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Analysing films to rethink the psychology of time

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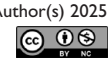

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Abstract

This paper contributes to social and cultural psychology by means of a systematic reflection on the notion of time in its togetherness with space as revealed by films. It presents a new theorisation of Mikhail Bakhtin's concept of the 'chronotope' by distinguishing created, creating, and creative types which exist in dynamic relations of mutual presupposition. This new theorisation is then used to guide the thematic decomposition of five films directed by Christopher Nolan (*Tenet*, *Inception*, *Memento*, *The Prestige*, and *Oppenheimer*). Each film, with its many minor chronotopes, offers its appreciator a distinctive meditation on the varied 'shapes' time can take, including the ways it can become problematic in people's lives. But taken together the films express a distinctive major chronotope which, we argue, characterises Nolan's genre more generally. We describe this as a chronotope of permanent liminality because characters and appreciators alike are confronted with paradoxes of constant transition involving multiple temporalities in which created, creating, and creative chrontopes are deliberately mixed. This opens new perspectives on the psychological value of aesthetic experiences, showing how art and life weave into one another thanks to being woven out of one another. Films do not merely entertain us but allow us to entertain the complexity proper to reality viewed, not as a static underlying materiality (about which we form representations) but as a real process of transition composed out of a rich multiplicity of temporal happenings.

Keywords

aesthetics, art, Bakhtin, Christopher Nolan, film

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Introduction

Our intent in what follows is neither to review the 'psychology of time' or 'time perception' as a field (see Wittmann, 2009), nor to summarise how psychologists have variously conceived of time (Block & Hancock, 2015). Rather, as psychologists, we want to learn ways of thinking about time from the arts, and from cinema in particular. The concept of time is fundamental both to Psychology as a discipline and to our formation as psychological subjects (Piaget, 1946). And yet time is difficult to grasp, especially since Einstein's notion of space-time asserted the connexion between time and space, and a consequent rethinking of the concept of matter. Prior to that point, physicists and psychologists alike tended to assume, following Newton's modern physics, that there exists one singular and definite space within which the real material elements thought to compose the universe undergo adventures that can be clearly recorded in terms of an equally definite and absolute time. Following Einstein and Minkowski, matter was reconceived as part of a vast extended *field* with strong and weak regions (entities, including 'particles,' being reconceived as densely concentrated 'strong' regions formed in the field, not unlike whirlpools formed in the medium of a 'weak' flowing river), and time and space became names for conducting measurements. Combined with the three spatial dimensions, time was conceptualised as the fourth dimension needed to describe a world whose ultimate elements are the occurrences of particles at infinitesimal points in the measurement system. The adventures of these particular occurrences no longer take place in Newton's one definite absolute space, and they can no longer be recorded in terms of an absolute time. After Einstein, the modern (i.e. Newtonian/Kantian) distinction between absolute 'physical' time and variously vulgar subjective 'psychological' time collapses, as it were, upon itself, and quantum physics, as Nolan's film *Oppenheimer* portrays, pushed the need to reconceptualise time, space, and matter even further (see Bohm, 1980). For the most part, psychologists have simply avoided the implications of the conceptual mess generated by the relativity of space-time and the consequent collapse of the physical/psychological time distinction. In fact, it carries multiple opportunities to gain a deeper understanding of time, and some freedom from unproductive metatheoretical assumptions.

Mikhail Bakhtin (1895–1975) is relevant to our concerns because he quickly recognised that the concepts of time and space that characterised the modern mentality were collapsing and needed rethinking. Bakhtin (1996, p. 84) observed an early use of the term 'chronotope' (which fuses two Greek words for time and space) within biology, and saw its potential for relating Einstein's theory of space-time to aesthetics and, in particular, to the historical study of literature. As part of a neo-Kantian movement, Bakhtin was keenly aware that Kant's modern philosophical position on time and space relied heavily on Newton's now superseded notion of absolute time (a pure time beyond and containing the natural time that passes). Kant had considered time and space to be *a priori* forms of the transcendental mind, and Bakhtin was intent on thoroughly revising this position. As transcendent mental forms, Kantian time and space were thought to lend their structure to the manifold of sense experience. They are conceived as transcendent in the sense that they provide the condition of possibility for any experience but are not themselves

experienceable. Against this position, Bakhtin (1996, p. 85, note 2) proposed that time and space are "forms of the most immediate reality."

