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The Technology of Time, Mathematization, and Hyperobjects in *Interstellar*[1]

Nai-nu Yang
National Kaohsiung Normal University

Abstract

In this paper, I will discuss the issue of the relationship among technology, time, and object, especially regarding how the technology of time re-shapes or transforms the human beings so as to enable them to travel in outer space. Mathematization, Quentin Meillassoux's term, a nonhuman approach, is the key to enabling humans to explore the worlds and realities beyond their common understanding of time, space, and themselves. Timothy Morton's conception of hyperobjects offers us a nonhuman perspective to (re)examine humans' relationships with matter outside of Earth. With its background of possible space travel in the future, Christopher Nolan's movie *Interstellar* shows us how the technology of time becomes an essential tool for humans to explore the universe and leads us to a posthuman and even nonhuman future. In *Interstellar*, while it appears that

Nai-nu Yang is Associate Professor in the Department of English at National Kaohsiung Normal University, Taiwan. Her research interests include English science fiction, Chinese science fiction, posthumanism, and utopian literature. She has published articles in *Fiction and Drama, Review of English and American Literature, Concentric, Chung Wai Literary Quarterly*, and *Ex-position*. She also co-edited *The Posthuman Turn*, an anthology of academic papers related to posthuman issues. E-mail: t3355@nknu.edu.tw.

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the storyline centers around the love between father and daughter, the gap between manifest time on Earth and physical time in outer space transforms their relationship. Love is still love, but their love bears witness to the "a-mortalizaton" of human relationships.

Keywords: time, the technology of time, mathematization, hyperobjects, the posthuman future

The most famous space-themed movie might be Stanley Kubrick's *2001: A Space Odyssey*. Though it did not receive positive criticism when it was first released,[2] *2001* created a milestone for space-themed SF movies. According to Adam Roberts, the new thing that "*2001* brought to SF was not in its content, but in its form; and in particular in the way it forges a specifically space-age visual lexicon, deployed by Kubrick as powerfully allusive visual poetry" (389). As the title suggests, Kubrick was ambitious to make a visual epic poem. The space odyssey, suggesting a hero's desire and ambition to explore unknown worlds as in Greek mythology, in this instance ironically strikes a melancholic note on how powerless humans are in outer space. *Interstellar*, a more recent space-themed SF movie, shares some similar visual and narrative images with *2001*. Foregrounding space travel as the major theme in *Interstellar*, Christopher Nolan presents to us an apocalyptic story in which the end of life on Earth propels humans to explore another planet in outer space that is a suitable place for humans to live. The solitary spaceship traveling through different galaxies with spectacular views calls to mind the epic scenes of outer space in Kubrick's *2001*. Actually, both Richard Corliss and Todd McCarthy mention that Nolan's *Interstellar* pays homage to Kubrick's film.

Nolan's reinterpretation of a space odyssey has drawn mixed reviews. For instance, Corliss does not think highly of the aesthetic achievement of *Interstellar* compared with what Kubrick achieved in *2001*. Nevertheless, Nolan enriches his story of space travel with more scientific and humanist touches. In the hope of creating scenes of the universe resonating with contemporary astrophysics, he invited Kip Stephen Thorne, an American physicist and Nobel laureate, to be the consultant and executive producer of the film. Nolan's presentations of space images do not merely offer his audiences contemporary scientific knowledge but also challenge their perceptions of space and time. Another difference from *2001* consists in Nolan's attempts to draw a link between the human world and the immeasurable universe. In *2001*, two solitary astronauts who routinely carry out their work every day aboard the *Discovery*,[3] an enormous spaceship, reveal Kubrick's aesthetic and ethical message that human relationships are not as important as their relationship with the unknown in outer space.[4] The ending of the story reinforces this message when David, the only

[2] According to Alex Nelson, several critics complained about the length and slow pace of the movie. For example, Renata Adler criticized that the movie was somewhere between "hypnotic and immensely boring" (208).

[3] There are seven crew members in total on the *Discovery*. Five of them are in a state of hibernation in the first period of their journey, but they are murdered later by the computer HAL 2000.

[4] In *2001*, Kubrick does not present much about how humans suffer from the changes in their so-

survivor of the *Discovery*, stumbles into a mysterious region of space, growing old, then undergoing a rebirth, and turning into a Star Child. Kubrick seems to suggest to us that the decentering of the human is inevitable if humans choose to leave Earth. Nolan's story, however, shows us more about the changes of human relationships in the era of space travel. The human world is still the center of Nolan's cinematic narrative.

