

A New Materialist and Quantum Posthumanist Reading of Human and Non-Human Entanglements and Material Agency in Weir's *Artemis* and Gibson's *Hinterlands*

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<https://doi.org/10.66376/galaxy.v15.n5.8>

Abstract:

The realm of invisible and microscopic particles is inextricably fused with both matter and meaning. Even the smallest parts of matter are capable of producing significant explanations of Ontology and Epistemology through a series of deeply entrenched ideas. This paper explores the power of microscopic particles and their effects on macroscopic notions. It also explores the consequences that microscale materiality has on philosophical phenomena and its entanglement with humanity. *Artemis* by Andy Weir and *Hinterlands* by William Gibson offer an innovative, intriguing space to explore the agential relations between matter and humanity and the need for

Article History: Submitted-31/08/2026, Revised-11/09/2026, Accepted-15/09/2026, Published-30/09/2026.

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new materialist thought to emphasise the prominence of material agency. It draws on the inevitable relational nature between the Human and Nonhuman to emancipate new material discourses from being discriminated against by the metanarratives of anthropocentric discourses. The paper also explores the reinforcing elements that sustain the viability of the new material realm and elucidates their relational nature. The need for a new materialist reading through contrapuntal and synchronous examinations aims to bring out a newfound visibility on the perceptions of new materialism, material agency and entanglement.

Keywords: New Materialism, entanglement, human, nonhuman, material agency, quantum posthumanism.

Introduction

The imbricated nature of Human and Nonhuman notions is a subject of polyphonic discourses related to their characteristic nature and distinct conceptualisations. An ineluctable need for revisionary measures regarding the basic perceptions of matter, its connection with meaning, philosophy and its parallelisms with Quantum theory is pivotal. The inherent nature of Nonhuman and Microscale materiality leverages its discernment that is distinct and recalcitrant towards anthropocentric paradigms and their epistemological limitations. This recalcitrant approach catalyses the subsumption of new materialist philosophy within the broader and dominant agencies that control defining discourses on ontology and epistemology. The same approach helps in the reification of New Materialist notions along with their quantum counterparts, pioneered by scholars such as Karen Barad and Werner Heisenberg. This paper elucidates the ontic inchoation between the Human and Nonhuman using the axioms of the New Materialist philosophy and Quantum Posthumanism in Andy Weir's *Artemis* and William Gibson's *Hinterlands*.

The liability between matter and meaning and the way in which Quantum Posthumanism and New Materialist Philosophy delve into the intricacies of the shared ontogenesis between the Human and the Nonhuman is consequential to the emancipation of New Material Agency. New

materialism has emerged as an important theoretical movement that challenges the prioritising of language, discourse, and human agency in social and cultural theory. In *New Materialisms: Ontology, Agency, and Politics*, Diana Coole and Samantha Frost foreground the significance of materiality, ontology, and nonhuman agency. Similarly, Francesca Ferrando, in *Posthumanism, Transhumanism, Antihumanism, Metahumanism, and New Materialisms: Differences and Relations*, identifies new materialism as a response to representationalist and constructivist approaches that have historically marginalised the material realm. Within this theoretical development, Karen Barad's *Meeting the Universe Halfway: Quantum Physics and the Entanglement of Matter and Meaning* (2007) is particularly influential. Drawing on Niels Bohr's interpretation of quantum mechanics, Barad develops 'Agential Realism', arguing that phenomena emerge through specific 'intra-actions' rather than interactions between pre-existing and independent entities. Her concepts of 'intra-action', 'entanglement', 'agential cut', and 'material-discursive phenomena' consequently challenge conventional distinctions between subject and object, human and nonhuman, and most importantly, matter and meaning.

