretative work specific to scientific advancement—which is conducted after perceiving—is for Kuhn an organizing process of differentiating between what the “world does and does not contain” is much like the process of integrating and differentiating phenomenal experience that Loewald proposes the human psyche undertakes when restructuring to greater levels of maturation.¹¹ Epistemologically understood, interpretations of perceptual experiences must be a fallible enterprise given that such interpretations consist of

the ongoing restructuring of past interpreted experience with current perceptual experience. To use Kuhn's own words, it is "hopeless" to think that an individual can step outside of a paradigm to make observations (Kuhn, 1962, p.126; see also Marcum, 2005, p. 73). Loewald echoes this stance when he argues that it is a fiction to think psychoanalysts are disinterested observers investigating the individual's human psyche as if the analyst and analysands were "closed systems investigating closed systems," for "psychoanalytic investigation must take into account and include in its investigation the phenomena of transference and resistance as essential parts of what we want to study and of our investigative method" (1970, p. 278). The crux of Kuhn's own work revolves around the notion that no longer can the scientist and the scientific community understand scientific revolutions occurring through "closed systems investigating closed systems." Both Kuhn and Loewald agree: no longer can we have, in a Deweyian turn of phrase, a spectator view of knowledge. Instead, "we understand something about nature and reality, know something about them, by being open to their workings in us and the rest of nature as unconscious life, the openness being what we call consciousness" (Loewald, 1988, p. 50). And the reason that we cannot do so is because in order to advance objectivity we must continually investigate the resistances found in the individual human mind or personality, a process that inevitably increases psychical tension. This point, however, does not suggest that objectivity is only arrived at once the individual's mind has rid itself of resistances.

Admittedly, the gestalt switch that occurs in scientific revolutions points to a psychological analysis of change in worldviews. Though the change in worldview is a description of a psychic restructuring in one's individual psychology, it occurs within a paradigm, and it would take a very similar gestalt switch to another paradigm with other members of a scientific community to achieve such a scientific revolution. The worldview change, to be a scientific revolution, is not only individual, but grouped individually. In a 1973 article titled "Objectivity, Value Judgment, and Theory Choice," Kuhn responds to such critics as Lakatos (1965) who think his theory choice is ruled by "a matter of mob psychology" (Lakatos, 1965, pp. 91–195). In the article, Kuhn elaborates on the characteristics of a good

scientific theory. The individual choosing a scientific theory must admit to the mixture both the objective and subjective factors, or what he calls “shared or objective criteria” and “individual criteria” (Kuhn, 1973, p. 325). The (shared) objective criteria include accuracy, consistency, simplicity, scope, and fruitfulness (p. 322), all of which are standard criteria for objectivity. The inescapable (individual) subjective criteria consist of previous scientific experience, influences outside the sphere of science, and personality (p. 325). Indeed, he thinks it prudent to refuse a description of the above criteria in the typical subjective-objective dichotomies, preferring the terms above in parentheses—shared and individual (pp. 336–39). He concludes the essay by arguing that developments in science, both theoretical and experimental, have never occurred without a “decision process which permits rational men to disagree,” as some work within [the new paradigm] and others within its traditional rival (p. 332). Again, Kuhn returns to the “essential tension” as a means to articulate a fallibilistic epistemology that assists in describing advancements in objectivity through revolutionary science.

Each scientist is governed by a paradigm, and each paradigm is settled on a set of objective grounds. It is only when tensions rise from competing paradigms that revolutionary change is possible, and it is only when the investigator addresses his or her resistances to change that revolutionary change may occur. As noted in the previous section, Kuhn, in his analysis, no doubt understood this need to address resistances. We are reminded early on in his work that revolutions in science are rare, and the settled objectivity of normal science that produces “periods of convergent research are the necessary preliminary to them” (Kuhn, 1959, p. 227). Both normal science and revolutionary science are complementary aspects of scientific advancement. Ever greater tensions within the paradigm, including the scientist’s worldview regarding the paradigm—so long as it is focused on development and possibly the eventual paradigm shift—are essential for scientific advancement. More importantly, it is within this tension that arises *between* the two that development occurs. Kuhn states:

Since these two modes of thought [convergent and divergent thinking] are inevitably in conflict, it will follow that the ability to support a tension that can occasionally become almost unbearable is one of the prime requisites for the very best sort of scientific research. (1959, p. 226)

Kuhn, then, would agree with Loewald when he states: “Disorganization and higher organization often go hand in hand; the balance or confluence of the two may be precarious or disrupted, but they are part of the investigative process itself” (Loewald, 1970, p. 280). This is the essential tension for Kuhn, for without the objectivity of normal science and the psychological, subjectively-driven innovativeness of the scientific practitioner, there are no scientific revolutions.