Bakhtin did not doubt that time and space are relevant to any and every experience, but he challenged the idea that they are *a priori* by virtue of being a transcendental aspect of the form of mind: not something empirical but something unchanging and universal. Against the modern notion of time as a transcendent form (itself a modification of the Platonic doctrine and its uptake into Christian theology as a spiritualised abstraction), Bakhtin asserted what he called the *fullness* of time. One cannot grasp Bakhtin's aesthetic philosophy without understanding his view of the novel as a major contributor to the historical articulation and creation of forms of space-time within a culture at a given time and place. A chronotope is nothing less than a 'form for experiencing time' (Bakhtin, 1996, p. 205). He developed the concept in a book-length article written mostly between 1937 and 1938 and translated into English as 'Forms of time and of the chronotope in the novel' (Bakhtin, 1996). The chronotope was perhaps his primary device for understanding the novel—in its historical evolution—as a means to recapture, for common sense, this fullness of time. This preoccupation was his life-long focus, the lengthy 'concluding remarks' of the essay having been written in 1973 (Flanagan, 2009, p. 3, 2009, p. 57). Bakhtin, as part of this focus, *historicises* the Kantian *a priori* notions. In so doing he simultaneously brings time and space back down to Earth (as experienceable forms of immediate reality), and multiplies them. The chronotope is nothing less than the creative organising principle of Bakhtin's (1996) processual conception of human culture as "alive and still in the process of becoming" (p. XIX).

Following and developing Bakhtin, this paper pursues the hypothesis that psychologists can learn a great deal about how to conceptualise and recognise distinctive spatial forms or shapes of time by engaging with film. The first section cut, below, provides a more detailed summary of Bakhtin's chronotope concept, including its uptake within cultural psychology and film studies. It also outlines our new theorisation which is then used to guide a thematic decomposition of the five selected films. The methodology and resultant themes are presented in the second section. We opted to focus on Nolan's films because he is famous for cinematographic experimentation with time and with the multiple, often non-linear, forms it can take (Bernard, 2017). Each of his films contains multiple chronotopes which afford the appreciator new experiences with the possibilities of space-time. Taken together, however, they constitute a distinctive genre characterised by what we will call, in the third section, the chronotope of *permanent liminality*. Liminality, as further discussed below, is a threshold concept designating transitional experiences of 'in betweenness' which combine spatial *marginality* with temporal *passage* (Stenner, 2017; Wagoner & Zittoun, 2021). Liminal experience is typically related to occasions during which the usual order of things is temporarily suspended, but if it endures, lives can become stuck in the resulting paradoxes (Szakolczai, 2017; Zittoun & Stenner, 2020, 2021).

The third section goes on to discuss theoretical implications of these findings. It highlights the significance our study has for understanding the value and social psychological function of films in people's lives, and by extension perhaps of all art forms. It suggests viewing the psychological value of art in terms of the understanding of time (understood as a multiplicity of interwoven processes) that it affords the appreciator who engages

