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GLOSSOPOESIS IN "STORY OF YOUR LIFE" BY TED CHIANG AND *ARRIVAL* BY DENIS VILLENEUVE AND ERIC HEISSERER

Advisor: Sebastião Alves Teixeira Lopes

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No dia vinte e sete do mês de fevereiro de 2018, às dez horas, na Sala 323 J, no Centro de Ciências Humanas e Letras (CCHL), da Universidade Federal do Piauí (UFPI), na presença da Banca Examinadora, composta pelos docentes: Prof. Dr. Sebastião Alves Teixeira Lopes - UFPI (Presidente), Profa. Dra. Margareth Torres de Alencar Costa - UESPI (Examinadora Interna), Profa. Dra. Maria do Perpétuo Socorro Rego Reis Cosme - UFPI (Examinadora Externa), iniciaram-se os trabalhos de avaliação para a obtenção do título de Mestre em Letras (Área de Concentração em Literatura), pelo(a) mestrando(a) **ISRAEL ALVES CORRÊA NOLETO**. Os examinadores, observando o tempo regulamentar, arguiram o(a) candidato(a) sobre a Dissertação apresentada, intitulada **GLOSSOPOESIS IN STORY OF YOUR LIFE BY TED CHIANG AND ARRIVAL BY DENIS VILLENEUVE AND ERIC HEISSERER**. Após a arguição, foi suspensa a sessão pública e a Comissão Examinadora reuniu-se, em sessão secreta, para a atribuição de pareceres. De acordo com o Regimento Interno do Curso de Mestrado em Letras, o(a) Mestrando(a) foi considerado(a) aprovado, fazendo jus ao título de Mestre em Letras. Nada mais havendo a registrar, foi lavrada a presente Ata, que será assinada pelos membros da Comissão Examinadora.

Prof. Dr. Sebastião Alves Teixeira Lopes - UFPI (Presidente)

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Teresina, 27 de fevereiro de 2018

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“The artist and the scientist are not unlike in their ultimate purpose, which is to order experience in such a way as to give it meaning.” – Julie M. Johnson, Georgia Institute of Technology.

Abstract

The connexion between glossopoesis and science fiction has long been strong and fruitful. Notably, the constructed fictional language called Heptapod B plays an innovative and meaningful role in Ted Chiang's award-winning short story "Story of Your Life" (1998) and its filmic adaption *Arrival* (2016), directed by Denis Villeneuve and written by Eric Heisserer, which constitute the corpus of my research. Accordingly, in this thesis, I intend to produce a speculative analysis of the three main topics that emerge from the issues in both the short story and the film. (1) I discuss the power language exerts on thoughts, as prescribed by the Sapir-Whorf hypothesis, briefly accounting for what is currently known in the field while also highlighting its profound associations with Heptapod B and its quintessential role in the mechanics of the plot. To this, the contributions advanced by Benjamin Lee Whorf (1944), Guy Deutscher (2010), Stockwell (2006) and Ria Cheyne (2008) will be of paramount importance. (2) Then, I investigate how the heptapods perceive time differently, that is, not in a sequential manner. In this context, Fermat's principle of least time is used as a strong metaphor to represent the aliens' time experience. Starting from the writings of Isenberg (2016), Nussenzveig (1998), Curtis and Robson on MacTaggart (2016), as well as the authors' own elicitations, I analyse the associations thereof with the aliens' time perception. (3) All that leads to an intricate paradox. If it is possible to look into the future, does it mean the future already exists? If so, how can that be consistent with the existence of free will? This dialectic is the central discussion of the third issue. To this end, I review the contributions of Aristotle, as referred by Todd (1976), Schopenhauer (1839) and Friedrich Nietzsche (1895), among others, in relation to the plot developments both in the literary text and in the film. As a result, I demonstrate the theoretical and philosophical criticism of the two storylines and produce an extensive exegesis of the texts.

Keywords: Literature. Cinema. Glossopoesis. Science Fiction. Philosophy

Resumo

A conexão entre glossopoese e ficção científica foi sempre longa e frutífera. Notadamente, a língua fictícia construída chamada Heptapod B desempenha um papel inovador e significativo no premiado conto *História de sua vida* (1998) de Ted Chiang e em sua adaptação fílmica *A Chegada* (2016) dirigido por Denis Villeneuve e escrito por Eric Heisserer, os quais constituem o corpus de minha pesquisa. Por conseguinte, nesta dissertação, pretendo produzir uma análise especulativa de três temas precípuos: (1) Discuto acerca do poder que a linguagem é capaz de exercer sobre o pensamento, conforme descrito pela hipótese Sapir-Whorf, comentando brevemente o que se sabe neste respeito atualmente, ao passo em que também realço suas profundas associações com o Heptapod B, e seu papel essencial na mecânica do enredo. Para tanto recorro basilarmente às reflexões de Benjamin Lee Whorf (1944), Guy Deutscher (2010), Stockwell (2006) e Ria Cheyne (2008). (2) Em seguida, abordo difere a percepção de tempo dos heptapods em relação à dos humanos, isto é, sequencial. Neste contexto, o princípio do menor tempo de Fermat é usado como forte metáfora para representar a percepção de tempo dos alienígenas. Nesta seção, investigo as associações deste princípio com a percepção de tempo dos extraterrestres partindo dos escritos de Isenberg (2016), Nussenzveig (1998) e Curtis e Robson (2016) sobre MacTaggart, bem como as elucidações do próprio autor. (3) Tudo isto leva a um intricado paradoxo. Se for possível ver o futuro, isso não significa que o futuro já existe? Se for assim, como isto pode ser conciliado com a existência do livre arbítrio? Esta dialética representa o cerne da discussão do terceiro capítulo. Destarte, coleto e reviso as contribuições de Aristóteles conforme referidas por Todd (1976), Schopenhauer (1839) e Friedrich Nietzsche (1895), além de outros relacionados ao enredo tanto do texto literário como do longa-metragem. Como resultado, demonstro uma crítica filosófica e teórica das duas obras, bem como produzo uma extensa exegese dos textos.

Palavras-chave: Literatura. Cinema. Glossopoese. Ficção Científica. Filosofia.

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1 INTRODUCTION

Both "Story of Your Life" (1998), written by Ted Chiang, and *Arrival* (2016), written by Eric Heisserer and directed by Denis Villeneuve, tell the story of Louise Banks, a linguist and university professor who is hired by the U.S. military for a first-contact mission. The job consists of learning the language of the aliens, the Heptapods, in order to understand why they are trying to communicate with humanity. As Louise studies their language, she develops a new ability: precognition. The authors constructed a conceptual invented language from scratch that plays a role critical to both plots. Even though inventing a new language may sound bizarre to most people, this is neither a novelty nor an exceptional thing, especially in literature.

For centuries, writers have used the so-called fictional languages in prose fiction. For instance, Sir Thomas More wrote *Utopia* in 1516, describing a fictional land of his own creation and its Utopian language, heavily based on Greek and Hebrew. Sometime later, in 1623, William Shakespeare wrote the play *All's Well That Ends Well* and also created a language for the plot, the Chough's language. Building up the tradition, so to speak, in 1726, Jonathan Swift authored *Gulliver's Travels* which contained several fictional languages: Lilliputian, Laputan and the language of the horses, to name only a few. More recently, George Orwell invented Newspeak for the novel *1984* (1949), and Anthony Burgess devised Nadsat for his book *A Clockwork Orange* (1962). All those languages have in common that they were artificially constructed by the authors of their respective texts with a definite objective rather than evolving through human usage and communication.

Representing a foreign culture and/or conveying a veiled message to the more attentive reader often feature as characteristic goals of such linguistic-literary fabrications (Seeber 586). Languages constructed to appear in a work of fiction are distinct from natural languages; they do not originate out of people's use of a "protolanguage"; they are rather a deliberate invention of an individual's intellect meant to fulfil a

particular mission. Conlangers or glossopoeists, as the enthusiasts of language invention are termed, customarily group their linguistic creations as philosophical languages, artistic languages (or artlangs in their jargon), universal auxiliary languages (or auxlangs), fictional languages (conceptual sketchy languages) and so forth (Rosenfelder, 10).

This literary-linguistic "tool", if it can thus be regarded, has been given the name glossopoeia or glossopoesis, a term whose coinage is sometimes attributed to famous writer J.R.R. Tolkien, from the Greek words γλωσσα, language, and ποίέσις, or creation (Drout 332). In some cases, such invented languages are not much more than sketches whose aims are to enrich the plots of the texts in which they are inserted. Similarly, in "Story of Your Life" as well as its filmic adaptation, *Arrival*, the fictional languages Heptapod A and B are limited to grammatical concepts and graphic representations. Also, as in the case of *A Clockwork Orange*, whose invented language and story ended up represented beyond the book, that is, in a film, Chiang's lingo has also been "augmented" for the cinema perspective. Both in Kubrick's[1] and Eric Heisserer's works more information had to be invented and added to the languages because of the differences in medium between written texts and the big screen. This is why the corpus of this research is comprised of both the short story and its filmic adaptation.

Fictional languages, the ones that appear more often in science fiction texts, are really a particular type of constructed language, although criticism does not generally examine them accordingly. As commented by Cheyne (391) most literary fictional and invented languages works share a few common features. They usually show utterances in or purporting to be in the fictional language, for example. What is more, frequently, there are instances of translations that impart information about the beings that speak the language. Explanations on how a translation is attained are also very common as well as subjective impressions of the conlang's sound or appearance in the case of written languages.

[1] Director and screenwriter of the cinematographic version of *A Clockwork Orange*.

Another characteristic readily found in such works is information about grammar structures that may not conform to the standards of contemporary linguistics, which is also the case of the object of the present research. Finally, readers are very likely to come across detailed descriptions or even discussions among the characters of properties or notable features of the language which is also the case here.

Fictional languages have always served as means of communication between the author and the audience. Samples of an alien tongue included in literary texts allow writers to reach readers on several levels, helping to give notice of difference or to provide the right metaphors and allegories. Following this line of thinking, the more ostentatiously an utterance flouts the norms of the language in which the rest of the text was written, the more exotic the intended perception of the beings who speak that tongue (Cheyne 392), and because of that, being scientifically inaccurate is not a bad thing at all, provided that a minimum plausibility criterion is met. Occasionally, invented languages can also be used to demonstrate superiority or influence how the audience views the language (Cheyne 395). Commenting on the purpose of invented languages in literature, Stockwell writes:

> […] the primary function of new language in literary fiction is to delineate the distance and connections between the reader's world and the world imagined in the text. Whether the invented language is for local ornamental color or seems intended for a central thematic purpose, imaginary lexis, grammar, and pragmatic patterns play an important role in establishing the readerly perception of escapism or political comment. Delineating the difference between the textual world and the reader's world is the first step in determining the significance of the work, in making identifications for empathy or satire, in being able to generalize the specifics of the story-world onto principles for the reader's world. (3)

Said otherwise, the first step towards inventing a language attached to a literary world is determining the aspects and concepts of such world since they must be reflected in the fictional language. Unlike most literary texts that use glossopoesis as a plot-enriching tool, the Heptapod language is not shown in "Story of Your Life", but it is instead described and explained as a concept. In the conlanging (**con**structed **lang**uage) tradition, that would be classed a conceptual language (Conley and Cain 10), which means the ideas pertaining to the tongue or the discussions arising from it are more important than its form and appearance. In that sense, Chiang did not even bother creating words or sounds. He chose to create a concept that could represent his creatures' minds and delineate their world limits and characteristics.

The languages used by the alien species introduced in the plot can be divided into two very distinct tongues. There is Heptapod A, which stands for the spoken language, and there is Heptapod B or the written language. While the first form receives very little attention and is the subject of scarce comments, Form B is exactly upon which the whole plot is built. With respect to that, one notices an underlying concept that permeates the entire discussion: the meaning or signification of things in our world is a social and linguistic construct created by humans when they communicate with one another, describing and explicating their views and experiences. Language itself is a social construct, and so, words learned by people can widely structure or even limit their interpretations of events. (Berger and Luckmann 48)

Following the narratorial discourse, it is possible to observe that Ted Chiang utilises glossopoesis to explore mainly three philosophical topics, which Heisserer replicates. They have been organised into three chapters as follows: (1) Glossopoesis and Sapir-Whorf Hypothesis, which approaches the influence of language on thinking, something intensely debated and advocated by Chiang. While I survey notable linguistic studies and report what evidence there is regarding language influence on thought, I also try to connect all that to the two plots, providing underlying content to

demonstrate the plausibility levels of the ideas conveyed by the authors. (2) Glossopoesis and Time Perception: that is, the way thought is organised in Heptapod B and how it intensely disrupts or warps its speaker's time perception. This chapter examines how the theory of time relativity in connexion with Fermat's principle is conciliated with glossopoesis in the narrative. Again, this involves the undertaking of a bibliographic survey. (3) Glossopoesis and Free Will. The Whorfian hypothesis and the non-linear time perception experienced by the speakers of Heptapod B implicate a great deal of philosophical questions regarding the existence and relevance of Free Will. This chapter deals with this dialectic taking into account the presumptions concerning the influence of determinism and how the authors debate Free Will in comparison to modern philosophy. Such are questions that neither science nor philosophy are currently able to answer satisfactorily. Right there lies the central role of literature, and even more so science fiction; taking the reader, and also the viewer, someplace else, instilling in them the passion and enthusiasm for imagining. Or, as elegantly put by Aleksandr Solzhenitsyn, "the only substitute for an experience we ourselves have never lived through is art, literature" (40).

"Story of Your Life" and *Arrival* do just that. While science fails to provide a proper response, science fiction takes upon the role of leading people not towards the answers but on the way to inventiveness and ingenuity. This has much to do with the objective of the present thesis; instead of providing the solution, raising the questions and fomenting the debate in a speculative manner is what truly interests me here. Those interrogations are the reason why this thesis focuses primarily on Heptapod B, that features both in the short story and its cinematic adaptation.

Sadly, not much has been written specifically about these thought-provoking pieces of literatureand cinematographic production; not academically, I mean. Fortunately, the same is not true about the three philosophical questions raised above. They have been the object of much debate and controversy.

Therefore, as the conundrum of this thesis begins with the solid relationship between glossopoesis and science fiction, the reflections of Stockwell (2006) and Ria Cheyne (2008) are of paramount importance. About the debatable Whorfian hypothesis, it behoves me to deepen into the writings of Benjamin Lee Whorf (1944) and Guy Deutscher (2010). As well, Emanuel Byland and Panos Athanasopoulos (2017) recent article, *The Whorfian Time Warp: Representing Duration Through the Language Hourglass* approaches the slight changes in people's temporal perception depending on the language being spoken; their comments serve the purpose of illustrating my discussion.

Such dispute is undoubtedly fanned by Lera Boroditsky in *Does Language Shape Thought? Mandarin and English Speakers' Conceptions of Time* (2001), in which the researcher remarks that Anglophone people and speakers of Mandarin Chinese talk of chronological time in distinct manners. While the former talk about time as though it were, say, 'horizontalised', the latter speak as thoughit were 'verticalised', and such difference reflects to some extent on the way speakers perceive time (Boroditsky 1).