Nolan creates his own cinematic aesthetics of space opera via his scientific presentations of outer space and the link between the human world and the unknown one. In *Interstellar*, the scientific details, which are not essential elements in *2001*, endow the movie with a realistic touch, pointing to our curiosity of the world beyond Earth. In a way, Nolan's approach to his cinematic aesthetics can be defined as a posthuman one. His imaginings of advanced technologies for space travel, on the one hand, are implicated with the human desire to overcome the unknown. On the other hand, those technologies that enable human beings to go into outer space actually point to the vulnerability of their bodies. For instance, humans need to live in an environment with oxygen, water, food, and the gravity of Earth. Without these basics, humans cannot survive. Rich with the envisioning of state-of-the-art, cutting-edge scientific knowledge and technological developments, the movie provides us a rich basis to discuss posthuman issues in terms of what humans can and cannot do. Among those creative imaginings of the future, the science and technology that can help us overcome time in space travel are significant because they have to lengthen the human life span as well as to cope with the problems of the time-space structure in outer space. The distance of interstellar travel is much longer than that of any trip on Earth. Take the journey from Earth to the sun for example. The distance between them is around 149,600,000 kilometers.[5] With the normal speed of an aircraft at 450 km/hr, we would have to spend more than 30 years to arrive at the sun. Even if we could invent a spaceship with a speed of 10,000km/hr, the same trip would take 62 days. Since most of the planets are much farther than this distance, space travel would be difficult for human beings unless we can solve those problems related to the time-space structure of the universe. We have to face our limited understanding of time and space since our knowledge of them is nurtured by the unique environments of Earth. Modern physics tells us that time and space are not fixed concepts. If we seek to leave Earth and its

cial relationships when they travel in space. A major part of the storyline focuses on the two astronauts' journey in outer space. That is why I argue here in this paper that humans are not very important characters in the film since the human society is not the center of the movie.

[5] This information comes from the homepage of NASA, accessed on August 20, 2019.

unique environment to explore the universe, we have to go beyond a knowledge of space and time based on that of Earth.

In this paper, I will discuss the issue of the relationship among technology, time, and object, especially regarding how the technology of time[6] re-shapes or transforms human beings so as to enable them to travel in outer space. Mathematization, which is Quentin Meillassoux's term, a nonhuman approach, is the key to enabling humans to explore the worlds and realities beyond our common understanding of time, space, and ourselves. Timothy Morton's conception of hyperobjects offers us a nonhuman perspective to (re)examine humans' relationships with matter outside of Earth. With its background of possible space travel in the future, Christopher Nolan's movie *Interstellar* show us how the technology of time becomes an essential tool for humans to explore the universe and leads us to a posthuman and even nonhuman future. In *Interstellar*, while it appears that the storyline centers around the love between father and daughter, the gap between manifest time on Earth and physical time in outer space transforms their relationship.[7] Love is still love, but their love bears witness to the "a-mortalizaton" of human relationships.

Time, Mathematization, and Space Travel

The reality presented in space-themed SF, if it is based on the research or speculations of astrophysics, is usually depicted as a window for readers to see extraordinary objects, such as black holes, asteroids, and superstars, in the universe. It provides an interesting perspective for us to re-examine human life on Earth. As Christophe Galfard notes, the evolution of human beings on Earth is unique (131-2). The earth nurtures environments that are suitable for humans, and humans have corresponding organs in order to adapt to our surroundings. For instance,"[o]ur eyes are tuned to judge whether a fruit is ripe enough to eat, our ears to listen for danger and our skin to the cold of ice and the heat of fire" (Galfard 131). But our bodies fail to know "the subatomic world, the speed of light and the full array of light, from microwaves to X-rays" (Galfard 131). Because of modern science and technology, we are allowed to go beyond the limits of human bodies. In this light, all space-themed SF stories encourage us to

[6] This term will be explained later.

[7] The terms "manifest time" and "physical time" are borrowed from Craig Callender. "Manifest time" refers to time as we perceive it on Earth; it will be discussed further later. "Physical time" refers to the theory of time in modern physics (Callender 2).

experience realities beyond our senses.

In *Interstellar*, the presentations of warped time and space, the wormhole,[8] and the fourth and fifth dimensions of the universe in space travel,[9] enable us to see the universe in new lights. The advanced technologies of time created in this movie help us (re)examine human-centered thoughts which are nurtured in the environment of Earth. The posthuman approach reinforced by the scientific knowledge recurring again and again conveys an essential message. That is, science and technology allow us to go beyond humanity, which involves a philosophical question: how do we construct a system of knowledge that is beyond the perceptions of the subject on Earth? Quentin Meillassoux's theory in refutation of anti-realism, which stems from his thoughts on "the problem of ancestrality" (*Time* 12), a method to help us to know the world without human subjects, might provide an answer to this question.

"The problem of ancestrality," or "the problem of the *arche-fossil*," is raised by Meillassoux's question as to how we can attain absolute knowledge (*Time* 13). Intending to "refute every form of correlationism," a term referring to the philosophy which asserts that we cannot understand what reality is in itself, he demonstrates the possibility of knowing the thing-in-itself (*Time* 12). According to him, "the problem of the *arche-fossil*" serves as the best point to grasp the problem of correlationism. In his explanation, "an 'arche-fossil' is a material indicating traces of 'ancestral' phenomena anterior even to the emergence of life" (*Time* 13). Here, "ancestral" means a thing or an event which "existed before life on earth" (*Time* 13). How do we know about the pre-human world, such as the origin of the universe, the first birth of Homo sapiens, and the formation of glacially derived sediments? According to Meillassoux, the philosophers before Kant were more concerned with problems related to substance. Meillassoux remarks that "the central notion of modern philosophy since Kant seems to be that of *correlation*" (*After* 4). By correlation, Meillassoux explains, "we mean the idea according to which we only ever have access to the correlation between thinking and being, and never to either term considered apart from the other" (*After* 4). Simply put, "for correlationists the sentence 'X is,' means 'X is the correlate of thinking'—thinking in the Cartesian sense—that is: X is the correlate of an affection, or a perception, or a conception, or of any other subjective