Conclusion

A detailed account of this theoretical common ground deserves further articulation with expanded discussions on Loewald’s conceptualization of internalization and how the clinical import of Loewald’s theory can directly relate to the scientific practitioner’s interaction with herself, her community, and her object of study. That said, even in this brief account of Kuhn’s inherent need to psychologize the scientific practitioner in order to understand the structures of scientific knowledge, we may begin to see why it was that Kuhn felt the need to “put on the record” his “tremendous debt” to psychoanalysis. At the same time, what makes Kuhn’s theory so attractive is that even in psychologizing the enterprise of revolutionary change in science he never downplayed the necessity of an established objective grounding that normal science offers, emphasizing the need for normal science in the development of revolutionary science. It is between these lines of the necessity of both the subjective and objective in the revolutionary development of scientific reality that we can relate Hans Loewald’s (1951) radical reinterpretation of a psychoanalytic account of reality as a continual process of differentiation and integration of subjective and objective experiences. Where, for Loewald, the

integration and differentiation of both subjective and objective experiences from the infant, and even in the adult in the consultation room, is the nascent level of understanding a separation of oneself and the world, the discipline of science and its revolutionary moments are the pinnacle—the exemplary levels of integration and differentiation of internal and external scientific knowledge. Without Loewald’s description of where individual psychology begins, we would not have a robust—I dare not say complete—understanding of where Kuhn’s scientists, scientific community, and eventual revolutionary science periodically settle.

Both thinkers broke from their institution’s traditional view of reality as a closed-system, advancing developmental theories of reality that account for the intermediary areas between the subjective and objective through the acknowledgment of resistive unconscious processes. Where Kuhn saw normal science as a resistance to an open-system of reality, setting aside anomalies for a more static and familiar account of ourselves and the world, Loewald understood neuroses as the defensive need to maintain a closed-system of psychic organization. Given all that has been said, one may very well be confused as to whether the following remarks are Kuhn’s, Loewald’s, or my own: “The developmental process described in this essay has been a process of evolution from primitive beginnings—a process whose successive stages are characterized by an increasingly detailed and refined understanding of nature” (Kuhn, 1962, p. 170).

Further still, through this account we may find that the psychoanalytic framework is not merely a tool used for curing psychopathologies, nor is it merely the metapsychology for a specific discipline, but a way of looking at the greater social world we live in as a process that does not differ much from the personal psyches from which it is founded. Here, then, and this is just a consideration, we may not concern ourselves with the argument of whether psychoanalysis is a science itself but situate the discipline in its own field of human understanding—one that leaves its mark on science’s developmental, let us say, revolutionary process.

Notes

1. It is worth noting that Kuhn defines crisis very broadly as “the common awareness that something has gone wrong” (1962, p. 181).
2. Kuhn’s reformulation of paradigms as a disciplinary matrix include such elements as “symbolic generalizations,” “metaphysical paradigms,” or “beliefs in particular models,” “shared values,” and “exemplars,” though he emphasizes these components are not exhaustive (1962, pp. 181–87).
3. For an earlier account of his Aristotle epiphany see the preface to Kuhn (1977, pp. xi–xiii).
4. It is worth noting that Kuhn describes a gestalt switch as “an unstructured event” (1962, p. 122). This suggests that such an experience must be unstructured before it becomes structured again, for as he goes on to say in the quote provided above, “though scientific revolutions leave much piecemeal mopping up to do, the central change cannot be experienced piecemeal, one step at a time. Instead, it involves some relatively sudden and unstructured transformation in which some part of the flux of experience sorts itself out differently and displays patterns that were not visible before” (Kuhn, 1987, p. 17).
5. Here, I am talking of the ego both structurally and dynamically. And by anomalous, I mean, very generally, irregular, unusual, uncertain behavior.
6. Some readers may wonder why of all psychoanalytic theorists I chose Hans Loewald. For many, Loewald is known as a first-rate psychoanalytic theorist with “systematic rigor and synthetic thrust,” an author who “attempts to reconcile many of the rigid oppositions that often become reified” (Whitebook, 2004, p. 97); and whose wide-ranging psychoanalytic vision has an “elegant and complete wholeness,” second only to Freud (Chodorow, 2003, p. 898). A student of Heidegger, Loewald’s theorizing also has philosophical depth, a point I will highlight in a later section.
7. Loewald’s postulations of the early infantile experience as unity between ego and reality, self and world, organism and environment—described by himself and Freud before him as primary narcissism—had been later grounded by empirical proof with the rise of attachment theory and contemporary infant research. For more on this subject see Chodorow (2003).
8. As Marcum reminds us, what Kuhn means by “behavioral world” in this early lecture will later encompass what is meant by the term normal science (2005, p. 33).
9. For a fallibilistic psychoanalytic epistemology of the sort I am suggesting here I refer the reader to Orange (1995).
10. “Parenthetically,” Loewald notes elsewhere, “I doubt whether any scientific work proceeds in a strictly detached, dispassionate way, motivated solely by the wish to find truth, except for those most significant moments and episodes which set for us the standard of scientific spirit” (1970, p. 297).
11. It is worth noting that both Loewald and Kuhn often use the same vocabulary in terms of tension-rising and restructuring. Such terms as *discrepancies* with tension inducing outer experience and the *maturing process* that occurs in periods of restructuring to greater levels of both subjectivity and objectivity are found throughout both thinkers’ corpus. See particularly Loewald (1952) “The Problem of Defense and the Neurotic Interpretation of Reality” and Kuhn (1959) “The Essential Tension.”

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