Not out of chance, then, how Louise Banks (the protagonist in both stories) narrates the events in the plot demonstrates the author's tacit belief in an association between Whorfianism and the theory of time relativity. Supporting the plausibility of Chiang's four-dimensional beings, James Isenberg, in the article General Relativity, Time and Determinism (2016), admits that the general relativity theory predicates the possibility of "bizarre events" related to time. Unambiguously, there are cosmos models consistent with the general relativity principles in which observers can cyclically move in time (Isenberg 2). Curtis and Robson (2016) exposition on MacTaggart's view of a "block universe" also provides the discussion with a reasonable amount of ammunition. Particularly helpful are the observations the author himself makes on Fermat's principle, and the objective descriptions by Nussenzveig (1998), leaving it unnecessary to look much further into the matter than at the short story itself.

A great many philosophers have dwelled on the question of determinism and its possible reconciliation with the existence of real free will. German philosopher Friedrich Nietzsche (1895) is one of the most echoed voices on this matter, alongside with Schopenhauer (1839) and the classical contributions of Aristotle accounted for by Todd (1976). Besides, Wolfgang Müller-Lauter (40) points out some interesting issues that lead to compatibility with the power to choose. Nel Grillaert (55) likewise supports a compatibility reading in which the human will is receptive to events and impressions that emerge into man's trajectory. In the third chapter of the thesis, I intend to focus on the opinions pro and contra compatibility of the two ideas in comparison with the authors' views.

Subsequently, for the reason that this thesis involves a dual corpus that comprises an adaption from literature to film, I shall, in addition consult Gualda (2010) and Bluestone (1968), who help to understand the theory of the intersemiotic translation of literary texts into films, bearing in mind, nonetheless, that the various dissimilarities between the literary text and its filmic adaptation concerning style or strategy are not my main focus here. Instead, examining the gaps left in the short story that is filled out inthe film and vice-versa constitutes the reason why both sources compound my corpus. However, the discrepancies are also the object of some brief and occasional discussion.

2 GLOSSOPOESIS AND THE SAPIR-WHORF HYPOTHESIS

The multitude of literary works that portray some kind of glossopoesis in their plots has shown one indisputable fact: Glossopoesis, science fiction and the Sapir-Whorf hypothesis have a strong and lasting bond. “It begins with naming”, writes Le Guin, “invented names are a quite good index of writers’ interest in their instrument, language, and their ability to play with it […]” (Conley and Cain 17), she continues; and in effect, invented languages have repeatedly appeared in science fiction texts and films.

Far from completeness, most science fiction glossopoeic “projects” usually present a sketch of the language and one or many philosophical issues. Utterances in the fictional language or uses thereof are generally a means used by the author to communicate with the reader:

> […] samples of alien speech included in sf [science fiction] texts – are polyvalent, allowing authors to reach readers on several levels. On the first and most basic, all samples of a created language within an sf text serve to give notice of *difference* […] from readers’ expectations for contemporary humans. […] The more ostentatiously an utterance flouts the norms of the language in which the rest of the text is written, the more exotic the author’s intended perception of the beings who speak. (Cheyne 392)

The case of Ted Chiang’s “Story of Your Life” illustrates Cheyne’s premise very well. The fact that the author did not put much effort to constructing a fictional language that would resemble a natural language but rather focused on building moral and scientific questions serves to prove that Chiang’s main interest was to communicate with readers, making them envisage the extrapolations he had once imagined, thus providing them with the appropriate metaphor.

Indeed, the naming of or in the fictional language is in itself a means of communication with the audience of the text. It is also noteworthy that there seems to be a lack of concern for adhering closely to what is currently held correct and accurate by linguists, as previously noted.

Clearly, the author uses glossopoesis in his text to question reality, morals and science. In this regard, the disputable Sapir-Whorf hypothesis has been the scientific trope most widely found in narratives. Malmgren writes that it should not strike anyone as a surprise that most science fictions featuring an alien or invented tongue adopt a Whorfian view of the relation between language and reality since what they seek to emphasise is the extent to which any new language system can affect our view of reality (16).

Heptapod B, in both written and filmic texts, deals a lot with the speculations on that linguistic theory. That is why before proceeding towards a deeper analysis of the alien language, I present an overview of the Whorfian hypothesis that is nowadays thought to impart.

2.1 The Sapir-Whorf Hypothesis – An Elicitation

The idea that language can influence people's thinking dates back to unmemorable times. Settlers from remote centuries believed that less advanced or “primitive” nations also spoke “primitive” languages, yet that was most often quite the opposite. However, this notion began to change when the concern on the issue started raising the interest of researchers. A vast uncharted terrain opened up when languages asexotic as Navajo, Nootka, and Paiute were becoming the objects of close study. That was the moment in which linguist Edward Sapir and his student Benjamin Lee Whorf commenced to conceive of the linguistic proposition nowadays known as the Sapir-Whorf hypothesis. Sapir and Whorf became convinced that the intense dissimilarities between languages must have consequences that go beyond meagre syntactic

organisation and must be associated with the profound discrepancy in manners of thought (Deutscher 130).

In other words, they claimed that our mother tongue determines how we think and perceive the world. That view may sound extraordinary to some, but indeed the choice of words one makes can alter the outcome of what one says positively or negatively; that is, one can either offend or please someone just by changing the exponent of an utterance, even though the function in the phrase remains intact.

Whorf exemplified his assessment by compiling instances from numerous languages, particularly from Hopi, an Amerindian language. In Hopi, one word refers to everything that flies except birds (including insects, aeroplanes and even pilots, but not a single bird). This appears "alien" to someone used to thinking in English, but, Whorf argued, it is no weirder than English-speakers having only one word for many types of snow, while Eskimos have different words for falling snow, snow on the ground, and snow packed hard like ice. Once more abstract concepts are considered, time duration and speed, for instance, the dissimilarity becomes yet more intricate: Hopi lacks a notion of time seen as a dimension; there are no forms equivalent to English tenses, but there are a series of forms which make it possible to talk about several durations, from the speaker's perspective. It would be problematic, according to Whorf, for a Hopi and an English physicist to comprehend each other's thinking because of "the major differences between the languages" (Crystal 15).

It follows that when a language has a straight label for a concept, through its label, the concept can be unswervingly prompted, thus establishing it as a cognitive position from which to go on. On the other hand, in a language in which a straight label for the concept is not available, other available labels will be used to prompt their respective linked representations, with the prospect that these representations will, in turn, in combination with extra data, either delivered or taken to be already recognised, lead the hearer or reader albeit not straight, to the projected concept (Bloom 276).

Nowadays, this view underwent a dichotomy that resulted in two different levels of acceptance of language power on thinking. The stronger view holds that language ultimately structures how we think and perceive the world around us, which is called the language determinism theory. The weaker view considers that language can only influence our thought and world perception to a very limited extent, and that came to be known as the linguistic relativity theory.

Regrettably, through the years, this fascinating theory has fallen into disrepute. Many linguists late concluded that Sapir and Whorf had attributed far-fetched cognitive consequences to whatwere, in fact sheer variances in the syntactic organisation. Today, mentions of Whorfianism have been related mainly to mystical philosophy, fantasy and science fiction, and, indeed, philosophers, literary critics and especially science fiction writers have repeatedly shown much interest in it (Deutscher 144).

The problem is. However, some languages do offer evidence in support of the hypothesis. Because of that, interest in the theory is revived every now and then by some linguists who have found just those evidence that language does have some influence on the structure of thought; that is why, henceforth, I relate some very curious examples that might have swayed and enchanted many glossopoeists, including Ted Chiang.

Guugu Yimithirr, for one, an aboriginal language spoken by roughly 780 people in northern Australia, has a completely unexpected deictic system. The common way of relating to the position of things in space is known as the egocentric coordinates; that is, when you want to talk about the location of something, you are likely to refer to words like “in front of”, “behind”, “to the left”, “to the right” and so on. This means you base your description on your own location or that of the person you are orienting. The axis continually shifts as we move ourselves around. In that sense, something that is at some point in front of us can simply “move” to the back as we turn our bodies around.

On the other hand, there is a second system of describing spatial relations that, although also known to people of different linguistic groups, cannot be considered an everyday and colloquial strategy to talk about the location of things, namely the geographic system. Oddly, Guugu Yimithirr native speakers have developed an unmatched ability to do just that. Instead of using left or right-hand, they use "east", "north", "west", and "south", and remarkably regardless of where they are, they always seem to know how to locate themselves using that system. They have perfected such ability so much that their language does not even have words for left and right (Deutscher 138). This could be considered an unnatural skill, but it is commonto all native speakers of Guugu Yimithirr. It could be argued that it is the way people think about spatial relations that determines the way their language is organised, and not the other way around. Still, the fact that younglings first learn how to speak and then how to locate themselves is undeniable!

Even when it comes to time perception, several experiments have been conducted in the attempt to show how much language can really structure or influence thoughts; that is something of paramount interest to my research since the Heptapod's connexion with the Whorfian hypothesis is the ability to view time in a non-linear manner. Lera Boroditsky, for one, has established a few differences in time perception between Mandarin and English native speakers. She observes (4-5) that in English, people predominantly use front/back terms to talk about time, whereas Mandarin speakers use vertical metaphors to talk about time. Spatial morphemes such as *shàng* (up) and *xià* (down) are often applied to talk about the order of events, weeks, months, semesters, and so forth. The result of such differentiation could be that English speakers often use horizontal metaphors to think about time (if put in a picture, a straight line from left to right), but Mandarin speakers use vertical metaphors (again if put in an image, a straight line from the bottom to the top). In this case, when people were exposed to time metaphors distinct from the ones commonly used in their languages, they would take more time to respond.

Something else extraordinary is how vocabulary may render diverse interpretations of colour shades. The language of the Murray Islands, for example, has an intriguing way of organising colour categories. As Guy Deutscher describes them, they are the people who call the sky "black" (67). For those people, it was natural to apply the term "black" (*golegole*) to the brilliant blue of the sky and sea, and it was not that they used the same word for different colours; they really regarded blue as a different shade of black, for they would gladly compare the colour of the sky to that of dark, dirty water (Deutscher 68).

But how about perceiving time in different durations? Emanuel Bylund and Panos Athanasopoulos recently published the article *The Whorfian Time Warp: Representing Duration Through the Language Hourglass* in which they relate tasks performed by 40 native and monolingual speakers of Spanish and Swedish as well as 74 adult Swedish-Spanish bilinguals. They report that language *can* have a powerful role in transforming humans' psychophysical experience of time, contrary to the universalist account that time perception is unique to any person regardless of their language (1). While Swedish speakers tend to quantify time as long or short, Spanish speakers are more likely to use notions of big or small. Because of that, depending on how the duration of an event is graphically represented (as the time-lapse bars in video software) Swedish speakers may view the passage of time as longer or shorter than Spanish speakers (Byland and Athanasopoulos 7).

2.2 Implications of Heptapod B and its Associations with the Sapir-Whorf Hypothesis

As aforesaid in this thesis, the fictional language that genuinely matters for my research is the written variety of the alien language named Heptapod B. What follows next is a closer look at it, how its concept is heavily grounded on the Whorfian theories and the implications thereof. The aliens get their name from their seven-leg unusual appearance (Hepta, Greek for seven; Pod, Greek for feet); and in fact, this peculiarity was the first thing to enthral me about the aliens. One reason for this is that naming in literature is hardly ever a subject of mere coincidence or randomness, chiefly when glossopoesis is involved.

Authors usually are very careful when choosing names of characters, places and so on. Equally then, there are some reasons that drove me into thinking that it is not arbitrary at all the fact that the aliens have seven limbs; there must be a hidden semiotics that, too, has to do with the linguistic theory that orients the plots. That is why I believe the name heptapod deserves further consideration before advancing on the scrutiny of the fictional language Chiang invented.

After dissecting its Greek etymology, I have pondered as to why the author decided that his alien species ought to have such awkward physiology of seven limbs. First of all, I must admit that it is very humanlike to think of limbs in pairs, so it is possible that the seven limbs simply intended to make the alien look odd. However, elaborating a little longer on that, I consider it likely that this bizarre shape of seven legs or arms may have deeper ties with the exterior world. I have commented that the Sapir- Whorf hypothesis which strongly affects the plot in the stories has been strongly influenced by certain tongues that the theorists studied prior to postulating the linguistic relativity theory, namely the Uto-Aztecan branch of languages. As it is, the number seven has been mystified in various cultures. In the Bible, for example, seven is a symbol of perfection or completeness, and such is related to God. Many meaningful occurrences of the number seven are found throughout the Bible: God created the world in seven days, and the seventh day was declared sacred; Jesus died on the 14^{th} of Nisan (2x7=14). Outside the holy book of the Christians, likewise, the number seven continues to intrigue: there are seven days of the week, seven seas, seven continents, seven colours in the rainbow, seven notes on a musical scale, and even seven levels in the periodic table of elements, etc. Even more fascinating is that for the Mayan numerology, those born on a seven day are believed to have the ability to see both backwards and forwards (Johnson 1). Could that be a reference to a divinity character of the heptapods, or is it a reference to their ability of precognition? Very titillating! It is clear, however, that the seven-leg shape cannot be out of chance.

In addition, the heptapods possess different vocal equipment, which allows them to produce sounds compared to “a wet dog shaking the water out of its fur” (Chiang 119); in the film, however, they sound very similar to the tripods in *War of the Worlds* (2005), the cinematic adaption of H.G.Wells’s homonymous novel (1898). That sound is a very common tune in Villeneuve’s films. We can hear different reverberations in the cinema adaption that are odd and unpronounceable. Anyway, the human larynx is not capable of reproducing those sounds or more appropriately, noises. Therefore, Louise uses recordings in playback to engage the heptapods in crude conversation, at least in the first moment, right before she realises the written form is much more suitable for interracial communication. With the use of videos and computer programmes, she then tries to see what graphemes she might identify and use to compose her own utterances. Louise eventually recognises Heptapod B as a “semasiographic” writing system that follows a non-linear order, in reality, a more circular “word order”. Heptapod B can thus be described “as a more flexible and effectively entirely different language” from its oral variety (Conley and Cain 180).

Also, it is, as Cheyne (391) points out, a performative language rather than informative; they used it“to actualise”. Of course, since they could look into the past or the future at will, they could predict what their interlocutor would say. Still, only if they said something; otherwise, there would not be anything to predict, for the aliens could not read minds or at least that is what the text implies (Chiang 138). There are examples of that in the human world as well. At a wedding, for instance, everyone anticipates thewords “I now pronounce you husband and wife”, but the ceremony is not valid unless those words are actually uttered (Chiang 138).

The Heptapod aliens also had a different and particular response to the variational principles of physics (e.g., Fermat’s principle of least time, according to which light always chooses the fastest possible path). Right as a ray of light seems to select the fastest path to reach a destination, the Heptapods notice and converse teleologically rather than casually.