[8] According to Thorne, the concept of an astrophysical wormhole was conceived by Ledwig Flamm, inspired by Einstein's general relativistic laws of physics. A wormhole is a shortcut from location A to location B in outer space (128).

[9] As Thorne tells us, time is the fourth dimension of the universe (185). In *Interstellar*, there is a multi-dimensional bulk where there might be some extraterrestrial beings living, which has "a fifth space dimension, *out-back*," extending perpendicular to our universe (188).

or intersubjective act" (*Time* 10). Therefore, as he points out, "to be is to be a correlate, the term of a correlation" (*Time* 10). Following the logic of correlationism, "it is impossible to conceive an absolute X, i.e. an X which would be essentially separate from a subject" (*Time* 10-11).

Targeting the two "principal 'media' of the correlation," i.e., consciousness and language, Meillassoux examines the paradoxical nature of correlational exteriority in phenomenology and analytic philosophy (*After* 6). Labeling this exteriority a prison, he notes that we are "within this outside proper to language and consciousness given that we are *always-already* in it, . . . and given that we have no access to any vantage point from whence we could observe these 'object-worlds,' which are unsurpassable providers of all exteriority, from the outside" (*After* 6). Arguing that we should not be confined by a philosophy based on a denial of absolute knowledge, Meillassoux brings up the concept of the "principle of factiality," whose goal is "to know what there is when we are not" (*Time* 19). In the logic of correlationism, it is impossible to conceive of the non-being of the correlation. He challenges the logic and argues, "It is because I can conceive of the non-being of the correlation, that I can conceive the possibility of the in-itself being essentially different from the world correlated with human subjectivity" (*Time* 24). Refuting Kant, he points out that the for-us and the in-itself "are grounded on an implicit absolutization: the absolutization of facticity" (*Time* 24). Factiality is the necessity of facticity, the necessity of contingency, enabling us to be skeptical of the reasoning of positive access to the absolute possibility of the correlation, which does not allow the possibility of contradiction (*Time* 24). In other words, facticity can be considered an absolute rather than a limit (*Time* 25).

Meillassoux also remarks that facticity as absolute must be considered as time, or in his term, Hyper-Chaos (*Time* 25). He complains about the theory of becoming as the eternal becoming of everything:

> But these properties are not properties of Hyper-Chaos: its contingency is so radical that even becoming, disorder, or randomness can be destroyed by it, and replaced by order, determinism, and fixity. Things are so contingent in Hyper-chaos, that time is able to destroy even the becoming of things. If facticity is the absolute, contingency no longer means the necessity of destruction or disorder, but rather the equal contingency of order and disorder, of becoming and sempiternity. (*Time* 25)

The conception of Hyper-Chaos leads us to think of the possibility of the co-existence of contradiction and non-contradiction, not limited by the logic of contradiction in the process of reasoning. Time without becoming, Meillassoux's critique of Gilles Deleuze and Félix Guattari's theory of becoming, allows

us to consider time as contingency.[10] In other words, contradictory dimensions of temporality co-exist. Time does not always flow. It might distort itself, freeze itself, or split itself into different flows. In the human world, manifest time, the time we perceive on Earth, and physical time, the time dominated by the time-space structure in the universe, compete and co-exist. In SF, the multiple relationships between manifest time and physical time resonate with this concept of time without becoming.

On the other hand, how do we "conceive the possibility of the in-itself being essentially different from the world correlated with human subjectivity," in Meillassoux's words? Meillassoux's answer is mathematized science (*After* 115). According to him, two of the most important scientific revolutions in history, the Galilean and Copernican revolutions, brought us two events: astronomical decentering and mathematization of nature. While the former rendered possible the decentering of the astronomical observer, who could describe the movements of celestial bodies independently of their sensible qualities, the latter made possible the mathematization of nature with its capacity for the "decentering of thought relative to the world within the process of knowledge" (*After* 115). He indicates that "the mathematization of the world bore within it the possibility of uncovering knowledge of a world more indifferent than ever to human existence, and hence indifferent to whatever knowledge humanity might have of it" (*After* 115).