with it. This involves approaching aesthetic objects, like individual films and novels, as 'liminal affective technologies' for use in generating aesthetic experiences which can then be connected to real lives (Stenner, 2017). Ritual was the original affective technological form for summoning and managing the liminality of social psychological transitions, and more specialised aesthetic, ludic, and sacred technologies emerged from rites of passage over historical time. Hence, what we call *aesthetic experiencing* is a subject's (embodied and socially embedded) experience with an aesthetic technology construed as a variety of liminal affective technology (for a fuller account, see Greco et al., 2025; Stenner & Greco, 2018; Stenner & Moreno-Gabriel, 2013; Stenner & Zittoun, 2020). Aesthetic experiencing itself foregrounds (and reflects upon) the importance of time and space. Engaging with films, and art more generally, can enable the appreciator to creatively generate and enjoy aesthetic experiences in which temporality emerges, not as a single dimension, but as a complex composition. Aesthetic experiencing can thus function to get actual and fundamental experiences of passage, transition, and becoming into perspective. This in turn calls for a rethinking of socio-cultural psychology on an explicitly processual basis, within a relational process ontology (Brown & Stenner, 2009; Stenner, 2017). From this perspective, aesthetic objects can be considered in their dialogic togetherness with their appreciators (and creators), and chronotopes can be considered as a kind of portal through which artistic chronotopes may re-enter and enrich the actual lives from which they are drawn, helping us to fathom our place in society and nature (Bakhtin, 1990). We hope that this study advances our previous work on aesthetic objects as symbolic resources operating within liminal affective technologies (Stenner, 2017, 2021a, 2021b; Stenner & Zittoun, 2020; Zittoun, 2006, 2013b; Zittoun & Stenner, 2020, 2021).

A reconsideration of Bakhtin's 'chronotope'

The notion of chronotopes has entered the vocabulary of human and social sciences, but its broad implications are often missed. Chronotopes are typically defined quite narrowly as the primary means at a novelist's disposal "for materializing time in space" (Bakhtin, 1996, p. 250). In this sense, the chronotope is a device for resolving the problem of how to artistically express the togetherness of temporal and spatial relationships in the created worlds of literature which, after all, can only be indicated through the medium of words. In terms of critical analysis, the content of a novel can then be examined to identify the ways in which time and space are combined and described in the different artistic representations to be found there. Amongst psychologists, attention has been given to Bakhtin's important distinction, discussed below, between major and minor chronotopes (Cresswell & Baerveldt, 2011; Cresswell & Sullivan, 2020; Grossen, 2021; Larrain & Haye, 2019; Ligorio & Ritella, 2010; Marková & Novaes, 2020; Neuman, 2008; Ritella et al., 2021; Silseth & Arnseth, 2022). Less attention has been given to Bakhtin's sometimes implicit distinctions between creating, creative, and created chronotopes. Minor and major chronotopes, as will be made clear later in this section, are species of *created* chronotope. To better grasp how these relate to *creating* and *creative* chronotopes, it will be necessary after that to also briefly introduce Bakhtin's theory of two interrelated processes of formation at play in any art work: formed material (forming the *composition* of

an external material work) and formed content (forming the *architectonics* of an aesthetic object). As we shall see, the major and minor chronotopes in a novel are (architectonic) forms within its content.

Major and minor literary chronotopes

How to identify chronotopes in the content of a story? First, a given novel can contain many chronotopes, including chronotopic 'motifs' which are sometimes interwoven or contrasted or opposed. Hence 'the road encounter,' 'the castle,' 'the salon,' 'the public square,' 'the alien world,' 'the provincial town,' 'the threshold,' 'the carnival' may feature as motifs in a given novel, in which case Bakhtin calls them *minor* created chronotopes. For Bakhtin, even a minor chronotope 'gives body' to the more abstract aspects of a novel (the 'narrative,' for short), because events unfold and *take place* differently in each of these minor chronotopes. In the architectonics of a novel it is common, however, for one of these chronotopes to 'envelope and dominate the others.' A literary work then "contains within it" (p. 243) a *major* chronotope which serves as its principal evaluating aspect. Hence in Kafka's novel the castle is a major chronotope, as is the salon in Proust or the carnival in Rabelais, and much of the action in Dostoevsky's novels occurs in 'threshold' situations, in waiting rooms, hallways, porches, staircases, alleyways, and squares, serving to energise and give body to his favoured chronotope of crisis or the time of life-transformation (Stenner, 2003). A major chronotope serves as an attractor which lends unity of coherence to all the otherwise fragmentary minor chronotopes and their connecting narratives. Hence Bakhtin discovers hidden beneath the *exterior* index of Rabelais' favourite images, motifs, and plots (which bring together space-times of eating, drinking, death, copulation, etc.) a "specific form for experiencing time and a specific relationship between time and the spatial world, that is, there is hidden a specific chronotope" (p. 205).