Their writing involved, in every case, a single continuous and circular line, which means that they had to know how the entire sentence would be laid out before they could write the very first stroke. Both in the short story and in the film, descriptions of how the language worked are offered:

> The language had no written punctuation: its syntax was indicated in the way the semagrams were combined, and there was no need to indicate the cadence of speech. There was certainly no way to slice out subject-predicate pairings neatly to make sentence and a paragraph, or a page, was size. (Chiang 112)

Although Ted Chiang does not present a visual representation of Heptapod B, there are vivid accounts that get us thinking. Dr Banks outlines their writing as something far more complex than mere pictography; the language shows rules of "visual syntax", she remarks (Chiang 108). Louise then explains what she means by saying:

> In their written language, however, a noun is identified as subject or object based on the orientation of its logogram relative to that of the verb. Here, take a look. […] For instance, when 'heptapod' is integrated with 'hears' this way, with these strokes parallel, it means that the heptapod is doing the hearing. […] when they're combined this way, with the strokes perpendicular, it means that the heptapod is being heard. This morphology applies to several verbs. (Chiang 109)

Syntax can be defined as a set of rules, not only in a natural human language, which must be followed to make a sentence, a programme or even a picture meaningful. If the rule of syntax in language, for example, is broken, you can toss together as many words as you want, but the sentences will not make any sense. As it happens, this can also apply to the visual 'text'. Visual syntax explores colours, lines, and shadows as part of a visual grammar. Heptapod B is said to have such representational properties that would vaguely resemble some human writing or esoteric semiology. One of these comparisons posed by Louise is the Buddhist representation of human versus cosmos dynamics known as

mandalas: “The semagrams seemed to be something more than language; they were almost like mandalas.” (Chiang 127) The word mandala originates from Sanskrit for ‘circle’, and mandalas have been used to represent time and timely cycles in a person’s life. Nowadays, many esoteric people use them as a symbol of ‘a zen way of thinking’; to meditate towards a state of inner peace. It is thought-provoking to relate that to the nihilistic way the heptapods viewed the freedom-determinism dichotomy because that is the way Buddhists approach “fate”, a never changing karma that must be accepted embraced. Since life is a cycle, there is no real beginning and no real end either (Krishan 40).

There is another religious doctrine or, say, tradition, or culture, which fits the idea of cyclic time. Again, Hopi (also a Uto-Aztecan language akin to Mayan) regarded time, or so believed Edward Sapir, as cyclic rather than linear. I have already overviewed the Sapir-Whorf hypothesis in the previous topic of this chapter, but this makes for an interesting addendum to the discussion. Guy Deutscher (143) remarks that Hopi is somewhat a timeless verb language, or dare I say, “tenseless”. Hopi apparent cyclic view of time is the one thing that most amazed Edward Sapir and Benjamin Lee Whorf (Crystal 15), and this is likely the very origin of Chiang’s Heptapod’s cyclic time perspective. The use of a “circular or cyclic” looking kind of written system is, therefore, a reference to that, albeit, perhaps unintentionally, a hidden mode of linking Heptapod B to the linguistic theory that interested Chiang so much.

Following that line of thinking, it is possible to correlate the origin of the design with the ancient Mayan “Ouroboros”. An ouroboros (see figure 1) is an ancient symbol depicting a serpent or a dragon eating its own tail, it is found in many cultures, and in most cases, it represents infinity and life’s cycle. The Maya believed the white snake biting its tail (*Quetzálcoatl*) represented a perfect alignment of the processes of the Earth, the Sun, and the centre of the galaxy, which, in a way, are also biting their tails as they are in the shape of circles or ellipses (Melchizedek 8).

Fig. 1. A Mayan Ouroboros as depicted by Drunvalo Melchizedek, in *The Mayan Ouroboros – The Cosmic Cycles Come Full Circle*. San Francisco, Red Wheel/Weiser, LLC, 2012.

Note an instance of a proposed representation of that 'writing' as shown in the filmic adaption, whose concept was developed by production designer Patrice Vermette and his wife, Martine Bertrand. The following semagram is a vectorization of what is shown on screen, rather than a print screen thereof, and so, there may be scarce disparities in a few details, nonetheless, it shall serve the purpose of illustration.

Fig. 2. Heptapod written sample (semagram for human) from my personal archive

I focus on analysing the above figure for a while. As previously stated, the heptapods were beings that perceive time in a non-linear fashion. Human languages usually follow just a linear order in which words are added one after the other composing a straight line, which depending on the language can be from left to right, from right to left or even from top to bottom, but always a straight line. There is always some sort of word order as well; a natural order that words have to follow if they are to make any sense. English, for example, most commonly follows the SVO order (subject + verb + object). There is no explanation whatsoever as to why that is the semasiographic representation of "human", but one thing strikes the eye: instead of following the straight-line language pattern, the Heptapod writing is circular. The word in figure (2) has no beginning and no end either. You do not know where to start reading, you have to look at everything at once and recognize it. This reflects the way they see time, and at the same time, it is the means that allows them to do that, a clear reference to the Sapir-Whorf Hypothesis.

Consider a more complex semagram, a whole sentence, this time, and again note there is no word order to be observed here; words are put together at will, and you have to get them all at once in order to convey meaning. Correspondingly, you also have to have in mind the whole sentence before laying it out.

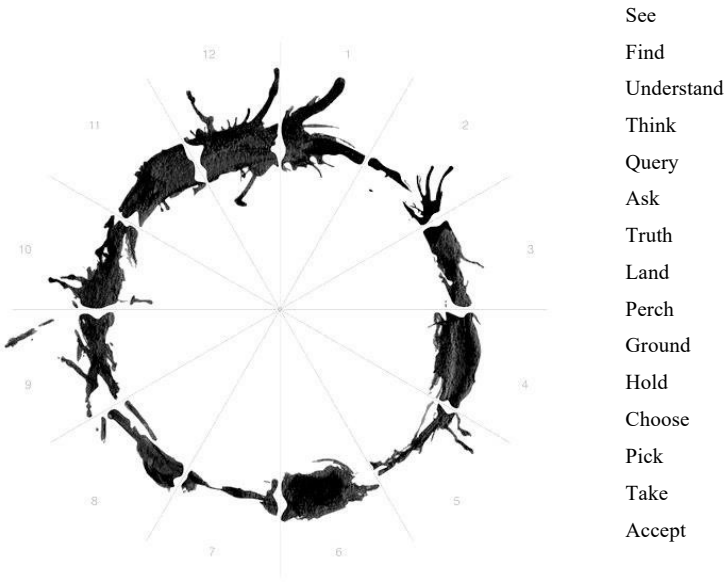

Fig. 3. Heptapod written sample (semasiographic sentence) from my personal archive

The above semagram is seen in the film at 01:01:10, but no translation is offered. Every stroke represents one or more of the words listed on the right. Again, there is no beginning or end in the sentence, readers have to look at the whole sentence at once, and the writer has to know exactly how to finish the clause, before even starting it. This is a neat way of reflecting the philosophy behind the conceptual language.

Notably, Dr Banks alludes to some characteristics of the language that harks back to traffic and road signs or pictography alike. If you see any of the signs below, you do not have to "voice them up" in your head, you simply and promptly get them (see figure 4).

Fig. 4. Traffic and road signs from my personal archive

Now, imagine you are driving your car around and come across those signs. No one "reads" them in their mind like: 'there are parents walking their kids to school'; 'I cannot park my car in here'; 'It is forbidden to make a U-turn here'; 'Oh I cannot cross the street right here'. Anyone simply understands them; it is a very efficient non-verbal language. Take now the following excerpt from the short story as a comparison. It sounds like the same sort of non-verbal language, but obviously with infinitely more complex information (cf. Chiang 108):

> The language had no written punctuation: its syntax was indicated in the way the semagrams were combined, and [because Heptapod B is a self-sufficient mode of expression] there was no need to indicate the cadence of speech. There was certainly no way to slice out subject-predicate pairings neatly to make sentences. A "sentence" seemed to be whatever number of semagrams a heptapod wanted to join together; the only difference between a sentence and a paragraph, or a page, was size. (Chiang 111-112)

This association fits flawlessly the readiness of interpretation of road signs, despite being a much simplified model. “The logograms weren’t arranged in rows, or a spiral, or any linear fashion. Instead, Flapper or Raspberry [what the heptapods Louise had contacted were called in the short story] would write a sentence by sticking together as many logograms as needed into a giant conglomeration.” (Chiang 107) As it is, following Cheyne’s descriptions of literary fictional languages, Louise goes on to provide information about how a translation must be done, subjective impressions of the constructed language, data about grammatical structure, and discussions of other properties of the language, or of notable quirks and featureswithin the language (391):

> Much more interesting were the newly discovered morphological and grammatical processes in Heptapod B that were uniquely two dimensional. Depending on a semagram’s declension, inflections could be indicated by varying a certain stroke’s curvature, or its thickness, or its manner of undulation; these were non-segmental graphemes; they couldn’t be isolated from the rest of a semagram. And despite how such traits behaved in human writing, these had nothing to do with calligraphic style; their meanings were defined according to a consistent and unambiguous grammar. (Chiang 114)

Every “depiction” of the fictional language both in Chiang’s and Villeneuve’s and Heisserer’s texts serves the purpose of defining the heptapods as exact and reasoned beings who are bound by a simultaneous time perception. The impossibility of detaching strokes or bits of the “whorl” in the Heptapod circular semagrams appears to be yet another allusion to their non-linear perception of time, and as a consequence, a display of the writers’ acceptance of the language power exerted on mind, or the reflexion of it on culture.

It is possible that the mention of declensions, inflections, stroke’s curvatures and such is an occurrence of what Stockwell (8) and Cheyne (396) classify as an alien characterization, that is, the author

collects linguistic items that sound or look foreign to speakers of English in order to instil in the readers a strong impression of alienness and difference (out of curiosity, in the glossopoeists' jargon that is called a kitchen sink conlang).

Next, Louise presents an outline of some characteristics that she compares to a language that is often regarded as exotic by western language speakers, namely Arabic, and Chiang even emphasizes the language's exoticism by adding that no human being would be able to deal with the complexity of the Heptapod B writing whorls in the necessary speed, reinforcing that no stroke and no bit of the "sentence" could be altered without changing all the rest:

> The heptapods didn't write a sentence one semagram at a time; they built it out of strokes irrespective of individual semagrams. I had seen a similarly high degree of integration before in calligraphic designs, particularly those employing the Arabic alphabet. But those designs had required careful planning by expert calligraphers. No one could lay out such an intricate design at the speed needed for holding a conversation. At least, no human could. (Chiang 123)

Louise labels this as a "two dimensional grammar", and again a fact is reinforced here; only a simultaneous consciousness could naturally construct a sentence in Heptapod B. Stockwell (6) arguments that where invented languages are mentioned but do not appear fully, it is usually because they are imagined to be so far in advance of the reader's mind that the narrator cannot render them in a way which would be at all comprehensible, and indeed, one of Chiang's premises is that, again, only someone with a simultaneous consciousness can fully understand Heptapod B. Louise comments on the visual effects that the looks of the aliens semasiographic writing may exert on, say, primitive minds:

> […] The writing looked like fanciful praying mantids drawn in a cursive style, all clinging to each other to form an Escheresque lattice, each slightly different in its stance. And the biggest sentences had an effect similar to that of psychedelic posters: sometimes eye-watering, sometimes hypnotic. (Chiang 112)

Psychedelic nausea, eye-watering sensations and hypnosis experiences are the results of a long stare at the whorls. Furthermore, Louise compares the logograms to Escheresque lattice forms (see figure 5). Maurits Cornelis Escher was a Dutch graphic artist who made mathematically inspired woodcuts, lithographs and mezzotints. Escher's works feature mathematical solids and operations, explorations of infinity, reflection, symmetry, perspective, hyperbolic geometry and tessellations (Britannica 633). Indeed, Louise associates the aliens' logograms with the exact sciences:

> "There are other examples, but you get the idea. It's essentially a grammar in two dimensions."
>
> He began pacing thoughtfully. "Is there anything like this in human writing systems?"
>
> Mathematical equations, notations for music and dance. […] I think it's like a full-fledged, general-purpose graphical language." (Chiang 109-110)

It is possible to notice (see figures 2 and 3 again) that the film crew really made a fabulous effort to represent Chiang's descriptions of the whorls. They also showed their struggle to stick to the Whorfian theory and even extrapolated on it. They also maintained the narrative aesthetics but changed some characters' names. It goes without saying that precisely epitomizing all of Chiang's "portrayals" was never an easy task. From praying mantids to Escheresque lattice there is a lot of difference. In an interview published by a newspaper, design director Patrice Vermette reveals that first sketches of the drawings included digitally altered versions of J.R.R.Tolkien's Elvish language, only rendered in a closed circle (O'Sullivan 1).

Although this alleged faithfulness is appreciated by many, the idea of adapting a literary text into the cinema requires a large amount of changes (Gualda 215); those changes are perceptive in all the gaps of the information left by the short story that were filled by the film, though other gaps that did not exist in the literary text were left in the film.

For example, the book did not bring any graphical realisations of the language's writing system; those were shown in the film, however most of the intense explanations of the language commented on by Louise and the science behind it are left out in the adaptation for obvious reasons (Gualda 205).

Evidently, short story and film are two independent and autonomous works. They carry predetermined objectives, different audiences (most of the time), distinct ideologies (writer/director); and still uphold a strict relation to one another (Gualda 201).

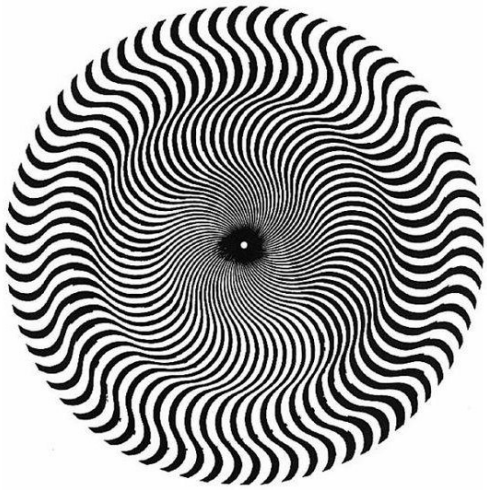

Fig. 5. An Escheresque lattice
(sample taken from http://optischeillusies.blogspot.com.br/search?updated- max=2013-07-03T14:00:00-07:00&max-results=10 on 17.10.2017 with kind permission from the blogeditors).

There is a moment of awakening both in the short story and in the film in which Louise is realizing her thoughts are changing dramatically. An incomprehensible ability begins to manifest. In the literary text, she commences to experience something similar to what she had once gone through while learning Russian; she was starting to think in Russian.