Drawing from Meillassoux's theory of speculative materialism, we can conclude that the mathematization of nature renders insignificant human existence. Although it appears paradoxical that mathematized science gives us tools that are able to detect infinite worlds indifferent to human existence while it is we who make use of those tools, his theory offers us a nonhuman approach to understand and explore the worlds beyond our senses. Mathematized science enables us to understand both macro and micro worlds, such as outer space and

[10] I am very grateful to one of the reviewers' comments on Meillassoux's critique of the concept of becoming. As the reviewer points out, Deleuze also proposes the co-existence of different durations in *Bergsonism*. However, as Meillassoux argues, those philosophers who are usually considered as anti-metaphysicians, such as Heraclitus, Nietzsche, and Deleuze, attempt to make a breakthrough against the philosophy of fixed principles by metaphysics of becoming (*Time* 26). He points out that "the metaphysics of becoming believe in two metaphysical necessities: the necessity of becoming, rather than fixity; and the necessity of such and such a becoming, rather than others that are equally thinkable" (*Time* 26). In *Bergsonism*, emphasizing the importance of differences in kind, Deleuze formulates his ideas of durations via the logic of the necessity of becoming, which is different from Meillassoux's conception of Hyper-Chaos. Liberated from metaphysical necessity, as Meillassoux notes, the hyper-chaotic time is "neither becoming, nor the substratum" (*Time* 26-27). That is why the hyper-chaotic time "is able to create and destroy even becoming, producing without reason fixity or movement, repetition or creation" (*Time* 27).

the world of bacteria, which human perceptions cannot easily approach or make sense of. So, it is not surprising that with the advent of mathematized science humans have become more and more insignificant, which echoes the phenomenon that high-tech inventions or outer space itself is usually the foreground of SF stories wherein humans seem to be unimportant characters.

Mathematization of nature and the world is a double-edged sword. Whereas it can help us see beyond our senses so as to explore the universe, it also triggers the tendency to decenter the status of the human. In terms of the mathematization of nature, the human body is one of the objects studied by mathematized science. No longer unique, it becomes an object that is composed of an array of materials. The mathematized body has the potential of developing itself into other bodily forms, which opens up a path for it to transcend its original biological structure. As a result, humans will be able to go beyond Earth since their mathematized bodies can be posited from the structure of modern physics, bioengineering, and other advanced technologies. Theoretically, the reshaped body, strengthened by the technologies of time, should be able to reach immortality. Nevertheless, the multiple dimensions of temporality will generate unexpected challenges to the new forms of humans. In *Interstellar*, the story evolves around the exploration of multiple dimensions of time. The technology of time offers humans freedom to undergo long space travel in different dimensions of temporality.

Love, the Technology of Time, and Hyperobjects in *Interstellar*

The technology of time here is a term related to physics, a product of mathematized science. Broadly speaking, it refers to technology that helps us lengthen our life span and overcome the time-space structure of the universe in order to embark upon long-distance space travel. Promoting scientific realism, the director of *Interstellar* carefully structures the technology of time involved in space travel. As mentioned earlier, Nolan invited Thorne to build a scientific framework as the basis of the movie. In his recounting of the process of working on the screenplay, Thorne told his colleagues his science guideline: "Nothing will violate firmly established laws of physics; speculations will all spring from science" (8). Therefore, the concepts of space and time involving space travel are constructed by modern theories of physics in this movie. The universe presented in *Interstellar* is composed of several interesting objects of theoretical speculation in physics, such as wormholes, black holes, gravitational anomalies, and the extra dimensions of the universe. These visual presentations of math-

ematized science demonstrate how time distorts itself, freezes itself, and even splits itself.

However, this movie is more than an ostentatious display of astrophysical knowledge. Nolan explores the challenges humans have to confront when they undergo the non-linear structure of time, which is different from their experiences on Earth. Unlike *2001*, Nolan's story brings back the importance of human relationships. Cooper, the protagonist in the movie, leads a group of scientists to explore another inhabitable planet outside of the solar system. Before he leaves for the mission, he makes a promise to his daughter that he will come back to her again. But mishaps and accidents happen during Cooper's journey and severely delay his plan to return. Fortunately, he is rescued by another spacecraft after he is untowardly sucked into and then tossed out of a black hole. His journey spans ninety-one earth years which, because of time dilation, he experiences as merely the passing of months. Happily, he is reunited with his daughter, who is very old and on her deathbed. But it appears that the space-themed story is not radical enough for some critics since it mostly centers around traditional human love, the love between lovers, father and children, and brother and sister. In other words, Cooper's return home for love is based on human relationships under the traditional structures of heterosexual love, marriage, and family, just like Odysseus's return home in Homer's immortal epic. Nevertheless, Nolan's presentation of love actually transcends normal human perceptions as constructed by the biological structure of the human body because the space travel presented in the movie follows the logic of the mathematization of nature and undermines the traditional conception of humanity. The black hole that Cooper falls into is a symbol of implosion from the drastic changes that humans have to confront in the posthuman era in outer space.