However, Barad's application of quantum physics has attracted considerable debate. In *(Dis)entangling Barad: Materialisms and Ethics*, Gregory Hollin et al. question the movement from quantum phenomena to macro-sociological contexts, particularly the problem of 'scale-jumping'. Jan Faye and Rasmus Jaksland, in *Barad, Bohr, and Quantum Mechanics*, further challenge Barad's interpretation of Bohr by distinguishing epistemological inseparability from ontological inseparability. Thomas Everth and Laura Gurney's *Emergent Realities: Diffracting Barad within a Quantum-Realist Ontology of Matter and Politics* extends this debate by identifying 'quantum decoherence' and 'quantum Darwinism' as inherent in Barad's concept of agential realism. Drawing on Wojciech Zurek and Maximilian Schlosshauer, they argue that

‘decoherence’ helps explain the emergence of relatively stable classical reality from quantum processes. Thus, the existing scholarship establishes a productive theoretical intersection between new materialism, quantum entanglement, material agency, and emergent reality. Existing research has extensively examined Barad’s agential realism, quantum entanglement, and the scientific limitations of extending quantum concepts to macroscopic and social realities. However, comparatively little attention is given to how literary narratives such as Andy Weir’s *Artemis* enact Human and Nonhuman material entanglements across microscopic, technological, and environmental scales. This paper elucidates the following research questions garnered from the research gap. (1) How do Andy Weir’s *Artemis* and William Gibson’s *Hinterlands* depict the entanglement of Human and Nonhuman matter within their technological and environmental setting? (2) How can new materialist concepts of material agency, intra-action, and entanglement illuminate the relationships between human bodies, technology, and the lunar environment in *Artemis* and *Hinterlands*? (3) How do these narratives negotiate the relationship between microscopic material processes and macroscopic realities without reducing material relations to quantum indeterminacy?

From Human Centrality to Relational Entanglement: The Posthuman Genealogy of Agential Realism

Humanism serves as the philosophical point of departure for understanding the subsequent emergence of posthumanist, quantum posthumanist, new materialist and relational modes of thought. Humanism erroneously establishes the human as the privileged centre of value, agency, and meaning, positioning human rationality and autonomy as the principal measures through which existence is understood. Inbaraj explicates this humanist configuration:

Humanism is a philosophical movement or theory that affirms the value and agency of human beings individually and collectively. It places humans at the center of or measure of everything. It sees humans as rational, self-conscious, autonomous, self-contained, and exclusive beings. This model sets the standards for humans and those who don't come into this categorization are expelled as the 'Other'. Therefore, the humanist notion of the human isn't universal as it is an exclusive notion that has classified and excluded several other life forms, throughout history, as sub-human, non-human, and inhuman. (Inbaraj 44)

The humanist conception of the subject is therefore not merely an affirmation of human value but a classificatory framework that establishes boundaries around the category of the human itself. By defining the human through qualities such as rationality, self-consciousness, autonomy, and self-containment, humanism simultaneously produces those forms of existence that fall outside these parameters as its constitutive 'others'. The supposedly universal human consequently becomes an exclusive category whose boundaries are defined by excluding beings that cannot be accommodated within its normative conception. Humanism is grounded in a hierarchical configuration, apparent in humanism's treatment of the non-human, thereby maintaining "human supremacy, and speciesism over other non-human species and treats them as non-human other" (Inbaraj 44).

The privilege of the human thus extends this distinction to establish a broader hierarchy between human and non-human existence. Such human supremacy sustains an anthropocentric ontology in which agency, subjectivity, and significance are principally attributed to the human, while non-human entities are positioned as subordinate objects or others. The human consequently

appears as an autonomous and self-contained subject, separable from the material relations within which its existence is sustained.

Taken together, Braidotti, Hassan, Hayles, and Nayar mount a sustained critique of anthropocentrism by dismantling the presumed universality, autonomy, sovereignty, and exceptionalism of the human, thereby displacing it from the ontological centre and opening the way toward a relational understanding of human and non-human existence. The anthropocentric ontology of humanism is fundamentally predicated on constructing the human as a privileged and autonomous subject. Its apparently universal conception of humanity, however, conceals a history of exclusions through which certain bodies and forms of existence have been relegated to the status of the other. Rosi Braidotti exposes this exclusionary architecture of humanism by foregrounding bodies that were historically denied full participation in the category of the human. She writes in *The Posthuman*:

These are the sexualized, racialized, and naturalized others, who are reduced to the less than human status of disposable bodies. We are all humans but some of us are just more mortal than others. Because their history in Europe and elsewhere has been one of the lethal exclusions and fatal disqualifications, these ‘others’ raise issues of power and exclusion. (Braidotti 15)

Braidotti’s formulation renders visible the hierarchical logic embedded within the ostensibly universal category of the human. The humanist subject is not simply a neutral philosophical abstraction; it is historically constituted through processes of differentiation, exclusion, and othering. The distinction between the human and its Other therefore becomes inseparable from the power structures that determine whose existence is recognised as fully human

and whose is rendered disposable. Braidotti's intervention consequently initiates a crucial displacement of humanist universality: Rather than treating the 'human' as a self-evident ontological category, posthumanism interrogates the historical and material conditions through which that category has been constructed.

This interrogation extends beyond the exclusions inherent to humanism and toward the broader anthropocentric hierarchy separating the human from non-human existence. If the humanist subject derives its privileged status from its presumed rationality, autonomy, and exceptionalism, then the destabilisation of those attributes necessarily unsettles the boundary between human and non-human. Ihab Hassan's intervention matters here because it conceptualises posthumanism as a transformation of the very image of humanity. In his essay *Prometheus as Performer: Towards a Posthumanist Culture*, Hassan writes:

We need first to understand that the human form – including human desire and all its external representations – may be changing radically, and thus must be revisioned. We need to understand that five hundred years of humanism may be coming to an end, as humanism transforms itself into something we must helplessly call posthumanism. (Hassan 843)

Hassan's argument marks a departure from preserving the humanist subject towards revising its conceptual foundations. The significance of posthumanism lies not simply in replacing the human with a technologically augmented successor but in recognising that the category of the human itself is undergoing a profound transformation. The humanist subject consequently ceases to appear as a fixed and immutable ontological entity. Its boundaries become permeable through technological mediation, organic interdependence, and encounters with forms of existence beyond

the conventional human domain. Hassan's formulation thus establishes an important conceptual threshold: posthumanism does not necessarily demand the biological disappearance of humanity but the dissolution of a particular historical conception of what humanity is. Hassan clarifies this distinction by emphasising that posthumanism does not signify "the literal end of man but the end of a particular image of us" (Hassan 845).

This 'particular image' being displaced is precisely that of the autonomous, sovereign, and self-identical humanist subject. Posthumanism therefore constitutes less an announcement of human disappearance than an ontological and epistemological reorientation. The human persists, but its mode of existence is increasingly understood through its symbiotic relations with technological, organic, and inorganic forms. The movement is consequently not from *human* to *non-human*, but from a supposedly self-contained human toward a human whose existence is implicated in an expanding network of relations.

Katherine Hayles radicalises this critique by directly challenging the presumed autonomy upon which the humanist subject depends. In *How We Became Posthuman: Virtual Bodies in Cybernetics, Literature, and Informatics*, Hayles argues that the posthuman does not represent the termination of humanity but the collapse of a historically particular conception of the human:

the end of a certain conception of the human, a conception that may have applied, at best, to that fraction of humanity who had the wealth, power, and leisure to conceptualize themselves as autonomous beings exercising their will through individual agency and choice. (Hayles 286)

Hayles consequently reveals autonomy as neither universal nor ontologically intrinsic to the human. The sovereign subject of humanism is instead exposed as a historically situated

construction dependent upon specific material and cultural conditions. This destabilisation becomes even more significant when Hayles argues that biological alteration is not a prerequisite for entering the posthuman condition. She writes that “biologically unaltered Homo Sapiens counts as posthuman” (Hayles 4). The posthuman, therefore, cannot be reduced to the technologically enhanced body of transhumanist imagination. It signifies a transformation in the conceptualisation of human existence itself. Human beings are already situated within technological and material systems that complicate the boundaries of the autonomous individual. Hayles consequently shifts the discussion from a speculative future toward a condition already embedded within contemporary existence: “Increasingly the question is not whether we will become posthuman, for posthumanity is already here. Rather, the question is what kind of posthumans we will be” (Hayles 246).