Major chronotopes are important because they function as the *organising centres* for the basic narrative events of the novel's content. The narrative events, as it were, unfold from and take place within the minor chronotopes enfolded within the major chronotope. Chronotopes can thus be distinguished from the more abstract narrative proper, and yet, as "the place where the knots of narrative are tied and untied," they are the source of "the meaning that shapes narrative" (p. 250). Hence chronotopes energise the rest of the content of the novel, providing a matrix of meaning deep in the background yet capable of linking together and nourishing the various more abstract aspects of narrative material that appear in the foreground. A major chronotope makes the time/space of the novel tangibly 'material,' as it were, providing the very ground for "the showing forth, the representability of events" (p. 250).

Major chronotopes as definitive of genres

As a decisive and constitutive formal device with a dynamic and creative function, grasping a literary chronotope at work is, for Bakhtin, the key to understanding literary form. Indeed, major chronotopes are of such representational importance that they can be definitive of entire genres of literature. The first 60 or so pages of 'Forms of time and of

the chronotope in the novel' are devoted to identifying and describing the major chronotopes that define the three main genres of the ancient novel. The novel ('a large fiction influenced by biographical models') is a highly syncretic art form which fuses together chronotopes and motifs that have been used in practically all other types of literature. Hence the 'Greek Romance' genre, which flourished from the second to the sixth century A. D. in the work of authors like Heliodorus, Achilles Tatius, Chariton, Xonophon of Epheseus, and Longus, incorporates love motifs from Hellenistic poetry, adventure motifs from ancient epic, as well as elements from tragedy, rhetoric, historiography, etc., all of which are given a new novelistic unity by the major chronotope defining the genre. The chronotope of metamorphosis defining the second ancient genre (the 'Adventure Novel of Everyday Life') also incorporates many sources, including the Eleusinian Mysteries, the *Theogony* of Hesiod, and the image of time in a long tradition of popular folktales and lore. To flesh out how Bakhtin's concept works in practice, we will here summarise just these first two genres. As we shall see, each major chronotope comes with a distinctive 'image' of the human being (in a sense, its own folk psychology). The first produces an 'image' of the person as stable despite being assailed by unpredictable happenings. The second produces an image centred on the crisis of a guilt > redemption > blessedness sequence.

The 'Greek Romance' genre (or 'Adventure Novel of Ordeal') is defined by a chronotope of adventure time in the space of an unfamiliar alien world. Bakhtin extracts a typical schema common to practically all these novels. They begin with a flare-up of aroused desire when a heroine and hero of great beauty and marriageable age first meet, and they end with the satisfying consummation of marriage. Bakhtin observes that, apart from this obligatory start and end, the major plot of the novel is constructed in the "gap, the pause, the hiatus" (p. 89) between these two transformative biographical moments of love at first sight and marriage. Adventure time exists as an empty "extratemporal hiatus" (Bakhtin, p. 91) between these segments of ordinary *biographical* time. By biographical time Bakhtin means time which changes those living through it, prompting them to develop or suffer setbacks, or to think and act differently. 'Adventure time,' by contrast, is an ordeal made up of a long series of events that typically include the forced separation of the lovers, a journey involving multiple accidents re-uniting them, and obstacles keeping them apart, storms and shipwrecks, attacks by pirates, abduction and captivity, presumed betrayals or deaths, challenges to chastity, criminal accusations, etc. Adventure time is "highly intensified but undifferentiated" (p. 90) as characters rush through "a most improbable number of adventures," each of which *happens* "suddenly" and "just at that moment" to the hapless characters, yet none of which changes them (or their love) in any way. It is a time of contingency and chance rupture, governed only through fate, and through which, as it were, one can only "hold one's breath." Leaving no "indications of its passing" (p. 91), this time evades rational analysis but is the site of omens, prophesies, and legends revealing the will of Gods, knowledge of which does not spare misfortune but merely makes the inevitable suffering more bearable. Spatially, adventure time plays out in an alien terrain of movement from place to unfamiliar place, crossing seas, wandering wastelands, etc. This "*abstract* expanse of space" (p. 99) is minimally sufficient to allow chance meetings, disrupted plans, the abduction of characters to 'a place

far away,' etc., but beyond this the spaces are interchangeable (the action could equally happen in Egypt, Babylon, or Byzantium).