Though love is a major theme in *Interstellar*, paradoxically, it signifies both a bonding between father and daughter and a gap that bears witness to the hyper-chaotic time. Love for humanity compels Cooper to leave the comfort zone of Earth to look for alternative futures to ensure human survival. Cooper understands that he can never have a normal relationship of close contact with his daughter once he decides to embark upon decades-long space travel. In other words, he will be subject to time dilation, barring him from experiencing the same manifest time with his daughter. Unlike Kubrick, Nolan adopts a more realistic strategy to simulate and portray the time dilation, drawing his audiences' attention to the impact on humans of the unfathomable time-space structure of the universe. The gap between manifest time and physical time foreshadows the coming of a new era for humans. Traditional concepts pertaining to time, such as the past, the present, and the future will be challenged. To

a certain degree, Cooper is a suffering cyborg because technology forces him to face a different temporal order and duration, no longer the linear one. Cooper's suffering echoes the drastic changes in our conception of time in terms of physics. In Craig Callender's terms, Cooper's manifest time grounded in his bodily experience is forced to change when he is traveling in outer space.

In his *What Makes Time Special*, Callender coins the term "manifest time" to define the time that we perceive in the temporal sequence of events. But it is "not a reflection of time as we directly experience it" (2). Manifest time "is informed by experience, to be sure, but it is instead time as it arises from a kind of regimented common sense picture of the world, a theory that psychology suggests we come to in late childhood" (Callender 2). As a central part of the time we live by, manifest time has "no counterpart in the fundamental science of our world" (Callender 3). That is why, as Callender tells us, we have "an 'explanatory gap' between time as we use it in life and as we find it in science" (3). According to him, there are four features of time which are core components of the model of time that we develop on Earth (2-7). The first feature is that it is egocentric. In Callender's words, "[e]gocentric temporal frameworks are those that locate by reference to one's current temporal location, e.g., Socrate's death is past, and the first mile-high building is future" (6). Other features include that the present is special, that time flows, and that the past is fundamentally different from the future (2).[11]

Differentiating manifest time from physical time, Callender tries to help us understand the explanatory gap between the time we live with and the time we find in science. By physical time, he refers to the time that studies in physics work with (19). Of course, there is no unified concept of time in physics. But there are some basic assumptions in studies of physics. First of all, in physics, to define time requires a metric structure that allows us to define distances amongst events and to measure a duration between instants (Callender 20). Second, although physical time departs from manifest time, it requires very few of the properties featured in manifest time (20). As Callender tells us, physics suffices without positing an A-series, i.e., the tripartite structure of time—the past, the present, and the future (21). According to him, "Aristotelian physics, Newtonian physics, Einsteinian physics, and quantum mechanics all manage without positing a special now" (21). As a result, as he indicates, "they don't posit a temporal flow or a past/future asymmetry either, as both are dependent upon a now" (21). Take Einstein's theory of relativity for example. In his theory, time

[11] Callender calls this feature the past/future asymmetry (7). As he points out, in the model of time we develop, we usually think that the past is fixed and the future is open (12).

is not a flow composed of instants that can be measured in the same unit. Time is a relative concept. According to Thorne's explanation of Einstein's relativistic law of time, time "must be warped by the masses of heavy bodies such as the Earth or a black hole, and that warping is responsible for gravity." Therefore, the "greater the slowing of time, the stronger gravity's pull" (Thorne 35). Einstein successfully predicted and explained "the expansion of the universe, black holes, neutron stars, and wormholes" (Thorne 28). The time we find in science is not just a theory, but an important medium for us to understand the universe.

Interstellar faithfully presents to us the gap between manifest time and physical time. In the beginning of the movie, we find Cooper, a loving father who takes good care of his son and daughter, Tom and Murph. Cooper's manifest time on Earth is grounded in his daily life of routine work on his farm and his relationships with his family. Everything in his life is foreseeable if he stays on Earth. So, the scene in which he watches the videos that Tom sends him from home after Cooper goes back to the *Endurance*, the spaceship launching Cooper and his team into outer space from a mission to Dr. Miller's planet,[12] is both shocking and touching. Cooper and his crew members take a much longer time than they have planned in their search for Dr. Miller because of an unexpected accident. After they come back from Dr. Miller's planet, twenty-three years of Earth time have passed. This is because the gravity of Dr. Miller's planet is very strong and one hour there means seven years on Earth. The years of messages stored relentlessly point to the gap between Tom's manifest time and the warped time in outer space.

The three messages that Tom has sent him have condensed several important events in his life. In the first video clip, Tom happily tells Cooper that he has graduated from high school and has a girlfriend. In the next message, holding a little baby, Tom says that he is married and has a boy. The third video is the last message that Tom has sent him. Unlike the happy young man in the first two messages, Tom has become a mature middle-aged man. Tom tells him that Cooper's father died a week earlier. Wondering whether Cooper has ever received his messages at all, Tom has decided to let him go, meaning he is giving up on the hope that his father is still alive. When Cooper tearfully touches the black screen at the end of the message, surprisingly, he finds Murph's message attached to Tom's. Murph, who has never sent any message to Cooper because she is very angry at his decision to leave his family, tells him that it is her birth-

[12] Dr. Miller and eleven scientists went on a mission to explore planets inhabitable by human beings before Cooper's team set off. Cooper's team is responsible for determining the most suitable of them, judging from the data that is sent in.

day. She says, "It is a special one because you told me . . . You once told me that when you came back, we might be the same age. And today I'm the age you were when you left. So it would be a real good time for you to come back."