This proposition is crucial to the movement from anthropocentrism toward relational ontology. Once the human is no longer regarded as an autonomous entity whose agency originates exclusively within the individual subject, agency itself must be reconsidered as something emerging through networks of technological, biological, and material relations. The posthuman thus becomes not merely a new version of the human but a conceptual rupture with the ontology of human self-sufficiency. Promod K. Nayar makes this relational dimension explicit in his formulation of critical posthumanism. In *Posthumanism*, he states: “Critical Posthumanism . . . is the radical decentering of the traditional sovereign, coherent and autonomous human in order to demonstrate how the human is always ready evolving with, constituted by and constitutive of multiple forms of life and machines” (Nayar 11).

Nayar’s formulation brings the preceding critiques into sharper ontological focus. Braidotti exposes the exclusionary violence through which the category of the human is constructed; Hassan

calls for the revision of the humanist image of humanity; Hayles dismantles the presumed universality of human autonomy; and Nayar advances these critiques toward a relational conception of human existence. Therefore, it is evident that the human is no longer sovereign, coherent, or self-contained, but is continually constituted through its relations with multiple forms of life and machines. Human, in this formulation, is simultaneously a product of relation and an active participant within relational processes.

The cumulative force of these posthumanist interventions therefore lies in their systematic displacement of anthropocentric ontology. The question is no longer whether the human should remain at the centre of philosophical inquiry, but whether such a centre can be coherently sustained at all. The progressive dissolution of human exceptionalism opens a conceptual passage from autonomy to relationality, from separateness to interdependence, and ultimately from discrete entities to entangled processes of becoming. It is specifically at this juncture that posthumanist critique converges with New Materialist thought: once the human is understood as constituted through relations with other forms of life, machines, and material processes, the agency of those relations and their material participants demands philosophical reconsideration. This trajectory provides the necessary conceptual prelude to Agential Realism, in which relationality is radicalised beyond interaction between pre-existing entities toward the notion of intra-action, whereby entities themselves emerge through their entanglements. The war against anthropocentric centrality thus culminates not merely in the decentring of the human, but in the dissolution of the ontological separateness upon which that centrality depended through the institution of new materialist philosophy and Barad's Quantum Posthumanist features.

New Materialist Thought and Features of Barad's Quantum Posthumanism

New materialism emerges contrapuntally between social constructivism and scientific realism by negotiating the tensions between humanly mediated knowledge and the material reality that exceeds such mediation. Social constructivism tends to privilege epistemological processes through which reality is interpreted and constructed, a tendency that Barad critiques by observing that

Language has been granted too much power. The linguistic turn, the semiotic turn, the interpretative turn, the cultural turn: it seems that at every turn lately every ‘thing’—even materiality—is turned into a matter of language or some other form of cultural representation. [...] Language matters. Discourse matters. Culture matters. There is an important sense in which the only thing that doesn’t seem to matter anymore is matter. (Barad 132)

New materialism responds to this privileging of representation by restoring matter as an active component of reality, while simultaneously avoiding the opposite extreme of treating reality as entirely independent of human practices. In this respect, it enters into a contrapuntal relationship with scientific realism, which Hoefer defines as “the family of philosophical views that assert that we have strong reasons to believe in the truth or approximate truth of much of the content of our best current scientific theories” (Hoefer 19). Scientific realism affirms science’s capacity to provide reliable knowledge of an external material world. In contrast, new materialism complicates this position by asking how material reality, human practices, and knowledge become mutually implicated. The new materialist position consequently does not simply choose between constructivism and realism; rather, it negotiates their competing emphases by acknowledging both the significance of human epistemological practices and the irreducibility of materiality.