Examples of the second genre, the 'Adventure Novel of Everyday Life,' include *The Golden Ass* by Apuleius and the *Satyricon* of Petronius. This genre combines a mixture of adventure and everyday time. The features of both are transformed through being enveloped in a chronotope of moral metamorphosis. This chronotope is precisely a time of identity *transformation*. The adventures of the heroes of Apuleius and Petronius mark out an identity crisis which fundamentally alters the characters. The plot charts the course of a life in its critical moments, showing "how an individual becomes other than what he was" (Bakhtin, 1996, p. 115). Hence in *The Golden Ass* Lucius undergoes a transformation from man to ass and back again. In contrast to the random 'chance time' characterising adventure in the first genre, where agency has no foothold, Lucius *falls* into becoming an ass, exists a while in that fallen state (in which friends and family think him dead), and then *rises* again to his former human condition, purified. The fall is not a chance event but results from voluptuousness and carelessness, both of which are moral failings which can be, and are, redeemed. Adventure sheathed in this metamorphic time ceases to be the 'empty' realm of fortune and takes on some of the concrete living meaning of everyday time. Hence Lucius-as-ass is steeped in the lowest, most bestial form of mundane everyday life. His various adventures (while serving a baker, a cook, a soldier, a gardener, etc.) thus provide readers with detailed glimpses of mundane activity (sexual, violent, cunning) that is usually veiled. Lucius, having the body of an ass, is living through an *extraordinary* time, and can thus observe the quotidian life as if from afar. Hence biographical time divides into a time/space of ordinary everyday life and an extraordinary time/space lived by the hero as he encounters a biographically decisive 'fork in the road.' Compared to the first genre, this chronotope of the 'path of life' or 'road' (with which the hero's life is fused) makes for space composed of more substantial irreversible time which fills the adventures with a living meaning involving redemption through the punishment of guilt. The Gods here do not just make the suffering more bearable: they can *see* the hero's own contribution to their plight and hence guide and protect.

Each of these major literary chronotopes (we will not discuss the third) Bakhtin conceives of as an 'appropriation' or 'assimilation' of real historical time. As appropriations they are limited simplifications: samples, as it were, of time's fullness. As noted, the 'sampling' of time in a novel is syncretic, with minor chronotopes from other types of literature being incorporated into its major chronotopes. Over historical time, different methods (and hence different major chronotopes) have been devised for expressing these samples in literary form. The methods permit authors to fuse temporal and spatial indicators into a coherent and concrete unity through which spaces are charged with the living sense of time's passage through plot and history, and time takes on vital flesh as it is spatially thickened to become artistically palpable (Bakhtin, 1996, p. 84).

Creating, created, and creative chronotopes

The account of the chronotope just provided will be broadly familiar to Bakhtin scholars and to cultural psychologists using his work. In this next section we make an original

contribution to Bakhtin scholarship by introducing the creating, created, creative trilogy noted above. Especially in the 'concluding remarks,' Bakhtin used three different Russian expressions corresponding to this trilogy and, to some degree at least, connected these to three distinguishable types of chronotope. These subtle distinctions have to date been overlooked, partly because much Bakhtin scholarship is based on English translations which miss the distinctions, and partly because Bakhtin did not draw them clearly and consistently (and late revisions may have been done in a hurry). The following summary should therefore be considered as much our theoretical contribution as Bakhtin's.