Cooper, Tom, and Murph all suffer from the results of warped time and space. Tom's and Murph's messages to their father remind us that love, the bond that holds humans together, is mostly grounded in the shared experiences of manifest time. Tom's messages of love congeal into instants of "now," in the flow of time of Tom's life. Since Tom's life is centered around the environment of Earth, his experience of time is his manifest time there. The gap between Tom's time and Cooper's makes it impossible for the two to share the same moment with each other. Therefore, Tom's messages of love to his father, which are symbols of his present in his life, are doomed to become painful memories for Cooper. When Cooper is waving his hand and saying "Hi" to the image of Tom, he is waving goodbye to manifest time in Tom's life, mourning the loss of the old tripartite structure of time. Unable to follow the "objective" temporal sequence of events on Earth, Cooper somehow becomes a stranger in his son's life since he cannot have a synchronic relationship with his son. When Tom is wondering whether his messages are only "drifting out there in the darkness," darkness here points to several meanings. It literally means the unknown universe in which his father might have died. On the other hand, it symbolizes the loss of all traditional human relationships under the influence of warped time. Murph's message in which she tells her father she is the same age he was when he left is the climax of the drama that shows the splitting of manifest time and warped time. At this moment, both Murph and Cooper know that they will never share the same temporal perceptions again. Murph will become much older sooner than her father even if he comes back to Earth.

Murph's message points to the consequences of the impact of warped time, that is, a-mortalization of human relationships. Here, the concept of "a-mortal" is borrowed from Yuval Noah Harari. Differentiating "a-mortal" from "immortal," Harari points out that the human future is "a-mortal" because advanced technologies will reshape human bodies to help them become stronger and much powerful. But, as Harari remarks, humans "could still die in some war or accident, and nothing could bring them back from the netherworld" (29). "A-mortal," he argues, is a better term to describe the high-tech future than "immortal." If humans become a-mortal, many human relations would definitely be changed. Resulting from technologies of time, the transformation of human relations can be defined as a-mortalization of human relationships.

Warped time makes Cooper's time move slowly while warped space leads him to encounter strange spatial structures in outer space. To be more precise,

warped space and warped time work together. On the one hand, Cooper and his team make use of these strange astrophysical structures to take long journeys. On the other hand, they make his journey home more and more difficult. His encounters with the wormhole, the bulk beings, Miller's planet, Gargantua,[13] and the tesseract all show how powerless humans are in outer space. Humans are just one sort of hyperobjects, to borrow Timothy Morton's term, not the center of the universe. In other words, in the universe, matter has its own agency. Humans should abandon conceptions of nature on the basis of dualisms, such as the dual concept of subject and object, that of humans and nature.

Morton's formulation of his theory of hyperobjects stems from his concern with ecological issues. Intending to develop a non-anthropocentric philosophical concept, Morton examines the problems of correlationism, sharing similar approaches with scholars who support speculative realism, such as Meillassoux (Morton 9). Unlike Meillassoux, Morton does not exclude humans in his thinking on the mathematization of nature. In his definition, hyperobjects refer to "things that are massively distributed in time and space relative to humans" (1). According to him, the hyperobject "is not a function of our knowledge: it's hyper relative to worms, lemons, and ultraviolet rays, as well as humans" (2). Under this philosophical framework, humans do not play the dominant role in explaining what an object is or what forms a relationship between humans and objects. That is why he replaces the word object with hyperobject, abandoning the subject/object binary opposition.[14] In his words, "*[o]bject* does not mean *objectified*; instead, it means *totally incapable of objectification*" (176). Arguing that we can only have indirect relationships with hyperobjects, he notes that "we only ever see footprints of hyperobjects" (176). He suggests to us that we learn to speculate "outside of the human" (10). As he remarks,

> Humans have entered an age of *hypocrisy*, *weakness*, and *lameness*. . . . The overall aesthetic "feel" of the time of hyperobjects is a sense of *asymmetry* between the infinite powers of cognition and the infinite being of things. There occurs a crazy arms race between *what we know* and *what is*, in which the technology of what we know is turned against us. (22)

With "hypocrisy," Morton refers to the hidden message that hyperobjects

[13] It is a black hole near Miller's planet.

[14] According to Morton, hyperobjects are characterized with many properties in common (1). In his explanation, hyperobjects "are *viscous*, which means they 'stick' to beings that are involved with them. They are *nonlocal*; in other words, any 'local manifestation' of a hyperobject is not directly the hyperobject. They involve profoundly different temporalities than the human-scale ones we are used to" (1). Some hyperobjects "exhibit their effects *interobjectively*; that is, they can be detected in a space that consists of interrelationships between aesthetic properties of objects" (1).

carry as hidden doom (148). The hyperobject is the bringer of destiny that comes from beyond the human world (148). Simply put, we should recognize the importance of nonhumans. His announcement of the end of the (human) world is a theoretical gesture of decentering the human. In claiming that humans have entered an age of hypocrisy, weakness, and lameness, Morton tries to remind us that humans are vulnerable and they "are tuned to entities that can destroy them" (176). So, it is not surprising that Morton's theory is replete with terms borrowed from contemporary physics. Science offers us the best means to speculate outside of the human, enabling us to re-consider our relationship with nonhumans, and to see the end of the world.