The big difference lies again on Chiang's tacit acceptance of the strongest version of the Sapir-Whorf hypothesis; of course he breaks all presumed barriers with it. In the film, likewise, close to the 58th minute of it, Dr Banks begins to premonition moments with her unborn and even unconceived child. The visions surely confuse her, but she soon becomes aware of what was really happening:

> More interesting was the fact that Heptapod B was changing the way I thought. For me, thinking typically meant speaking in an internal voice; as we say in the trade, my thoughts were phonologically coded. My internal voice normally spoke in English, but that wasn't a requirement. The summer after my senior year in high school, I attended a total immersion program for learning Russian; by the end of the summer, I was thinking and even dreaming in Russian. […] my thoughts were becoming graphically coded […] I saw semagrams with my mind's eye, sprouting like frost on a windowpane. (Chiang 126-127)

Louise was developing the same capability the heptapods possessed, that is, moving her cognition cyclically through time, remembering the future. She is already dreaming in the fictional language , which by the way is a clear sign of proficiency in a language. During the film, Banks even mentions the Sapir-Whorf hypothesis by name as she talks to Dr Donnelly, and reveals her mind disturbances (Heisserer 72). However, there are human limitations as she keeps recounting in the book:

> Even though I'm proficient with Heptapod B, I know I don't experience reality the way a heptapod does. My mind was cast in the mold of human, sequential languages, and no amount of immersion in an alien language can completely reshape it. My worldview is an amalgam of human and heptapod. (Chiang 140)

At this point, Chiang appears to be trying to make his story sound a bit more plausible, realistic and scientifically oriented, a concern not shared in the film, though, since Louise assumes henceforth a role of a saviour of humanity, interfering with the sequential futuristic events (that is a topic to be discussed in the 4th section) rendering an essential science fiction/fantasy flavour to the plot. It seems reasonable that Louise cannot get to the same level of nonlinearity of time as the heptapods, simply because human physiology is drastically different from that of the aliens:

> Seven lidless eyes ringed the top of the heptapod's body. It walked back to the doorway from which it entered, made a brief sputtering sound, and returned to the center of the room followed by another heptapod; at no point did it ever turn around. Eerie, but logical; with eyes on all sides, any direction might as well be "forward". (Chiang 97)

Despite physical discrepancies, some abilities seem to require an infant stage of life to be fully developed. Many people, for one, who learn a language as an adult, never get to speak like a native. The case of the aboriginal Guugu Yimithirr people who acquired the skills of locating themselves in space perfectly based on cardinal points exemplifies this; someone who learned that language would not simply develop the same skill with impeccable proficiency.

Here, Chiang seems to be trying to extrapolate on the Sapir-Whorf hypothesis associating the language features of a being to all aspects of its physical characteristics. That not only makes sensebut also is coadunate with scientific thought; it is not that language reshapes physiology, it actually evolves accordingly. The next quotation clarifies a little bit what I am implying here:

> "So they can read a word with equal ease no matter how it's rotated." Gary said. He turned to look at the heptapods, impressed. "I wonder if it's a consequence of their bodies' radial symmetry; their bodies have no 'forward' direction, so maybe their writing doesn't either. Highly neat." (Chiang 106)

It has already been established that their fictional language has no forward or backward direction. However, as of this moment, my intention is to emphasize how Chiang ponders the connexion among language, thought and anatomy. The heptapods were greatly adapted to non-linear perception of time, which humans are not, and, therefore, being unable to fully experience a sort of cyclic 'non-temporal' existence.

Even though the idea of acquiring such a skill only by learning a different language, be it as alien and exotic as it might, may sound absurd and implausible, it does find some connexion with one of the examples I gave in the previous topic. Modern linguists will argue that there is no evidence of a tremendous permanent impact on cognition left by the language one speaks. Nonetheless, recall the instance of the Guugu Yimithirr aboriginal language, whose speakers had acquired the ability to always know the south, the north, and so on. Ordinary western people do not have such skills, or at least it is not a common ability among the speakers of western languages. How come they can do that? Linguistics has not provided a satisfactory answer to that. How about all the other examples of people's perception of time being slightly altered because of the languages they were using, like in the cases of Chinese speakers vs English speakers, and Spanish speakers vs Swedish speakers?

As Stockwell quite appropriately remarks, it must be taken into account that "the literary context is an artistic one, where poetic license ought to be allowed" (9). Fictional extrapolations in the field of linguistics appear to be more inflexibly analysed than equivalent conjectures in other knowledge areas. The "debates over linguistic patterns adopted by literary writers become very vehement, as if the language itself, even though imaginary in origin, has a status and reality of its own, and a life beyond the world in which it belongs" (9). Cheyne (391) agrees while quoting Suzette Haden Elgin by saying that "the grammar descriptions of ET languages provided in science fiction are, most of the time, grossly unscientific or they perpetuate the worst myths of traditional grammar and language study on Earth".

Johnson (219) makes an important analysis on the matter of the typical scientific unorthodoxy, more peculiarly in linguistics. She reasons that "the arts are influenced by science through its philosophical implications, not its mathematical proofs. Consequently, the implications may not always fit the facts as science considers them, "but the influence [of the facts] is nonetheless real" and strong.

In this case, the metaphysical implications of scientific facts and theories are more important to reasoning, imagining and fantasising than the precision in application or interpretation. After all, the purpose of science and arts is not as antagonistic as some may think; it is more of organising experiences from distinct perspectives, but always so that they have meaning.

Fictional languages have an "indexical function", which is to support the construction of the fictional world and raise the reader's sense of its believability, I mean, that of the invented world. This utility is "indexical" for the reason that it is one of the chief apparatuses by which readers can define the degree of openness between their own world and the fictional world (Stockwell 7). Neographies, as Stockwell names the artificially constructed writing systems, have "an emblematic function in the sense that the language itself represents a thematically important idea" (8).

This is why the Sapir-Whorf hypothesis has long been a target of speculative fiction, since extrapolating on that thoughtful and imaginative theory creates the possibility of attaining a new way of thinking, or of becoming more than human (Cheyne 396). It is no surprise that most of science fictions featuring an invented tongue as its narrative dominant adopts just the linguistic relative view of the relation between language and reality (Cheyne 397). Since the language being spoken "structures and even limits its speaker's view of reality" or, be that as it may, their entire way of thinking, language can serve the purpose of defining indirectly how characters perceive or interact with their own societies, and as such, it is an incomparable means of describing an invented nation or race (Fairchild 6); the previously mentioned *1984*, written by George Orwell, explored it; Suzette Haden Elgin's Láadan in *Native Tongue* approached it; Ursula K. LeGuin's Pravic in *The Dispossessed* is yet another example, and so is it with "Story of Your Life" and *Arrival*.

It is really intriguing! The implication of that may be that the learning of the alien language could make a pre-existing but dormant aspect of human cognition accessible. Similar to the idea of the destruction of words in Newspeak in order to refrain people from thinking what was not desirable to the Party, the new language would "provide Banks with a cognitive technology to access a part of her mind that had always been there, but had never been used" (Adger 1).

This same implication is corroborative with the heptapods' claim that they have brought a gift, a tool with them for humankind to use in exchange for mankind's help in 3,000 years. "It's their language. [sic] They gave it all to us.", says Louise in ecstasy as she realizes what the heptapods came here to do (Heisserer 115).

This gift-exchanging idea is also present in the book as it is in the film; but the gift left by the heptapods is not disclosed in Chiang's text. In fact, there is a mention of multiple occasions in which they supposedly exchange gifts. In most opportunities, the heptapods would "give out" information and knowledge already known to human scientists. The aliens would routinely only demonstrate their own notations on physics and mathematics of the data humans would share with them, instead of partaking anything new. "[I]t was like performing in a play", said Louise.

Perhaps, all the gift-exchanging transaction was something novel to them. Since they already knew ahead of time what they were getting, it is possible that they figured they should also give out something humans already knew too. It is reasonable to imply, as a result, that it really is the heptapod language that stood for the gift, or else, perhaps there was never a gift, all they ever wanted was to establish a new channel of communication with a newlydiscovered species, and teaching us their language was this channel, as well I would say that discussing on anything in a language you are still learning, even subjects you are already proficient at, makes for an excellent way of practising; that might have been their interest in those talking sections. Just consider what can be achieved by carefully calculating what the future outcome of a course of action will be.

Maybe wars would be avoided, crimes could be prevented (like in *Minority Report*, a 1956 science fiction short story by Philip K. Dick), illnesses, diagnosed sooner and their cure brought from the future, and so forth, yes, a wonderful gift indeed, despite the real possibility of it being misused and corrupted as it frequently happensin human society.

However, that also poses another big question, the second issue I proposed in the introduction: Granting that language can deliver talents such as that (it cannot, says science), can time be experienced differently than the traditional separation in past, present and future, that is, in a cyclic manner? Both Chiang and the film approach this issue beautifully, but that is a discussion for the next chapter.

3 HEPTAPOD B AND TIME PERCEPTION

"We are so bound by time; by its order." (Heisserer 2) That is a part of the opening words in *Arrival* (2016). We are really very bound by time and its order, as Dr Banks remarks; everything around us, in our perspective is connected to our notion of it. Conceptualizing time is a problematic task, for its notion cannot be physically grasped. We tend to perceive it as a sequence attached to movement – "a day is the movement of the Earth around itself, while a year is the movement of the Earth around the Sun" (Kawamoto 17). It is of paramount importance to state from this point forth that "Story of Your Life" and *Arrival* are not about "time travel", at least not the traditional type of it. The characters of both stories do not move physically in time, but only their consciousness, their cognition. In other science fiction stories related to time, characters travel to the past, for example, and modify it. That is not the case here, although characters' consciousness moves cyclically in time, they cannot change the past, and perhaps, not even the future, as I manage to establish in the following discussion.

The way time is noted and how memories are represented in both literary and filmic texts make things even a little odder. There is an intentional confusion in the tenses used to narrate the stories: "I *remember* the scenario of your origin *you'll suggest* when you're twelve" (Chiang 91). The word "remember" and the future tense are put together in the same sentence. Is it a plot incongruity? Not really! Reading on in the text or watching the film onwards reveals a series of what appears to be flashbacks of Dr Banks, her husband and daughter, but they are in reality "flash-forwards", as shown through the citation below (all italics are mine):

> The request for that meeting was perhaps the second most momentous phone call in my life. The first, of course, *will be* the one from Mountain Rescue. At that point your dad and I *will be* speaking to each other maybe once a year, tops. After I get that phone call, though, the first thing I *'ll* do *will be* to call your father. (Chiang 95)

The short story follows two lines of narration that intertwine with each other all the time. Sometimes, the text that represents the present is interrupted, and there surges a flash forward regarding Louise's daughter. In fact, Ted Chiang's first paragraphs are about the protagonist's memories of her yet unconceived daughter. Only then, the foreground story really comes forth. Indeed, the same nonlinearity noticed in the heptapods' time perception and writing system is denoted in the narration, and that is intended to make the audience also experience a little bit of what Louise is going through.

The excerpt that follows shows this sort of nonlinear narration, as it presents a linguistic explanation Dr Banks was giving Dr Donnelly, which is interrupted all of a sudden to show one of the professor's flash forwards on her daughter. Only a single spaced line between the two paragraphs is used to indicate the change in the context:

> […] the third, and most interesting to me, was that the heptapods were using a nonlinear system of orthography that qualified as true writing.
>
> I remember a conversation we'll have when you're in your junior year of high school. It'll be Sunday morning nd I'll be scrambling some eggs while you set the table for brunch […] (Chiang 107)

The way the story is reported, sometimes in the past simple tense, sometimes in the future tense, indicates that Louise is telling it to her daughter, even before she is conceived, while she is still a memory from the future. It is possible to deduce that, because of the moment in the story at which Louise falls in love with Dr Donnelly, right to the end of it, more precisely in the last paragraph, when he comes to her and asks: "Do you want to make a baby?" (145) It is, a propos, her daughter that the title "Story of Your Life" is about.

Louise Banks has acquired the skill to perceive time in somewhat a similar way to the heptapods, after learning and thinking in their language; now, indeed she is *remembering* and *recounting* the "future", if I am to put it in the audience's perspective.

As already stated, the text and the film are related in a sort of temporal disorder or confusion, in which future is sometimes told as though it were past. Chiang and Villeneuve intended the audience to find out by themselves what this aesthetics is about, for there is no introduction about it or any previous explanation anticipating it. Instead, the author prefers to draw his narration towards the scientific issues of the short story. As Dr Donnelly makes it clear, the heptapods simplistic view and understanding of the variational principles of physics is what allows them to move their consciousness through time simultaneously in the past, present and future.

Physics is indeed a fantastic subject both for scientists and science fiction writers, and the way Chiang concatenates science fiction with linguistics and physics is quite astonishing. It is unnecessary to state that an elementary comprehension of such concepts is archetypal for the target texts of my research. Because of that I proceed with a brief explanation on both the basics of what is currently understood by the principles of time relativity and Fermat's principle.

3.1 Fermat's Principle and the Metaphysics of Time – An Outline

In plain and short terms, time relativity is a theory proposed by Albert Einstein in 1905, according to which time can be perceived in different ways and distinct durations depending on various factors, in other words, not everybody realizes time in the same way and length. Isenberg (2) makes some very curious and pertinent comments on this matter: "General relativity predicts the possibility of […] strange effects related to time. Specifically, there are models of the cosmos consistent with the principles of general relativity in which observers can move *cyclically* (my italics) in time."

One way in which time relativity is put into practice is in the behaviour of light. This right here is the point in which the understanding of Fermat's principle of least time (named after French mathematician Pierre de Fermat in 1662) comes handiest. In line with it, light travelling between two points traverses its path within the shortest possible time. In a homogeneous environment, light will always propagate in a rectilinear fashion, but that may change in denser mediums (Nussenzveig 11). The notion of the refraction of light is a good example of that. In this sense, a fascinating feature of "Story of Your Life" and *Arrival*, which has led many critics of the genre to classify them as "hard science fiction", is that the texts provide readers and viewers with a realistic scientific background.

After discussing some of the notorious characteristics Heptapod B presents, Dr Donnelly deduces the aliens' views and starts to explain Fermat's principle to Louise using just the example of the refraction of light. He says, "[…] here's the path a ray of light takes when crossing from air to water. The light travels in a straight line until it hits the water; the water has a different index of refraction, so the light changes direction." (Chiang 116) He then draws a diagram (see figure 6) to represent what he is saying, and goes on, "Now here's an interesting property about the path the light takes. The path is the fastest possible route between these two points." He next draws another diagram (see figure 7) adding a dotted line to represent what would be a linear route from point "A" to point "B" in a trajectory.

He remarks that the hypothetical path is shorter than the path the light actually takes, but light travels more slowly in water than it does in air, and a greater percentage of that path is underwater. Therefore, it would take more time for light to travel along that trajectory than along the real path. After drawing the third diagram, he continues: "[…] imagine if light were to travel along this other path" (Chiang 116-117).

Dr Donnelly reasons that any other hypothetical and plausible trajectory that anyone could come up with will always be longer than the path light actually takes from one point to another (see figure 8). So light is capable of bending its route in order to shorten the trajectory it is to take, that is, light will always arrive at the fastest speed and shortest path possible. He finishes, “That’s Fermat’s principle of least time.” (Chiang 118) It is attention-grabbing that understanding the behaviour of a ray of light at the boundary between air and water appears to involve awareness of both its starting and ending points; a perception that is by no means instinctive for humans.