This negotiation of New Materialism becomes particularly important in relation to the onto-epistemological relativism that emerged within certain strands of social constructivist and Science and Technology Studies. By bringing ontology and epistemology into a relativist framework, such approaches could treat not only knowledge of reality but, by implication, claims about reality itself as contingent on particular human, social, or discursive frameworks. The problem with such relativism becomes especially apparent when scientific claims concerning material phenomena are treated as merely constructed or contestable forms of knowledge. As Everth and Gurney point out, “The onto-epistemological relativism promoted by some within the field has often operated in tandem with particular political agendas built on the denial of climate science” (3). This critique further clarifies why the new materialist turn becomes significant: it seeks to retain the insight that knowledge is situated and mediated without collapsing material reality into the frameworks through which humans know it. In this contrapuntal space, Barad’s intervention becomes particularly significant because matter is neither reduced to linguistic construction nor treated as a completely detached object awaiting scientific representation; instead, materiality participates actively in the constitution of phenomena. This materialises in Barad’s primary quantum posthumanist feature, which offers a quantum posthumanist reconfiguration of the relationship between matter, meaning, and knowledge.

The first major feature of this reconfiguration is the inseparability of matter and meaning. Barad challenges the privileging of language, discourse, and representation over materiality, arguing that “matter and meaning are not separate elements. They are inextricably fused together, and no event, no matter how energetic, can tear them asunder” (Barad 3). This formulation is not merely a philosophical assertion about the relationship between matter and meaning. Instead, it reflects the relational and entangled characteristic that Barad identifies in quantum phenomena.

Rather than conceiving matter as a collection of discrete and independently existing objects, quantum physics reveals a material world in which entities and their properties cannot always be understood apart from the relations and conditions through which they emerge. It is this quantum character of relationality and entanglement that informs Barad's posthumanist ontology, in which matter is active rather than passive and phenomena are constituted through their intra-relations.

Barad consequently observes that contemporary physics makes visible the "inescapable entanglement of matters of being, knowing, and doing, of ontology, epistemology, and ethics, of fact and value" (Barad 3). The significance of this claim lies in the way the quantum does not simply provide a scientific illustration for her philosophy; rather, its relational and entangled nature becomes a basis for rethinking the conventional separation between matter, knowledge, and human agency. Matter and meaning therefore cannot be positioned as opposing categories, just as the knower and the known cannot be treated as wholly independent of the material phenomena through which knowledge is produced. In this sense, Barad's position directly responds to the representationalist tendency to transform "every 'thing'—even materiality"—into a matter of language or cultural representation (Barad 132). Her quantum posthumanism instead recognises that materiality possesses an efficacy that cannot be exhausted by human systems of meaning, while meaning itself remains materially implicated. Thus, the inseparability of matter and meaning becomes the first point at which Barad moves beyond both the constructivist reduction of matter to representation and a simplistic realist separation of an objective material world from the practices through which it is known.

Matter and Meaning: A New Materialist and Agential Realist Reading of *Artemis* and *Hinterlands*

“The human is what it is because it includes the non-human”, writes Nayar, highlighting the need for recognition of trans-species connection (Nayar 11). And acknowledging this interconnectedness and entanglement of the human and non-human world, the cultural theorist Richard Foltz writes, “many of our significant historical interactions have been and continue to be with non-humans” (Foltz 11). Building on this necessity, along with the quantum posthumanist framework of Karen Barad’s new materialist Agential Realism, the study takes up Weir’s *Artemis* and Gibson’s *Hinterlands* to argue that matter refrains from being merely passive and non-agential, and meaning cannot be treated as merely representational. The human characters, material entities, space artefacts, and technologies in these narratives are read as emerging relational and constitutive entities and not independent entities. Consequently, the study treats matter and meaning as not separate entities that pre-exist and interact, but are produced through Barad’s notion of intra-action. This new materialist refusal of aligning with “the ontological dualism between matter and meaning” destabilises the presumed role of matter as mere objects and carriers of meaning (de Freitas 1). The study, rooted in Barad’s treatment of the non-human as “more-than-human world”, proceeds to unveil how matter itself conditions and co-produces meaning (Everth and Gurney 1). Steinberg echoes this concern when he writes that “taking into account the independent world of nature should cause us to rethink the meaning of human agency” (Steinberg 819). Therefore, the selected texts provide the necessary ground for investigating the embedded nature of matter, meaning and agency.