In Morton's words, in their journey Cooper and his team encounter several alien nonhumans/hyperobjects, which are generated beyond human experiences in outer space. These encounters show us the end of the world, in Morton's sense. Cooper and his team encounter the first alien hyperobject of their journey when they attempt to leave the solar system. They go through a wormhole set near Saturn by a mysterious ultra-advanced civilization. The wormhole is made in the shape of a bulk, a shortcut from one galaxy to another in the space-time structure. As Doyle, one of the team members, tells them, "It is a space beyond our three dimensions. All you can do is record and observe." It seems that those mysterious beings live in the bulk. Although Dr. Brand feels them, she is unable to contact them since they are beings of four-dimensional space. In this movie, while the director employs human perspectives to observe extraordinary events in the universe, these human characters are humble observers of hyperobjects. As one scene shows us, when Cooper and his team members see the bulk, they understand that they do not see its whole picture. Confined by their three-dimensional perspective, these human astronauts experience only speed and light in the wormhole but they know an ultra-advanced civilization is somewhere in this space, co-existing with them.

Cooper's passing through Gargantua is another event which presents to us human attempts to go beyond the limitations of human perspectives. Gargantua is a unique black hole. Romilly, one of Cooper's team members, once explains to him that at the core of Gargantua is a gentle singularity, which means that someone falling into it fast enough might survive. In that conversation, Romilly tries to persuade Cooper that they should go through it in order to gain the data on the singularity that would help scientists solve certain problems of gravity so that humans could build colonies in outer space. Cooper's voluntary visit to Gargantua is a turning point in the future of humans on Earth. With TARS' help, he manages to collect important data with great success. TARS is a machine of high intelligence. But unlike HAL 2000, TARS is humorous and

loyal to humans. Literally speaking, Cooper and TARS rescue humans from a doomed future of extinction. This black hole event also points to the human race's inevitable future, that is, the end of the human world. The fuel inside the sun will burn up someday in the far future, leading to the collapse of the solar system. This black hole event is a metaphor for the possible extinction of the human race as well as a foretaste of reality. However, phoenix-like, this event also causes a rebirth of humans while paradoxically symbolizing the death of humanity. Since Earth is no longer inhabitable for humans, humans have to adapt themselves to new environments in outer space. Leaving Earth undoubtedly means the end of human nature, which was nurtured by the unique environments on it.

The moment that Cooper falls into Gargantua is the moment that the erstwhile path of humanity is terminated. The data about the singularity that enable the human race to leave Earth and build colonies in outer space demonstrate to us the new relationship between humans and nonhumans built up by the mathematization of nature. Humans are no longer observers confined by their Earth-centered perspective. The new colony, or alternative society, in which humans learn to go beyond their perceptions, is also a transition community that will eventually turn into a nonhuman one. Although the artificial environments in the colony vividly simulate those on Earth, they gradually deconstruct everything human. The scene with Cooper visiting his old and dying daughter highlights the crisis of humanity. Located in different forms of the time-space structure, Cooper and Murph cannot share the same temporal experiences based on linear temporality. The gap between their temporalities challenges their relationship as father and daughter. Family, as a social and ethical institution, is generated in the linear tripartite structure of time.

In the scene where Cooper, about to depart, tries to have a farewell talk with Murph, he tells her, "Once you are a parent, you are the ghost of your children's future. I can't be your ghost right now. I need to exist." He means that under normal circumstances parents will inhabit/haunt their children's memories some day in the future. Cooper knows very well that the decision he made will reverse this condition. Simply put, Murph might become his ghost. This conversation foretells the twist in their relationship. At the end of the film, while it is touching to see Cooper reunited with his daughter, it is shocking to see the middle-aged father tearfully holding the hand of an aged daughter surrounded by her children and grandchildren. In this scene, Cooper seems to be a stranger to his family since he has been absent for ninety-one years. As mentioned earlier, what they share is their blood relations, not love based on the same temporal experiences. This journey of love turns into one that mani-

fests the asymmetric relationship between life forms emerging from the gaps of warped time and warped space.