Noting the second diagram Dr Donnelly drew, it is easy to see that if the ray of light did not refract while travelling through water, half of its path would occur before entering water and the other half would be travelling through it (cf. dotted line), but because the ray of light refracts or bends, the path it takes inside water is reduced drastically, since light moves more slowly through water, the time needed for the ray to go from point “A” in the diagram to point “B” is also reduced drastically. But then again, you can only know how much time light spent in its trajectory once you know both the starting point of the light emission, and the ending point.

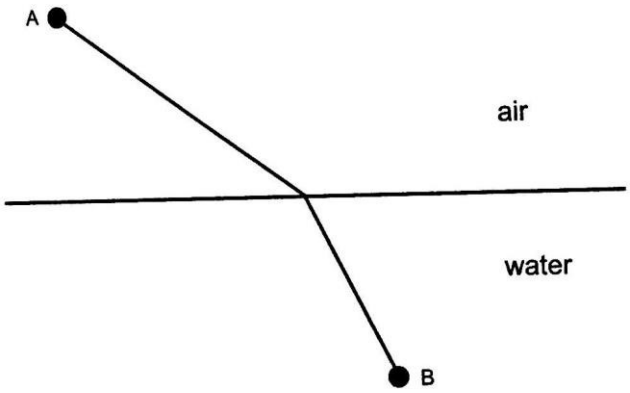

Fig. 6. First of Dr Donnelly’s diagrams (Chiang 116)

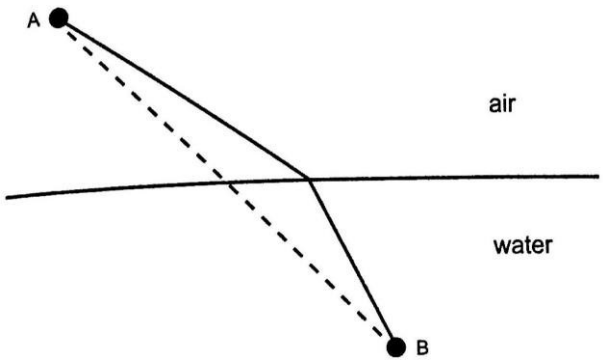

Fig. 7. Second of Dr Donnelly's diagrams (Chiang 117)

Laid in a practical standpoint, if one knows both the starting point of the emission of the ray of light and the point of its destination, it is very elementary to predict the amount of time that path will take. Fermat's principle defines "demeanour" in the physical world in terms of in what way the system works universally. Unlike, the author's views on language underlying the unorthodox and controversial premises of the Sapir-Whorf hypothesis, Chiang's outlook on this physics matter tends to be a little more factual and scientifically accurate, showing off impeccable knowledge. There is surely some amount of poetic license, as well, as it is proper of a great science fiction story.

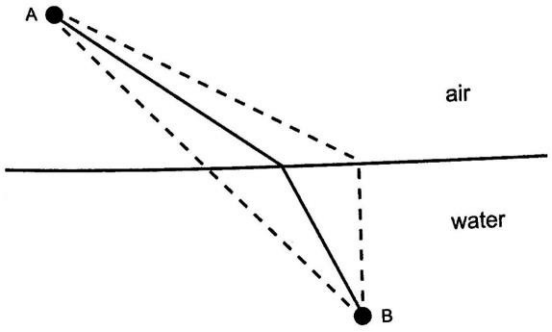

Fig. 8. Third of Dr Donnelly's diagrams (Chiang 117)

It interests me genuinely the fact that the heptapods' time perception or experience is remarkably similar to the theories of the "block universe", which is known in philosophy as Eternalism. This ontological view of the nature of time was first proposed by British idealist metaphysician John McTaggart Ellis (best known as McTaggart) in the paper entitled *The Unreality of Time* (1908), in which he argues that time is unreal. This entangles the notion that past, present and future things all exist simultaneously, being just as real as each other. In fundamental physics, this concept has been described as follows:

> […] Space and time are best described as a four-dimensional spacetime [*sic*] that represents all the places and all the times that ever exist as a single unchanging entity. There is no essential difference between the past and the future, because there is no present time defined to separate them; they cannot be distinguished from each other, so there is no meaningful present. Without an objective present, time does not flow in any real sense: the passage of time is an illusion. (Ellis 26)

This argument is interesting because it takes into account that distinguishing time into the classical categories of past, present and future is so dynamic that it is nearly impossible. With that, I mean that the present only lasts for a tiny fraction of time as perceived by an observer and as such is merely a subjective view. Put differently, present can quickly become past and future constantly becomes present depending on our own assessment of an event, and thus the passage of time is an illusion produced by an observer's mind in order only to organize things and happenings in his/her memory with no factual ties to reality.

Nowadays, comparable to what chanced to the Sapir-Whorf hypothesis, McTaggart's conclusion that time is unreal has fallen into disregard in the theoretical realm of modern physics, although his statement in relation to that conclusion is generally taken to be important (Curtis and Robson 3). Anyhow, what really matters for my discussion here are the philosophical implications of such observations, and that allows for many extrapolations in the genre of science fiction as well as constitutes just what Chiangneeded to convey non-linear time experience to his heptapods.

Therefore, the topic that follows addresses the philosophical and metaphysical implications of the least time principle and the confabulations on the nature of time in the short story and its filmic adaptation.

3.2 Heptapod B Time Perception in Relation to the Nature of Time and Fermat's Principle

Granting that the philosophical implications are more important than the facts and theories for a science fiction story, there are a lot of repercussions that I can derive from the heptapods' way of perceiving time, none of which may be very accurate in terms of the mechanics of physics, but that will still be very valid here. The most important of them all is what the nature of time and Fermat's principle have to do with the heptapods.

Well, I must begin by simply stating that according to the short story's and the film's "metaphysics", time, as we consider it, only exists in our heads, which is tacitly what McTaggart asserted; it is an illusion, just as defended by those who advocate the "block universe/Eternalism" theory. As it is, in both plots, not only light, but also the whole universe is depicted as being susceptible to explanation from two distinct viewpoints. The succeeding quotation confers a philosophical starting point:

> You're used to thinking of refraction in terms of cause and effect: reaching the water's surface is the cause, and the change in direction is the effect. But Fermat's principle sounds weird because it describes light's behavior in goal-oriented terms. It sounds like a commandment to light beam: 'Thou shalt minimize […] the time taken to reach thy destination.' (Chiang 124)

Consider a driver trying to decide on which routes to take among many possibilities in order to get to his destination in the least time possible. He would have to know first what his destination was and which route choices there were, logically. The same happens to the beam of light. Before being emitted, it is as if light had to know exactly where its path would end in order then to calculate which path would be the fastest one. Unlike the driver who chooses a route based on distance and traffic predictions, and may end up having to make corrections to his route along the way, light cannot make any changes in its path because something changed after it was emitted, otherwise, that would not be the fastest path possible.

Otherwise stated, light is capable of predicting the future, once it is emitted, it already "knows" precisely where it will end or reflect, and thus it serves the stories as a perfect metaphor to represent how the heptapods viewed time and events, or the cosmos. Ponder how Dr Donnelly explains that:

> "That's right; the notion of a 'fastest path' is meaningless unless there's a destination specified. And computing how long a given path takes also requires information about what lies along that path, like where the water's surface is."
>
> I kept staring at the diagram on the napkin. "And the light ray has to know all that ahead of time, before it starts moving, right?"
>
> "So to speak", said Gary. "The light can't start traveling in any old direction and make course corrections later on, because the path resulting from such behaviour wouldn't be the fastest possible one. The light has to do all its computations at the very beginning." (Chiang 125)

Without a doubt, in the plot, the whole universe is beheld as being susceptible to an explanation from two distinct angles. Whereas humans tend to shape language and physics so as to regard the cosmos in terms of cause and effect, the heptapods, on the other hand, understood the universe as involving final, not efficient, causes. Aristotle's doctrine differentiates four sorts of "*cosmic* causes". If I take, for instance, a sculptor at work on a statue; the marble block is the material cause, the action of sculpting, the efficient cause, the shape of the statue is the formal cause (formal in relation to form, shape), and the final cause is the purpose for which the statue is intended (Todd 1). The heptapods viewed the world in terms of purpose, goal, and destination, just like a ray of light according to Fermat's principle. So, instead of thinking about the causes and effects of actions or happenings, that is, sequence, they always looked at their purpose, in a teleological manner. So, the purpose had to be already known in order for one to start working on it or to take action. Putting it very simply, that was why they necessitated observing time in a cyclic way. Illustrating that difference, Dr Donnelly says:

> Consider the phenomenon of light hitting water at one angle, and traveling through it at a different angle. Explain it by saying that a difference in the index of refraction caused the light to change direction, and one saw the world as humans saw it. Explain it by saying that light minimized the time needed to travel to its destination, and one saw the world as the heptapods saw it. Two very different interpretations. (Chiang 133)

"The physical universe is a language with a perfectly ambiguous grammar." (Chiang 133) I return to the glossopoeic matter once again. Reality as we see it is a linguistic construction. The Sapir-Whorf hypothesis and Heptapod B are here again also underlying the metaphysics of "Story of Your Life" and *Arrival's* plots:

> When the ancestors of humans and heptapods first acquired the spark of consciousness, they both perceived the same physical world, but they parsed their perceptions differently; the worldviews that ultimately arose were the end result of that divergence. Humans had developed a sequential mode of awareness, while heptapods had developed a simultaneous

> mode of awareness. We experienced events in an order, and perceived their relationship as cause and effect. They experienced all events at once, and perceived a purpose underlying them all. A minimizing, maximizing purpose. (Chiang 134)

In conformity with that, however, one thing intrigued me from the start regarding the heptapods' time perception: They could move their consciousness through time, but how far could they go? In the case of humans, our memories of the past can only go as far as our own existence starts, and even the first moments of our lives are buried in our subconscious. Louise explains that by pointing:

> After I learned Heptapod B, new memories fell into place like gigantic blocks, each one measuring years in duration, and though they didn't arrive in order or land contiguously, they soon composed a period of five decades. It is the period during which I know Heptapod B well enough to think in it, starting during my interviews with Flapper and Raspberry and ending with my death. (Chiang 140)

I assume that just like Louise, any heptapod could only stretch its consciousness into the future within its own life span, which leads to the question of how long they were capable of living. That is not answered, regrettably. Here comes the whole "minimizing-maximizing" thing that Chiang keeps giving attention to, which was alluded to as well in the citation of page 134 of "Story of Your Life". Precisely like light can minimise or maximise its path in order to go faster from one point to another, the heptapods had the ability to cognitively minimise or warp the time needed to arrive at a certain point in the future in order to look at it. It does sound too fantastical, but the relativistic character of time, which depends on its *observer's* perspective, does allow, theoretically, for something like that to happen. With such a view, thinking of how long one can live ceases to be of any importance.

A big issue, though, which begins here as an underlying point in the whole Chiangian philosophy of time is this: Does the future already exist so that someone can really look at it? I demonstrated that for a ray of light, yes, the future sort of already exists since light can compute it and measure it in order to calculate trajectory with perfection; light "must know" in advance both the starting and the ending point; something similar to how the Heptapod writing system had to be laid out.

As previously discussed, this is just what the philosophy of Eternalism advocates; past, present and future are mental and linguistic constructions invented so that humans can organize memories and knowledge, but those three classifications do not occur independently but rather coexist, making it possible for precise foreknowledge to come about; just like past may be accurately described, so may the future as well.

In this regard, there are some great comments that I should like to borrow from the novel *The Time Machine* (1895) by H.G.Wells. With the intention of keeping focus and succinctness, I shall not leave the philosophical field. Before anything else, however, it is indispensable to note here that both "Story of Your Life" and *Arrival* have been dealing with the impossible all the way, and obviously, my thesis as well, so I may have to extrapolate science and philosophy during this discussion.

For Wells and his Time-Traveller, there was no difference between time and any of the three dimensions of space except that "*our consciousness moves along it*" (4). Men can move around with relative freedom through space. With natural capability, however, we can only move in two dimensions: right or left and forwards or backwards, and all those dimensions coexist; they do not simply come to be whenever we want to move into them; they are always there. With time, something similar takes place. We are always moving in time, from the moment of our conception until the day of our demise. "Our mental existences, which are immaterial and have no dimensions, are passing along the Time-Dimension with a uniform velocity from the cradle to the grave." (Wells 5).

As it happens, we not only can but also do move about in time, or our consciousness does. For example, when someone recalls an incident very vividly, theygo back to the instant of its occurrence: they become “absent-minded”. They jump back for a moment. Of course, they have no means of staying back for any length of time, any more than “an animal has of staying six feet above the ground” (6).

Another science fiction story that comes to mind on the subject of simultaneous time experience is Kurt Vonnegut’s Slaughterhouse Five (1969). the time travels of Billy Pilgrim who is abducted by a race of time-unbound aliens called the Tralfamadorians. According to the narration, extra-terrestrial species existed out of time and thus could move backwards or forwards in what humans perceive as time. As a result of that encounter, the story's protagonist also acquired the ability to move about through time. Coincidentally, the novel is also narrated in the same manner as “Story of Your Life” and *Arrival*, that is, non-linearly. However, Chiang claims he did not know thereof prior to writing his story (Chiang 277). The time travel that takes place in *Slaughterhouse Five* is poles apart from what theheptapods can do, in that instead of moving themselves in time or really travelling in time, it is theircognition that can stretch itself either in the past, in the present or the future. Still, the point is that the coexistence of past, present and future, or in fact, the inexistence of time, is always what allows for escaping the prison of time to which humans are condemned.

It is now essential to remember the central premise of Fermat’s principle; if a ray of light can “anticipate the future”, “knowing” no obstacle will suddenly show up to prevent it from reaching its initial destination; another big question regarding this comes up out of these considerations as Louise utters the following:

> Was it actually possible to know the future? Not simply to guess at it; was it possible *to know* what was going to happen, with absolute certainty and in specific detail? Gary once told me that the fundamental laws of physics were time-symmetric, that there was no physical difference between past and future. Given that, some might say, "yes, theoretically." But speaking more concretely, most would answer "no," because of free will. (Chiang 131)

The laws of physics are generally time-symmetric. Physical events can run backwards or forwards. Temporal and atemporal perspectives are equivalent; all the same predictions are made once the starting and ending points are determined. A memory entails our brain departing from the present and extrapolating backwards. This is not always a perfect system, sometimes we have false memories, and we think we are remembering something, but we are actually inventing something that did not happen. The same can go forwards; we can predict or plan ahead of time.

For instance, before crossing a road, a person may"predict" the near future by calculating with an outstanding level of precision whether or not there will be enough time to cross safely. Most of the time, the calculations we make are correct. Perchance the heptapods possess such means of unconsciously computing algorithms of purposes to reach a fine view of the future, just like a ray of light does before being emitted. This is also similar to the idea behind weather forecasts – a calculus of probability based on many observable variables that are taken into account before predicting that there will be rain or sun on the following day or days.