Artemis by Andy Weir follows the life of the protagonist Jasmine ‘Jazz’ Bashara, working as a porter in the titular Lunar City Artemis. The narrative depicts a materially conditioned life in the lunar environment, where human inhabitants constantly struggle with the technological, socio-economic and corporeal repercussions of extraterrestrial settlement. Drawing on Barad’s notions,

it can be said that lunar “matter is conceptual” throughout *Artemis* (de Freitas 1). Lunar dust is introduced as “extremely bad to breathe. It’s made of teeny, tiny rocks, and there’s been no weather to smooth them out. Each mote is a spiky, barbed nightmare just waiting to tear up your lungs” (Weir 10). The adverse physical repercussions of its presence challenge its treatment as inconsequential to human existence in the city of Artemis. As an active participant, lunar materials become consequential and crucial for the human economy, survival and sustenance of Artemis. Lunar dust, as the source of socio-economic stability, repeatedly emerges as a catalyst that drives the plot, entangling human survival in the extraterrestrial environment. It is simultaneously a health hazard to humans and the environment, an indispensable economic source and an immediate environmental agent affecting survival. Lunar dust resists being categorised as a distinct category; it is simultaneously technologically problematic, dangerous to human health, environmentally predominant and an institutional necessity. By acting upon the human body, lunar dust alters the conditions under which materially-conditioned labour practices, architectural protective technologies and economic investments are possible. This multifaceted entanglement – bodily, technological, socio-economic – of lunar matter makes it active and agential, rather than a passive non-human matter dispersed in a human space settlement. Every particle, every atom and every speck of lunar dust is entangled with human survival attempts at Artemis. Lunar dust signifies resource, economic value, danger and survival simultaneously. This condition foregrounds its material agency arising from lunar conditions. Therefore, this stubborn and indispensable entanglement proves the impossibility of separating the lunar matter from human agents in the novel.

Artemis’ inhabitants understand the insulation of their city from lunar materiality as a time-consuming and exhausting errand, “[w]e do everything we can to keep lunar dust from entering

the city” (Weir 10). This exposes how “matter is an enfolding, an involution” that keeps intra-acting and “touching” other matter (Barad 5-6). Lunar dust is seen as intrinsically non-agential. Its material consequences emerge only through its intra-actions with humans and technological entities of Artemis. The lunar materiality endemic to *Artemis* refuses reduction to non-human passive objects through its intra-action with human and technological agents. With human ontological and epistemological notions at risk, with the lunar dust *mise en scene*, Barad’s notions become enlightening. By demonstrating a Baradian destabilisation of the matter-meaning dualism, the lunar dust simultaneously shatters the human-non-human hierarchies too. Moreover, Weir successfully demonstrates that material entanglement in the novel manifests in the form of technological adaptation with constraints on human existence and understanding. Therefore, this inseparability of the lunar materiality and human condition in the city of Artemis shows that the matter-meaning nexus should be treated as a defining feature of quantum posthumanism.

While Weir’s *Artemis* depicts how matter is consequential through technological adaptation, William Gibson’s *Hinterlands* foregrounds space artefacts as disruptions of epistemological frameworks. *Hinterlands*, a short story by William Gibson anthologised in *Burning Chrome* (1987), explores the physical and psychological impacts of human encounters with the extraterrestrial in a space station named Heaven. The story follows the life of protagonist Toby Halpert, a ‘surrogate’ who treats “dead” or “catatonic” explorers and returnees from space (Gibson 69). *Hinterlands* features space artefacts, mostly exobiological objects, that are brought to Heaven by space explorers.