Moreover, Cooper's farmhouse, which he left a few months before in his manifest time, has been moved to the colony and become a museum. He has no home to go back to. In a sense, he becomes a ghost in the human world, which echoes the ghost event in the beginning of the movie. In this scene at the beginning of the movie, Murph complains that her books have been mysteriously knocked off her bookshelves several times. This inexplicable event makes her conclude that there are ghosts in her room. Suspecting that the ghosts are attempting to deliver a message to her, she tries to make sense of the graphs left by them. She thinks that the message means "Stay." Not until much later do we realize that Murph is right. The message is "Stay," left by Cooper from the future during his visit to the black hole. Cooper is rescued by a mysterious ultra-advanced civilization who posits a four-dimensional tesseract at the edge of the singularity in Gargantua. The tesseract sends Cooper back to Earth. And more than that, it transports Cooper back to the past before he took the journey into outer space. However, Cooper can only see Murph through the walls inside the complex structure of the tesseract. When Cooper is floating in the large chamber that looks like a huge building of blocks in the tesseract, he is moving in different moments of time (Thorne 252-57). According to Thorne, the flowing curtains and the falling of the books are significant because we can estimate the time that Cooper moves from one particular moment to another according to the movement of the curtains and books (256). So the flowing curtains and falling books represent the merging of the past and the future. The ghost is Cooper who is time-travelling by means of a cutting-edge technology of time. The significance of the scene points to more than the phenomenon of time travel. Confined to the structure of the tesseract, Cooper is unable to have any physical contact with the people of the past. Like a mirror, the walls of the tesseract that display the flow of time in the past reflect the inevitable future of the human race. This Cooper exists in a four-dimensional space, unable to interfere with past events. The message that Cooper leaves for himself to stay on Earth is ignored, an implication that the human race is destined to leave and take the path to a nonhuman future.

Out of love for the human race, Cooper takes the risk of never returning so as to explore outer space. Out of his love for his daughter, he never gives up the hope of coming back to the human world. In this journey of love, warped time and warped space distort his temporal experiences based on manifest time. The two scenes, his leaving Earth and his visiting his dying daughter, are both his farewell to the human world. He knows that he will never fit into the life

he led before he left. The two watches, one for his daughter and the other for himself as tokens of love, become tokens of farewell. Compared with the various forms of the technology of time presented in the movie, the watches as tools to measure time appear to be old-fashioned and even useless. Nevertheless, Murph's watch serves as the essential medium to save humankind. And this token of farewell is not only Cooper's farewell to his daughter but also a symbol of the human race's farewell to Earth. This symbol of farewell is reinforced by old Dr. Brand's recitation of Dylan Thomas's poem, "Do Not Go Gentle into that Good Night." Encouraging his daughter to be brave, Dr. Brand recites part of the poem to her: "Do not go gentle into that good night, / Old age should burn and rave at close of day; / Rage, rage against the dying of the light." As John Ackerman points out, Thomas wrote this poem for his dying father who was suffering from cancer of the throat (132). The threat of death in the poem parallels the apocalyptic background of the movie. But unlike the father in his fight against death, humans have to bid farewell to their life on Earth so as to gain rebirth since Earth will collapse one day in the movie.

Conclusion

A-mortal or immortal, space-themed SF provides us numerous imaginings of a posthuman future. As science and technology compel us to see beyond our senses, our philosophy of time and space has been greatly challenged. As a result, how we identify ourselves is also challenged. Our limited lifespan contributes to our meditations on being from the perspective of finitude. So, in most religious meditations, problems concerning life and death are major issues. Take Christianity for example. In the Bible, God is omnipotent and omnipresent. Punished by God for their disobedience, Adam and Eve, humans' ancestors, are driven out of Paradise, losing their status of immortality. As a finite being, the human has to undergo the natural cycle of life and death. In the philosophical structure of finitude, "my" experience of time is confined to the time of the Other. That is, "my" experience of time is measured and determined by the life cycle of my body, as conditioned by my essential need to depend on my parents and society for many years. "My" history and memory consist of the records of temporal experiences based on finite temporality. Nevertheless, if we can successfully extend our lifespan to become close to immortal, even here on Earth, who we are will become a new problem. Outer space may be a symbol of freedom, enabling us to imagine various forms of infinite time, space, and life. But, as *Interstellar* shows us, the freedom that outer space offers us may bring us new

problems. Do we want to give up the old human bodies and human relations developed on Earth? If the answer is positive, are we ready to face the drastic changes in the posthuman future? That we will suffer from the consequences of going beyond human limitations is the message that *Interstellar* conveys to us.

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《星際效應》中的時間技術、數學化與新物

摘要

本文的目的在於探討技術、時間與物之間的關係，尤其是著重於時間的技術如何重塑或者轉變人類使其能到外太空旅行。本文借用昆汀．梅雅蘇（Quentin Meillassoux）的數學化概念，也就是一種非人的方法，討論人類藉著數學化而能夠探索超越他們一般認知之外的時間、空間和人本身的世界與現實。此外，提摩西．摩頓（Timothy Morton）的「新物」（hyperobjects）理論也提供我們非人觀點檢視在地球之外人與物質之間的關係。克里斯多福．諾蘭（Christopher Nolan）的電影《星際效應》（*Interstellar*）以未來可能的太空旅行爲背景，呈現一個時間技術成爲人類探索宇宙的主要工具的故事，並且引導我們走向一個後人類，甚至是非人類的未來。在《星際效應》中，雖然故事主軸似乎圍繞在父女之間的愛，然而地球的心理感受時間與外太空的物理時間之落差轉變了父女之間的關係。雖然他們之間的愛仍然存在，然而這份愛卻見證了人類關係的「非死化」。

關鍵字：時間、時間技術、數學化、新物、後人類的未來