I see, nonetheless, a great paradox here. If someone can peek at their own future like Louise was doing, free will should be able to confer them a chance to change that future, and subsequently, that future prediction would suddenly become wrong and outdated; because of this, would that really be predicting the future, or would it just be guessing at it? What is more, since it is not possible to change the past, is it possible to change the future? If not, is there such a thing as free will? Again, if not, what is it like to live knowing precisely what is going to happen but at the same time being helplessly incapable of doing anything differently? I approach that discussion in the next chapter of my thesis.

4 HEPTAPOD B AND FREE WILL AND/OR DETERMINISM

As I pointed out in the two previous chapters, determinism seems to permeate the whole plot of "Story of Your Life" and *Arrival*, be it regarding language (in the case of the Sapir-Whorf hypothesis) or regarding physics (as in Fermat's principle of least time). Determinism makes it possible for the heptapods to see the future. On the other hand, however, note once more the following Louise's quotation: "Was it actually possible to know the future? Not simply to guess at it; was it possible to *know* […] with absolute certainty and in specific detail? […] But, […] most would answer "no," because of free will." (Chiang 131) An intrinsic problem with seeing anyone's future is the existence of free will. Louise continues: "The existence of free will meant that we couldn't know the future. And we knew free will existed because we had direct experience of it. Volition was an intrinsic part of consciousness." (Chiang 132) This is undoubtedly a significant paradox.

With the end of demonstrating the paradox the author wants his audience to think through, he tells of the Book of Ages tale. That book is supposedly the chronicle that records every event, past and future, something in a way similar to the Greek myth of Moira. If someone hypothetically is granted access to such a book and happens to locate the pages on their story of life; this person finds the passage that describes "her" flipping through the book, and she skips to the next column, where she finds details of what she will be doing later in the day; acting on information she has read in the book, she will bet $100 on the racehorse "Devil May Care" and win twenty times that much. Now suppose that though the thought of betting on horses had already crossed her mind, she resolves not to bet on horses anymore. That is the paradox in it; if she can change things and do a different future from the one she saw in the book, then the book is wrong.

The problem is that, according to the myth, the Book of Ages cannot be wrong; "this scenario is based on the premise that a person is given knowledge of the actual future, not of some possible future." (Chiang 131) The *Book of Ages* is a notorious logical impossibility, yet it illustrates the trouble of conciliating the theories of free will and determinism. Such a book could even exist, as long as nobody could ever read it.

Consider the events involving the death of Dr Louise's daughter, both in the literary and filmic texts. As Louise starts thinking in Heptapod B, she begins to realise time as the aliens did so that she can look into the future comprised of her own life span. As we remember our past, sometimes we have to make extra effort to recollect details of a particular event, and most of the time, we end up recalling only some specifics. The film depicts this exceptionally well. Even before her daughter is born, in the film, Louise knows her daughter will die young from a disease, while in the short story, a climbing accident will kill her. In both scenarios, her daughter will inevitably die. Nonetheless, an incurable illness is definitely harder to prevent than an accident, provided that you are able to observe the entire chain of events that will lead to it.

Another complication that pops up in the filmic adaptation is that Louise was able to participate in the developing events all thanks to her knowledge of the future. It could be argued that she did not alter the future in any way, but rather simply played a role in the chain of events that culminates with preventing a Chinese attack against the heptapods. The sole thing that allowed her to play that part in the developing happenings was her knowledge of the future, and a firm desire to do something to stop the imminent assault on the aliens. Is that not free will that allowed her to move her towards her actions? Louise observes the following in the short story: "[…] What if the experience of knowing the future changed a person? What if it evoked a sense of urgency, a sense of obligation to act precisely as she knew she would?" (Chiang 132)

Consequently, I discuss the metaphysical views on that matter exposed by Chiang and the film producers in the present chapter. There seems to be a slight disagreement between the two versions, and because of that I must go by the premise that the book has a harder deterministic view, whereas the film, a softer one, but both share a sense of compatibility of determinism and free will. If this is even possible is one thing that I try to demonstrate through the next pages. Is it possible that just like in the other issues (language and physics), the authors also took a bit of a poetic license in here as well, departing, thus, from what is currently taken as true or acceptable thinking? Again, to debate on that, I should first proceed with a theoretical discussion about the two philosophical views.

4.2 Free Will and/or Determinism in Philosophy

When dwelling on the issues regarding cosmology, metaphysics of time and the human role in all that, philosophers tend to take one of the three positions I relay here: free will, determinism or the compatibility of the two.

The myth of Oedipus elucidates very well what determinism defenders hold true, that is, our actions are determined by a chain of unescapable events, and no matter what we do, we cannot modify the future even if we already know what is going to happen. Most thinkers more commonly relate the myth with the phenomenology of “fate”, mainly due to the time in history and the culture, whereto the story is more deeply tied. The account, however, surely serves the purpose of illustration.

According to the most common version of the legend, Laius, king of Thebes, is warned by an oracle that his son is to slay him. When his wife, Jocasta, gives birth to a son, he exposes the baby on a mountainside in hopes the child would die and so the prophecy would not be fulfilled, but the infant Oedipus is saved by a shepherd and adopted by the king of Corinth. Several years later, still ignorant of his adoption and learning of the prophecy and willing to avoid its fulfilment by killing his own foster father, who he believed was his birth father, Oedipus flees and ends up travelling towards Thebes.

There he meets Laius, his birth father, who provokes a quarrel; Oedipus kills Laius. He then frees Thebes of the destructive Sphinx by answering her riddle; as a reward, he is given the throne of Thebes and the hand of the widowed queen – his mother – the point being that all that Oedipus and his father did to avoid the prophecy instead triggered its fulfilment ("Oedipus" 1399).

This concern for understanding the mechanics of time, events, causation and reality is ancient. Aristotle, for instance, conceived the four causes doctrine, as I previously mentioned, as early as 350 BC. Put in plain words, therefore, as considered in this thesis, determinism is the philosophical position that for every event, even human decisions, there are conditions that could cause no other possibility. Subsequently, in a more specific way, determinism states that every event is necessitated by antecedent events and conditions together with the laws of nature (White 231).

Pierre-Simon Laplace (1749-1827) is responsible for the classical formulation of determinism in the 18th century. For him, the present state of the universe is the effect of its previous state and the cause of the state that follows. Suppose a mind, he postulated, could know all the laws and all the forces operating in nature and the respective positions and momenta of all its components, at any particular instant. In that case, it could thereby know with certainty the future and the past of every entity. In other words, it is possible to organiseLaplace's doctrine into three properties: (1) Exact knowledge of the laws of nature; (2) Complete knowledge of the state of the universe at a particular point in time, given that he wrote his thoughts before relativity and quantum mechanics theories were formulated; and (3) the ability to solve any form of mathematical equation exactly (Reich and Cotter 7). "Laplace's demon", as his postulation later came to belabelled, is now mostly taken as philosophical extrapolations (Espain 37). Yet, it surely serves my purpose here, especially as I relate it to Schopenhauer's thoughts on the matter.

Schopenhauer firmly rejects that humans are free in any way; however, he contends that in exceptional moments of aesthetic contemplation, liberation from bondage to the will can be achieved; he posits that humans are the pure, w i l l l e s s, painless, timeless subject of cognition. Commenting on his impressions, Auweele holds that free will is essentially inconsistent with Schopenhauer's insistence on the rigorous determinism of all manifestations of the will (72).

One interesting thing Schopenhauer brings to light is a distinction between the freedom to act and the freedom to will. The former is the ability to do something if one wills to do it. Such freedom can be removed by peripheral hindrances to action, restraining motives, laws or pressures of various consequences if one acts, or by impairing the subject's cognitive faculties. Accordingly, he lists physical freedom, moral freedom, and intellectual freedom as the three species of freedom to act but not towill. The question adduced by the philosopher is not whether or not the one acting *can* or even *can want* to do something, but instead that they cannot will to do that since they are governed by determinism (Janaway 22), and that establishes a related assessment to the outcome from Laplace's demon.

For Friedrich Nietzsche, a German-Swiss philosopher, also regarded as an authority on this matter, free will results from man's extravagant pride. If, on the one hand, he vehemently criticises the notion of freedom of choice, on the other hand, he inconsistently attributes a positive implication to liberty of the will (Nietzsche 18). I find it curious that this point of view seems to rule out the existence of chance.

Conversely, the exact opposite of determinism is the ability to choose between different possible courses of action unimpededly, known as free will and commonly viewed as a gift from God. Free will is closely linked to the concepts of self-responsibility, guilt and other moral judgments that apply only to actions freely chosen. The strongest line of free will acceptance is known as metaphysical libertarianism, which claims that determinism is false and free will governs our actions.

Our society lives by that claim as our judiciary systems, for example, will never absolve criminals based on the ideathat what they did was inevitable or an unbreakable chain of events that led to the crime committed as a result they had no choice.

While commenting on Argentine fabulist Borges's statement, "the future is a garden of forking paths", Fischer (4) says "We tend to think of the future as branching, tree-like structure with many nodes at which there are various paths into the future." He agrees that there may be points at which there are no alternatives to the actual course of action people take, but one tends to think that there are many times when one has various paths genuinely open. When I take a path rather than another in a situation where the other path is genuinely available to me, it is said that I have a particular sort of control involving possibilities. This decision or choice-making capability first separates persons with personhood from non-persons with no personhood.

Conventionally, the existence of "alternative possibilities" is considered to be a precondition for free will and moral responsibility; an agent is free in his or her choice and responsible for this choice only if he or she could have acted otherwise, even if there were only two options (Grillaert 43). That means that the future is open, comprised of various paths and alternatives, and although only one of those paths and alternatives can be followed, it is entirely up to the agent which one to take.

Unlike determinists who believe there is no limit to how deterministic the universe is, most defenders of the doctrine of free will acknowledge to some extent the existence of some compatibility with determinism. Before delving any further into such a theme, it is essential to distinguish between two sorts of freedom, "freedom in action" and "freedom in choice". In dealing with this, Maurice Mandelbaum states:

> The difference between these two meanings may be briefly characterised by saying that the question of whether or not I have *freedom in action* is a question of whether or not I can do what I choose to do, while the question of whether or not I have *freedom in choice* turns on the problem of why I choose as I choose. (204)

Put another way, there are things that one may want to do that do not hinge simply on one's "want" or "desire", but may be dependent on the capacity one possesses. Take, for instance, an individual who wants to fly; he cannot simply choose whether or not he will fly because flying is not one of the human capacities. So for that matter, there is not free will, but a determinism imposed by nature. Besides, even when someone can do what they want to do, there might be surrounding factors that influence that choice, for example, the person's past experiences, the way they have been brought up, the country they live in, the genetic heredities, their financial capabilities and perhaps simply the options the person was offered or is aware of. All that is, one way or another a sort of deterministic input in an individual's life, which somehow does not prevent the existence of free will but rather makes it possible (Zimmerman 418).

Invariably, the concept of choice embroils the concept of "this rather than that"; and consequently, choosing involves selecting among predetermined options (Mandelbaum 205). In short, the problem of choice centres upon the explanation which is given for doing one thing rather than another, and this explanation will, in all circumstances, be a causal explanation, irrespective of what category of cause it is (Mandelbaum 206).

Now, returning to the discussion about a deterministic metaphysics of free will; the doctrine asserts that it is still the person who is exercising free will that makes a decision, even though a choice made is influenced and sometimes determined by external factors, like the available options, the conditions underlying the choosing, the existence or not of pressure towards a particular outcome, and internal factors like genetic heredities, childhood experiences, illnesses, personal likes or dislikes, character and so on, for all those factors are what makes someone that person's "ghost", or personality, and not that of someone else's.

In that sense, for Sankowski (106), the way whereby some actions stream from character or personality "does pose a problem for many a theorist who asserts that causal determinism and freedom are incompatible". He continues:

> Causal determinism, far from being incompatible with freedom, is required by freedom. One way we can see this (it is claimed) is by attending to cases in which action flows from character. At least some such actions (it is maintained) are free, indeed commonly and with good reason treated as paradigms of freedom, and we apportion moral responsibility to persons for such actions. However, these actions flow from character and are, in this sense, causally determined by character. […] Moreover, it is sometimes argued that *all* free acts must be causally determined by character. (106)

Daniel Glaser (489) also offers some pragmatic views on compatibility between the two doctrines. He brings up that both free will and determinism are socially derived linguistic representations of reality, free will as a means of justifying holding people morally responsible for their actions, and determinism to expound, influence or even foresee behaviour. As such, the two doctrines can contribute in different contexts: free will in moral assessment and determinism in causal explanation. He goes on:

> Indeed, the assumption that rewards and punishments can shape human actions paradoxically implies both the free will to choose that which is gratifying over that which is unpleasant in its consequences and the determination of behaviour by those who can affect its rewards and penalties. (489)

For Glaser, there is a necessary connexion between deterministic explanations and the free will assumption in moral assessments; and this postulation is based on inferences rather than on direct observations, but even so "a sense of choosing freely among possible alternative forms of conduct is introspectively observable in the imaginary role-taking and inner conversation that occurs when we think about our behavior" (490).

The compatibility between determinism and free will does seem plausible to me, except in one situation that none of the theorists aforementioned ever approached; the whys and wherefores for such are self-evident: there is an incompatibility between foreknowledge and free will. As I argued at the beginning of this chapter, Ted Chiang, Denis Villeneuve, and Eric Heisserer have slightly different views on that issue that, resulted in a dichotomy of a harder deterministic view and a softer one. “The existence of free will meant that we couldn’t know the future”, said Louise (Chiang 132). And I consider it valuable to point out that the following discussion is nothing but a reflection of what can be exhumed from the texts, rather than constituting a treatise on those issues. This, however, is what I intend to address in the next topic.

4.3 Heptapod B, Free Will and Determinism – Addressing the Paradox

Henceforth, I expect to demonstrate that both literary and filmic texts have a deferring view of how determinism and free will play a role in the cosmic phenomenology, and yet both understand that foreknowledge is incompatible with free will. To illustrate that I relay the Biblical account of Adam and Eve, which is regarded by many libertarians as a pinnacle and an origin of the doctrine of the freedom of the will.

In short, the account reports that Adam and Eve were given free will as a gift from God. Their loyalty was to be tested by obedience to a simple order: not to eat from the fruit of the knowledge about good and evil. As it follows, both Adam and Eve eat from the fruit, which counts as a mortal sin, resulting in their deaths of their offspring – all humanity (*New World Translation of the Holy Scriptures*, Genesis 3:1-15).

One issue stems from the narrative: since GodAlmighty, Jehovah, can see the future, why did He not see Adam and Eve's p r o s p e c t s and realized they were not trustworthy even before creating them? For one, there is the performative reason, i.e., it was necessary that Adam and Eve first existed so that they could ever have a future and could therefore be held accountable for any misdeed and then punished accordingly; something coadunate at how the heptapods regarded oral communication, whereas for another, and this is my opinion, God might have chosen not to look at their future in order not to mess with their free will.