As space explorers encounter these materials, they collect them as rare exobiological artefacts that could further human understanding of space phenomena, especially a wormhole named the ‘Tovyevsky Anomaly’. The finding of a “seashell” by Colonel Olga Tovyevski was

enough to fill in “more than two million tissue slides, racked and numbered in the subbasement of a bombproof biological complex” (Gibson 65). It is because of this discovery and extraterrestrial encounter that an entire field of “Exobiology suddenly found itself standing on unnervingly solid ground”, inviting and expanding human settlement in space (Gibson 65). The seashell, as an exobiological material, has “generated an entire subbranch of the science, devoted exclusively to the study of...Olga’s seashell” (Gibson 65). Furthermore, they are treated with divine reverence, as if they are “the Rosetta stone for cancer” (Gibson 69). They are constantly treated as objects of scientific and institutional knowledge. Contrastingly, such encounters have visceral “occupational hazards”, causing even “clinical depression” as a result of a “slow, relentless flowering of paranoia” during space exploration and exobiological encounter (Gibson 60-71). Apart from detrimental physical effects, the exobiological materials, just like Timothy Morton’s rendition of ‘Hyperobjects’, also cause an irreversible “psychological reorientation”, when the explorers return either dead, suicidal or catatonic (Hudson). One such explorer notes that there is “[t]he promise of pain. It’s there each time. You know what will happen, but you don’t know when, or exactly how”, whenever they attempt to understand the extraterrestrial environment (Gibson 70).

Therefore, these extraterrestrial materials are simultaneously outputs of space research, relics of glorious space expeditions, objects of exobiological knowledge, sources of psychological deterioration, and tools of human cognitive and epistemic failure. They signify different regimes of meaning, like new knowledge, exobiological presence, research, danger, trauma, death and survival. It is specifically the materiality of the space artefacts and their entanglement with human and non-human worlds that condition their meanings. These artefacts become accessible through intra-actions among space researchers, space technologies, and space research institutions. They are not independent, free-floating extraterrestrial space debris, but significant artefacts that emerge

from material-meaning relations. As the researchers in the narrative attempt to produce meaning through a recognition and understanding of those materials proves, human meaning-making is materially distributed. Therefore, this reiterates Barad's claim that matter and meaning are inseparable.

Hinterlands demonstrates how materiality pushes beyond human epistemological limits. Space researchers who attempted to observe and understand the space anomaly and the exobiological artefacts face complications, indicating that materiality destabilises human meaning-making entirely. The artefacts co-produce and exceed human epistemological frameworks simultaneously. This demonstrates how materiality refuses to be exhausted by human epistemological systems, because meaning-making is material and materiality is conceptual. Therefore, in *Hinterlands*, materiality operates within and beyond human epistemological frameworks.

Conclusion

By positioning Weir's *Artemis* and Gibson's *Hinterlands* in a comparative dialogue, the present study exposes how different modalities of Baradian entanglement of matter and meaning emerge through 'intra-action' between the human and non-human world. These materially grounded narratives reveal that matter can co-produce, reconfigure or even disorient meaning-making processes. In *Artemis*, lunar materiality conditions meaning. Contrastingly, in *Hinterlands*, extraterrestrial matter disrupts meaning-production and even exceeds meaning. From this comparative study between *Artemis* and *Hinterlands*, it is evident that material entanglement conditions both human survival and knowledge frameworks. *Artemis* depicts material conditioning of survival in the lunar city, while *Hinterlands* demonstrates material testing of human

epistemological limits. In this sense, *Hinterlands* furthers the Baradian matter-meaning nexus from adaptation for survival in *Artemis* to epistemological limitations in *Hinterlands*.

Both these narratives prove that there are different consequences for the same condition of materiality. These contrasting literary enactments show that matter both enables and constrains meaning-making processes. Despite these polar effects of materiality, the non-human matter in the texts defines, conditions, and actively participates in meaning-production. Therefore, it would be detrimental to read the human characters in the texts as independent agents, separated from material, technological and environmental factors, but instead should be treated as reconfigured meaning-producers, intra-acting and entangled matter. Such a co-constitutive approach is exactly the quantum posthumanist framework of agential realism demanded. Subjects/objects, meaning/matter are no longer rigid dualisms and separations, but rather sources of newer ontological and epistemological conditions.

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