Just like the heptapods, what God Almighty sees in the future must be the real future, instead of a mere possibility, something that once seen cannot be changed since it is "the future"; therefore, had God peeked at Adam and Eve's future, everything about that would have been determined. I relate once more to the myth of the *Book of Ages* here. Remember that after seeing their future, no one would be able to change a single bit of the events to come. Otherwise, the *Book of Ages* would have misdescribed the future, which according to the myth, is impossible. Even if God had looked at Adam and Eve's future, seen that they were going to betray Him, and told them accordingly, they would not be able to change anything because that was a certain future as opposed to a possible future.

That understanding is reflected in the inevitability of Louise's daughter's death. What the heptapods saw thanks to their language, and subsequently what Louise also saw thanks to the Heptapod language, was not a possible future. Just like a ray of light, which calculates precisely its path in such a way that it is impossible for it to miss the determined point in space or even to be delayed and not follow the fastest possible route, it was impossible that the future seen by the speakers of Heptapod should change in any way. For that reason, the little girl's death was simply inevitable!

To make things even more explicit, I am going to compare this kind of "prediction" or "foreknowledge" with the "prediction" made by the *"precogs"* from the universe of *Minority Report* (1956), cited hitherto.

The *precogs* were a group of three mutants who could see crimes before they were committed. With their help, the "Department of Precrime" could arrest people before they murdered someone, before they stole something and so on before anyone could commit any crime. Despite the mutable character of the future seen by the *precogs*, the same problem I am postulating here is palpable: foreknowledge and free will are incompatible. Note that the "precriminals" were arrested *before* their crimes. Suppose a man was to murder his wife after he saw her in an unfaithful action. He was probably to act as predicted because of the heat of the moment, a strong and transitory emotion. Who could guarantee he would not act differently once told about the chain of events that was to lead him towards the murder of his wife? Precisely, no one could guarantee that! And the man was never given a chance to exercise his free will and not commit that crime; he was, as it turns out, "pre-arrested".

At this point, it becomes clear how a deterministic view governs Ted Chiang's vision of the universe. He firmly believes that a chain of events, once started, will fatally lead toward a predetermined outcome:

> Freedom isn't an illusion; it's perfectly real in the context of sequential consciousness. Within the context of simultaneous consciousness, freedom is not meaningful, but neither is coercion; it's simply a different context, no more or less valid than the other. It's like that famous optical illusion, the drawing of an elegant young woman, face turned away from the viewer, or a wart-nosed crone, chin tucked down on her chest. There's no "correct" interpretation; both are equally valid. But you can't see both at the same time.

> Similarly, knowledge of the future was incompatible with free will. What made it possible for me to exercise freedom of choice also made it impossible to know the future. Conversely, now that I know the future, I would never act contrary to that future, including telling others what I know: those who know the future don't talk about it. Those who've read the *Book of Ages* never admit to it. (Chiang 137)

The way Dr Banks's daughter dies shows exactly that. As I have formerly stated, Ted Chiang creates a situation that could allegedly be changed should determinism not be a universal fact:

> I have a recurring dream about your death. In the dream, I'm the one who's rock climbing — me, can you imagine it?— and you're three years old, riding in some kind of backpack I'm wearing. We're just a few feet below a ledge where we can rest, and you won't wait until I've climbed up to it. You start pulling yourself out of the pack; I order you to stop, but of course you ignore me. I feel your weight alternating from one side of the pack to the other as you climb out; then I feel your left foot on my shoulder, and then your right. I'm screaming at you, but I can't get a hand free to grab you. I can see the wavy design on the soles of your sneakers as you climb, and then I see a flake of stone give way beneath one of them. You slide right past me, and I can't move a muscle. I look down and see you shrink into the distance below me.
>
> Then, all of a sudden, I'm at the morgue. An orderly lifts the sheet from your face, and I see that you're twenty-five. (Chiang 134)

Ted Chiang writes this bit in a provoking and intended confusing manner. It was thought to look like a dream, not exactly a memory from the future. The fact is that we sometimes do have plans that are based on memories. Most of the times, when the unconscious has suppressed a nasty and painful memory that thus can no longer hunt us in broad daylight, it keeps coming back in our dreams. Following the fashion in the text, it usually presents itself in broken pieces, with unclear information and puzzling details that frequently become unrealities. Older memories even get in the way of rendering everything even more

baffling.

Chiang did a good job there. Louise's unconscious has likely blurred the painful future memory of her daughter's death, but all the same, it keeps coming back to her in the form of a dream to haunt her in her sleep. Truncated pieces of information make it hard for her to discern at exactly what age this is going to happen. The circumstances surrounding the girl's death are only clear as to the fact that it will include a climbing accident. However, the details are not trustworthy. Note that initially in the dream, her daughter is three years old, but then, in the end, she is already twenty-five at the morgue. Besides the precise age, the way the protagonist's daughter falls while climbing is unclear. As the dream goes on, Louise describes a scene in which her daughter is a baby being carried in a sort of rucksack. Still, at a particular moment, it starts to pull itself out of the pack, and despite the mother's orders to stop, frightened screaming and physical efforts to prevent the announced tragedy, the baby does happen to fall into the abyss.

This bad dream must somehow represent the right occasion of the daughter's death, in my opinion, because of two critical points: (1) it is stated in the second paragraph that the girl will die still young (Chiang 91); (2) Experts comment that dreams of disturbed people (people mentally ill) usually take place within close, gloomy or dark spaces (Moustakas 114). That is quite the opposite of what Louise sees in her nightmare. Moustakas continues: "Dreams hold power to inform dreamers of something they did not realise and to enable them to solve a problem situation explored in the dream" (126). This is very interesting indeed. Since Louise's daughter is twenty-five at the morgue, she did not die at the age of three, and indeed not from falling from her mother's rucksack. Dr Banks also says: "I'm the one who's rock climbing – me, can you imagine it?" (Chiang 134). For me, that might be a suggestion that Louise was not even present on the day and occasion of her daughter's death, and the fact that Louise is at the morgue while an orderly lifts the sheet from her daughter's face so she can be recognised *as her daughter* only reinforces that; for why would she have to recognise her daughter's body if she had witnessed her death? So why does she dream that she and her daughter are rock climbing together?

My guess is that this is her unconscious suggestion that she should have done something to prevent her daughter's accident. When I first read the story, I kept thinking that she could have avoided that simply by never going rock climbing, to begin with. That way her daughter could never have died in a rock-climbing accident. Nonetheless, I was missing the point here. It is not Louise who is rock climbing, it is her daughter, and there was nothing she could have done to change *her* daughter's taste for adventure. Even if she warned her about this, for the whole short story is about Louise talking to her daughter about her daughter's story of life, there was still nothing that could change the future.

Now, in fact remembering a future circumstance, Louise recounts an episode when her daughter is three years old, and she is climbing a spiral flight of stairs. Worried, Louise holds the girl's hand extra tight. The girl then pulls her hand away and says, "I can do it by myself" (Chiang 135). They will often find themselves in similar situations in the future, reminding Louise of the repetitive nightmare. As if Dr Banks were thinking of the aforementioned myth of Oedipus, she says, "I can almost believe that, given your contrary nature, my attempts to protect you will be what create your love of climbing" (Chiang 135). For Chiang, the deterministic chain of events is unstoppable, like a ray of light. Given that, Louise ends up causing her daughter's accident after trying so hard to avoid it.

Louise is already at such a high level of proficiency in the Heptapod language that she is dreaming "in the language"; I say "in the language", because thinking in Heptapod B enabled her to see the future in the first place. This does not bring only good things but also painful side effects, like those bad dreams she keeps having.

Now I turn a little to *Arrival*'s point of view concerning this matter. Although Hannah, Louise's daughter's name in the filmic adaptation, also dies young in the future, the reasons and circumstances pertaining to her passing were drastically altered. Whereas in the book, she perishes from an accident, in *Arrival,* she demises from an incurable disease.

It is as though Eric Heisserer could not accept that an accident might not be avoided, given that one knew the initial events that led to its culmination. Indeed, for someone who does not believe in hard-determinism, this is something challenging to buy into, and it is possible that the audience reception they expected for the film had a part in that changing of perspective.

Science fiction films, especially, "hard science fiction films", require some adaptation tricks (Johnston 121). For example, instead of dying at the age of twenty-five, the film's Hannah dies still as an adolescent. They did not want to age the actress playing Louise (and that would be necessary in case twenty-five years had passed) because that would have made it evident that the scattered scenes were indeed flash-forwards of Louise's future and, thus, the whole emotion of that discovery would have been lost.

Contrary to the short story, however, the film's climax is shared by two significant events. One is the death of Hannah, but another is the "saving of the world", an issue not present in the book, which is only natural; for Gualda (203) and Bluestone (6) state that a film is an autonomous work, albeit an adaption. That means the film carries predetermined objectives and the director's ideologies but still keeps a strong connexion with the original work, the literary text. This is especially true about *Arrival* since Heisserer and Villeneuve have tried to change a significant directive in Chiang's plot – determinism versus free will. Gualda continues by saying that there is a manipulation process in any type of art – for when the director interferes, he prioritises one specific objective over another and makes his ideology clear. Thus it would be naïve to consider any cinematic interpretation as a real reproduction (216). For that matter,there are many differences between the two works that I do not approach in this discussion in order to keep my focus.

Accordingly, it must be indicated that cinema requires instant excitement; therefore, two new ingredients are added: tension and conflict. Now instead of an experience of first contact with an alien species, the protagonist has to run against time to prevent tension and conflict between humans and heptapods.

Louise's line to her daughter, "He said I made the wrong choice" (Villeneuve 1:34:29), can be easily overlooked. Still, it stands out as the emblem or introduction of the changes the filmmakers intendedto produce in the phenomenology of the plot. Her utterances at the end of the film summarise Villeneuve and Heisserer's opinion on that. She asks Dr Donnelly whether he would change things if he had his whole life laid out in front of him (Villeneuve 1:48:06). There is another scene that I see as a hallmark of the vision the filmmakers try to demonstrate, which might as well be quickly passed over. It is the one in which Louise remembers the term "non-zero-sum game" (Villeneuve 1:24:00). This scene was nearly transcribed literally from the short story into the film, with very little adaptation. The present, Louise is debriefing with the military staff about the possible purpose of the aliens' visit when suddenly a memory of her daughter strikes in. The short story follows:

> "You mean it's a non-zero-sum game?" Gary [Dr Donnelly] said in mock incredulity. "Oh my gosh."
>
> "A non-zero-sum game."
>
> "What?" You'll reverse course, heading back from your bedroom.
>
> "When both sides can win: I just *remembered*, it's called a non-zero-sum game."
>
> "That's it!" you'll say, writing it down on your notebook. "Thanks, Mom!"
>
> "I guess *I knew* it after all", I'll say. "All those years with your father, some of it must have rubbed off." [My italics] (Chiang 128)

It is rather confusing, I must admit, but in the scene, Louise, who is in the future (from the audience's perspective), remembers a conversation she had with Dr Donnelly in her past (or present in the audience's perspective). It turns out; she ends up changing her future conversation with her daughter because of what she remembered in the conversation she was having with Dr Donnelly. For the filmmakers, I suppose, this occasion accounts for the very moment at which Louise realises she is capable of altering the future to some extent. In contrast, for Chiang, I reckon, it might be just another case of Louise acting in a performative manner so that the future she saw can be possible.

That all together is obviously meant to change the deterministic phenomenology seen in the book into an issue regarding "choice" or the exercise of free will. It is significant, though, that even trying to change the story into something more coherent with the doctrine of freedom of choice, the actual outcome does not stand totally against the determinism presented by Chiang, provided that it is taken into account that despite being free to choose, for whatever reason, Louise acted precisely in the manner that she foresaw it. Nonetheless, she knows that having Hannah will be inevitably painful and traumatic; that it will conclude even with the end of her marriage; that she would likely never recover completely from such pain; all the same, she does not move a single finger to change her future. Be it due to the love of her daughter that she already feels or that the experiences that they both are to share are super valuable, the fact is that everything happens rigorously as foreseen.

It is safe to state that the mechanics of Louise's future had been determined or shaped by her love, her feelings, and her experiences with her daughter, her findingall the memories she had with her daughter meaningful regardless of whether they were bad or good, and why not say her foreknowledge. If she did not have exact precognition, that is to say, if she only had a vague idea of what was going to happen, for instance, that a daughter of hers was going to die at an earlyage. Still, she knew close to nothing about her or had not had any experiences with her, or say had not already felt the pain of losing her, perhaps she would have made a different "choice". That inexorably reminds me of what Terry Eagleton mentions

concerning the author's intentions when writing a text; sometimes the authors do not write in accordance to their beliefs and intentions, because writing can be tricky or because they are not sure of what their intentions are (Eagleton 58). Indeed, rather than discarding determinism as unrealistic, the change in the plot appears to demonstrate its unescapable nature.

It could be argued that Dr Banks's actions towards saving the world are a proof of the plot's position in favour of free will and against determinism, and indeed, I am convinced that was the intention of the director and screenwriter. Nevertheless, the scenes involving Louise acting to prevent a war between humankind and the heptapods reveal precisely what is going to happen, and because of that all she does is so that the future she saw really comes to be. There is a scene in which the Chinese General comes in the future and talks to her about what it was that she said that made him change his mind. It is only then that she learns how to do things to keep peace between the two races; so I would say that everything people do between the forthcoming human attack on the heptapods and the Chinese retreat from raging war against the aliens is just like talking to the heptapods, it is merely performative action; and, of course, that includes and is explained by what General Shang[2] does in the future ceremony, telling Louise his phone number and his wife's dying words, so that in the past (present in the audience's perspective), Louise could have had all the necessary knowledge to convince the Chinese General into changing his mind.

All that needed to be done in order to achieve the future Louise predicted. So, in that sense, once again the screenwriter and director of the film could not escape determinism. Let us say that someone also contends that Louise could have acted otherwise, that is, not taking part in the world saving actions, the fact that she did not shows thatshe exercised free will. I agree on that, but even that same reasoning is not able to escape determinism, as itactually demonstrates the compatibility between the two doctrines.

Louise could in fact have acted otherwise, there was not an exoteric or mythical, supernatural force produced by the cosmos pushing her into a certain direction, but her feelings, her moral standards that she acquired from her parents, family, studies or personal experiences had already determined that she could not simply sit down and watch what could have been the end of humankind, not doing anything to stop that (for they were about to attack a much more advanced species that could even see the future – that is an unbeatable opponent).

So, in reality she did make a choice, but she did not really have any alternatives. She did not see a possible future, but the future itself as it must be; and again that corroborates with the virtual incompatibility of foreknowledge and real free will, as described by Fischer (3-4) and Grillaert (43), noted earlier on this chapter.

Likewise, the stated incompatibility is somewhat underscored at the end of the short story. Louise's final lines, as she mentions the choices she makes regarding the conception of her daughter, are significant, especially if we take a closer look at the details that can effortlessly go unheeded. She reasons as to whether the outcomes of her decisions will lead to joy or pain, though she already knows what her future will be like:

> From the beginning I know my destination, and I chose my route accordingly. But am I working toward an extreme of joy, or of pain? Will I achieve a minimum, or a maximum?
>
> These questions are in my mind when your father asks me, "Do you want to make a baby?" And I smile and answer, "Yes," and I unwrap his arms from around me, and we hold hands as we walk inside to make love, to make you. (Chiang 145)

At first, it seems she is considering that she is exercising her free will and making all the choices about her future, but then she says, “I chose my route accordingly” right after saying, “From the beginning I know my destination”, and again, although she knows her future quite well she still does exactly as she saw, and no doubt that brings to mind Glaser’s: “a sense of choosing freely among alternative possible forms of conduct is introspectively observable in the imaginary role-taking and inner conversation that occurs when we think about our behavior” (490). In that sense, Louise could see only one future, and thus she chose her route according to it.

Similar to Louise’s final words in the film, here as well free will and exact foreknowledge do not seem to enjoy quite a connexion; it is rather one or another, never the two of them. It is striking though that Louise is questioning herself as to whether she is heading for a future of extreme joy or of pain. It gives the impression that she does not know so well how her entire life is going tobe like. That may be the same case that I mentioned previously, namely that sometimes we are not so sure about past memories; or that might be that she is just meditating in an awe state, not really questioning anything, but it is just rhetoric. It is also always possible that the author simply did not give much thought into the matter. Still another possibility is that in spite of knowing the future with precision, Louise did not fully understand her decisions yet, and therefore she could not see so clearly the purpose behind her actions(that sort of reminds me very much of the phenomenology in *The Matrix* (1999) universe, in which the protagonist, Neo, could only see past the choices he could understand).

The purpose of things indeed plays a very important role in the universe as seen by the heptapods. As it follows, the next passage emphasizes that for the heptapods, the alleged cosmic duality is seen in terms of purpose, “goal”, rather than in terms of choice. Returning to Fermat’s principle that I discussed in the preceding chapter, I can now state that while humans understand that “light is refracted through the most efficient path between two points,” the heptapods would see it as “light intends to reach its destination through the fastest route possible”.

As Chiang puts it, it is a teleological explanation of the universe as opposed to a causal one. Whereas for humans such understanding is that light is passive, for the heptapods light is active, it has a purpose, and so does everything else in the universe. In other quarters, humans tend to live their lives and make their choices in a passive manner; options are presented, choices are made, results are achieved. Contrariwise, the heptapods are aware of their role in a larger, purposeful plan, still making decisions, but looking for purposes rather than choices in the past, present and future (Tracy 1).

> In contrast, the physical attributes that the heptapods found intuitive, like "action" or those other things defined by integrals, were meaningful only over a period of time. And these were conductive to a teleological interpretation of events: by viewing events over a period of time, one recognized that there was a requirement that had to be satisfied, a goal of minimizing or maximizing. And one had to know the initial and final states to meet that goal; one needed knowledge of the effects before the causes could be initiated. (Chiang 130)

Given that, it is the purpose of things that determines how the chain of events will develop. This is what the heptapods saw when they looked into the future – purpose. In Physics, "action", as described in the excerpt, refers to the dynamics of a physical system from which the equations of motion of the system can be derived. It is a mathematical function which takes the trajectory, or path, of the system as its argument in the dimension of time. "Action" is considered intuitive by the heptapods, since they can move their cognition in time and get to know the whole trajectory of any given event beforehand. They do not worry about the means, they see the ends, the purposes; and that makes them purposive beings, rather than causal beings as we are; in theory that is a consequence or a reason for their cyclic time perception, instead linear. Again, they regarded free will not as a necessity as we do; like language, their "actions" are performative, they comply with the purposes and outcomes that they see and that is as much choosing as they can be interested in.

The fact that purpose rather than will or cause and effect determines the course of happenings is also emphasized in the film by the particularities surrounding the death of Abbott (the name jocosely given to one of the heptapods). Since the aliens perceived past, present and future simultaneously, it is safe to say that Abbott already knew he was not going to return home alive from the trip to Earth. As I have reasoned elsewhere in my thesis, the statement in the film that the aliens would count on our help in 3,000 years' time would imply that their lifespan was that long or even much longer, for as I reckon, Louise could only see time in both directions from the moment of her birth up to the event of her death, which is the most coherent thing to infer, truly. As it follows, Abbott could have decided not to come or he could have done things differently so as to protect himself from the explosion that culminates with his passing. Two suppositions rise out of that: (1) Following the short story's logics, Abbott had no choice, since the deterministic cosmic epiphenomenon had already placed things in order, and therefore his death was inevitable; (2) He saw a greater purpose to it, and was "willing" to give his own millennium-long existence away in order to achieve that purpose, perhaps that would impact things much harder in the future, at the end of those 3,000 years; anyhow he was ready to compromise so that a greater good could bebrought about.

Humans are quite different in the sense that since we cannot know the future, we can only guess, our actions are not intuitive, we take chances, we experiment, and we cannot see the effects or the outcomes or ends of our actions afterwards, we exercise free will, and most of the time we are not ready to give upon our lives for a purpose, we always tend to think in terms of results or effects, not the purpose.

CONCLUSION

Before anything else, I must say that after going down the same path as the authors, that is, consulting and concatenating with real-world science as well as philosophy, and even more, speculating and extrapolating on it, the short conclusion to which I have come is no doubt that the whole plot in the short story is about the compatibility between the two doctrines that I have discussed in the previous chapter. From the determinism that language imposes on our brains, defining the way thoughts are produced to the cosmic influence on universal and personal events, determining our choices and routes, everything that happens occurs in a predefined order, even the choices we are presented with.

Now, as for the long conclusion to which I have come, after having contemplated and examined everything regarding the three issues that I listed at the beginning of my thesis, it has become crystal clear that both "Story of Your Life" and *Arrival* are a sort of an intellectual treatise on determinism and its connexion with free will, in spite of the paradox that constitutes. For Chiang, language is deterministic in the sense that it shapes our thoughts by predetermining the words we choose to use and providing us with the grammatical background, which ultimately works as the surface or platform upon which our thoughts are laid out and structured, what is more, language is capable of influencing our worldview; that is a reflection of everything else in life. Despite the fact that the authors of the movie wanted to change that and have in fact produced an outstanding alternate point of view, it is ironic, however, that nothing really changed much, it is as though the creators of *Arrival* could not escape their own "determinism"; and what a support to Chiang's perspective that is!

Language, or more precisely glossopoesis, since Heptapod B is an artificial language, might be faultily seen as a simple metaphor for a time machine, for travelling in time has long been a human dream, but in reality, it serves very well the purpose of representing the determinism versus free will paradox that permeates the whole plot in both texts. It seems to me that Chiang realized that most of his audience might

not identify themselves quite easily with the deterministic epistemology that he defended, but language determinism provided a perfect introduction thereto. Now it was more plausible to accept the cosmic determinism and its "deterministic" free will.

Equally, *Arrival* follows quite a deterministic perspective as I have made clear, although with a slight change in direction, whilst the Whorfian hypothesis, for one, remains untouched. Unfortunately, not much room was left for the principle of least time, and that is why the literary text provided me with additional material for a metaphysical debate more in depth.

Besides determinism, linguistic or cosmic, however, I can now see and gather a plethora of other transversal topics that Chiang as well as Heisserer and Villeneuve seemed to have alluded. Frequently, and I have fully argued this, when science fiction involves aliens, glossopoesis and so on, the real deal is to show their differences in relation to humanity and reality. Indeed, analyses are usually based on contrast, on difference. That is why analysing humanity's essence is a difficult task; after all, to what or whom shall humanity be compared? That is where the alien race metaphor comes handiest; their culture, behaviour, and of course, language are means of examining ourselves. As I established in the introduction, glossopoesis is very often used as a means of communication between author and audience because it takes readers and viewers out of their familiar places and presents them with dissimilarities.

As it happens, both short story and film emphasise a great deal the hardships communication can display and how much sweat it really takes when someone wants to set up contact but does not possess access to other people's linguistic code. The film appears to delve much further into that, because of the engagement the various nations go through in a worldwide effort to understand and get understood by the heptapods. The tension and conflicts that mark the end of the film in which China and Russia decide to attack the space visitors show how easy it is for human countries to misunderstand each other, cease communication and go into war.

For me, that also accounts for how easy it is for us to stereotype people. Note that it is the Chinese and the Russians who rage into war against the aliens instead of, for instance, the French, the English, or the Americans. Those two peoples are frequently labelled as belligerent nations following the majority's viewpoint. Such stereotype is dismantled, though, when Louise gets in touch with the Chinese General, who humbly retreats from his former decision. In fact, he was effortlessly convinced by Louise than the American military staff, all it took was a little fiddling with his sentiments.

What is more, in the final scenes in which Louise is trying to prevent the war, it is the Americans who are seeking to stop her, and theChinese General who is listening. It must be highlighted as well that this is a surprising means of telling itis not the alien visitors that are to be feared, but we; our destructive nature is the real danger. The heptapods do come in peace after all; they do not pose any threats on humankind; all they proposed to do is contact us and teach us their time freeing language. Humans' attitudes, on the other hand, seem to be always impatient and ready to fight one another for every little misunderstanding. This, however, is made explicit in the filmic adaptation, whereas in the book, it seems to follow a slightly altered path. There is no international conflict or tension.

The focus is set on the protagonist. The story is really centred on Louise's and her daughter's lives. It is much more important for the short story, the personal view than the universal view. It is really about how a person handles private tragedies and seeks to achieve individual goals. The titles of each text, nonetheless, shed light on this dichotomy – "Story of Your Life" epicentres, in effect, on personal life stories, whereas *Arrival* concentrates on the transformations in the international community, which the heptapods' arrival to Earth brings about.

Besides that, both texts, but even more the literary one, present a life-affirming note. The tough decisions that are put in front of Louise, although merely performative, are painful and for me symbolise going ahead with life no matter what. Determinism in life is not like forcing people into some sort of course of action, but rather leading. It is clear that Louise does not have a choice indeed, but that is not the most relevant aspect of the texts; the fact is that she is *accepting* both good and evil in her life and just moving on, rejecting the "alternative" of giving up whilst faced with trouble and difficulty. It is also about how people react when confronted with the inevitable. Additionally, the plot also underscores that every moment of a person's life counts and must be treasured. If foreknowledge and free will are incompatible, then whenever someone does not have knowledge of the future, they are enjoying a simulated free will constructed by their own consciousness or unconscious to serve only one purpose: to make us happy.

Precisely like the language metaphor, mathematics and physics are used as signs to enlighten other aspects of human experience and existence. Just as glossopoesis has been used to communicate difference and at the same time show humanity's reflection on the aliens, the mathematics and physics metaphors havebeen used to show the difference between choice-oriented views and purpose-guided perceptions. The inclusion of the variational principles of physics in the context is one of the things that most amazes me in the plot created by Chiang. By the way, in case it has not been made sufficiently clear by now, Fermat's principle of least time is a metaphor used by the author to show that the epiphenomena in nature are deterministic and seek to accomplish purposes, rather than being merely causal. We tend to think of events as enmeshing a strict relation of cause and effect, and therefore for every cause there must be an effect and vice-versa. However, in the case of the ray of light, there is not such relation; instead, the ray of light has a purpose – taking the fastest path from one point to another, even if that path seems longer, like the phenomenon of the refraction of light in the water. It is because of that that the heptapods need to see the world and time in a cyclic manner.

Similar to light that has a single purpose and thus has to "know" accurately where it "wants" to go and what path to take before initiating its journey, the aliens could not act in the way they do without foreknowledge. For me, this is yet another metaphor of a transversal issue that Chiang raises – people have to reflect on their actions and ponder on the results they may show on other people's lives, or in a bigger scale, the planet's "life". In here, the texts suggest a fusion of personal and universal issues, meaning that our personal actions may interfere with everyone's lives – a teleological standpoint anew.

Moving on with the additional topics existent in the plot, there is the choice Chiang makes of the mother-daughter relationship or parent-child bond, replicated in the film, which is not without a reason. He as well as Heisserer and Villeneuve explore the implications thereof in depth. Although it seems obvious to state that such a relation would undoubtedly provoke more empathy on the audience, it really sets a strong bond between the story and readers/viewers that could not be achieved otherwise. The death of a beloved one is painful, if it involves the passing of a child, it becomes unbearable; and such a feeling incites reactions in anyone, even if they are not parents.

A mother's love for her child is one of the strongest emotions known. It does create an interesting paradox: if Louise goes on to have her daughter, the child's death and suffering will be inevitable; should she not avoid her daughter's tragedy by not having her? At the same time: if she decides not to have her, would she not be depriving her daughter of enjoying life even for a short while? Louise's "choosing" also accounts for a deterministic view of things, for her connexion with her child, her love, had already been determined "biologically". It is the mother's love or, say, an instinct that prevents Louise's from interfering, guaranteeing that way that the future she is seeing remains untouched and unaltered. Since the future cannot be changed, all she does to carry out the future events after all is just performative.

As a matter of fact, that reinforces my premise that free will and exact foreknowledge are incompatible. Louise is messing with her daughter's free will for telling her an exact future, in that while she is looking at the girl's future, she is at the same time determining it. She is perhaps trying a last move to avoid her family tragedy moved by infinite the infinite mother's love, but that ultimately ends up causing the disaster, once again just as in the myth of Oedipus.

The plot of both texts has been wonderfully orchestrated, no doubt. The most prominent characteristic of this genre, hard-sci-fi, is how it sounds or looks scientifically precise, how it takes brain to fully understand everything that is involved. Similar to blockbusters like *Interstellar* (2014) or *Inception* (2010) which also involve deep scientific research or philosophy inquiry, "Story of Your Life" and *Arrival* require much attention to details or the small picture rather than to the foreground drama. They could easily pass unnoticed to the careless eye as real science or philosophical epistemology as opposed to adventure or fantasy sci-fi like *Star Wars* or *Star Trek* franchises, whose extrapolations are rather flagrant and nonsensical. It is spectacular that I had at my disposal both the literary text and the filmic variation because as it usually occurs in the case of such faithful adaptations, film and short story fill each other's gaps.

There are still, however, a few gaps left, maybe intentionally so that the audience such as myself can fill them, perhaps by chance. Anyway, I believe the intention in both works was suggesting more than showing, and this calls for a great identification by the public. Part of my speculative writing here may be disproved in some ways in the future; all this Eco-like or Kabbalah-like semiology theory may sound fantasising and the authors may contradict it, but it does give much to think about.

One must never underestimate the impact sci-fi texts might have on real science or society. Many of modern innovations were first thought of in literary texts, like the ones written by Jules Verne, and later became reality. Sometimes all is needed is that someone takes it seriously enough to start discussing about it as I did.

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