1. First, there are creating chronotopes (изображенный хронотоп) at play in the actual historically formed world beyond the novel (p. 253). These creating or 'real world' chronotopes are themselves multiple. There is, to quote Bakhtin, "the world of the author, of the performer, and the worlds of the listeners and readers . . . all these worlds are chronotopes as well" (p. 252). Creating chronotopes are sometimes referred to as 'real-life,' 'actual,' or even 'exterior' chronotopes (e.g., p. 131 and p. 253).
2. Second, there are created chronotopes (созданный хронотоп) sampled for and depicted in the medium of words in the world *of* the novel. As summarised above, some are 'major' chronotopes (definitive of genres), and some are minor 'motifs.' Created chrontopes are sometimes called 'artistic' or 'literary' choronotopes (e.g., p. 84). Created chronotopes, as formed images, cannot themselves create, but are products of an actual process of creating: "everything that becomes an image in the literary work, and consequently enters its chronotopes, is a created thing and not a force that itself creates . . . not a creating, thing" (p. 256).
3. Third, there are creative chronotopes (творческий хронотоп) at the threshold between the actual creating world and the created world of the aesthetic object. These are spatio-temporal enclaves that are carefully set apart from the bustling business of the rest of the *creating* world in order to create or creatively appreciate the created chronotopes of aesthetic objects.

Creative chronotopes are the worlds in which created chronotopes are made (by an author) and re-made (by an appreciator), and both are embedded within and carved out of the broader creating chronotopes characterising the fullness of historical time (as we have tried to suggest using a spiral form in Figure 1). A given aesthetic technology (a film, novel, etc.) has, thanks to its creators, its own unique *created* world of time/space within which the events of the plot and the adventures of its characters unfold and take place. The events in a film, for example, take place within the world of the film that has been suggestively created (so as to be imaginatively recreated by each appreciator) by the director and their team. But of course the forms of time and space indicated within this created world bear a relationship to those of the *creating* world from which it has been sampled ('drawn' or 'abstracted'), and within which it must therefore exist as a world-within-a-world (Stenner, 2017, 2021a, 2021b).

The actual process of appreciation of the aesthetic object by each of its appreciators, in turn, itself unfolds and takes place in a *creative* world that has been carefully carved out *within* the ordinary workaday time and space of the creating world so as to be, at the

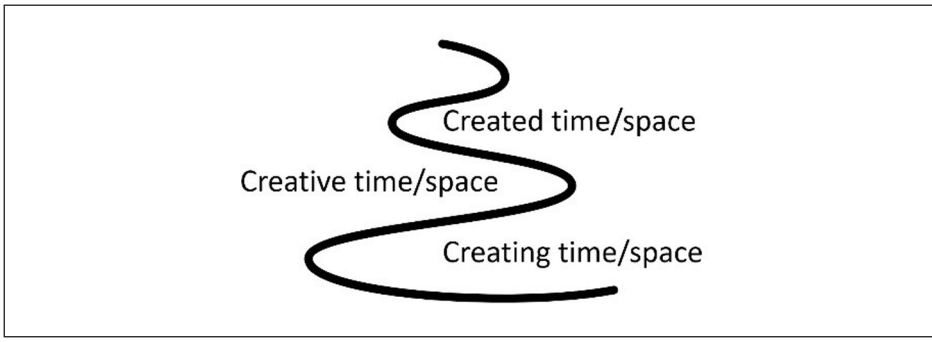

Figure 1. Schematic relation of the spiral dynamic between created, creative, and creating time/spaces.

same time, *outside* of it. For example, the viewer of a film might enter a cinema, or if viewing at home, may ritually create a distinct time/space 'beyond' the usual working day. We can think of this third *creative* world as a distinct time/space within the *creating* world that is designed to enhance appreciation of and involvement with making and remaking, the *created* world of the aesthetic object. In it, two distinct modes of temporality are brought together. Hence the *created* cinematic world of Nolan's *Oppenheimer* (Nolan, 2023) spans about 45 years and moves from Cambridge to Göttingen to Berkeley to Los Alamos, but the film, if enjoyed in the context of a *creative* world in one instalment, takes 3 hours and 9 seconds to watch and the appreciator need never get up from in front of the screen. The appreciator's experience of watching the *created* time/space of the film obviously unfolds and 'takes place' in the *creating* time of actual life beyond the film, but it does so in a *creative* spatio-temporal enclave that has been carefully set apart from the hurly burly of the rest of the creating universe so that the created time can be experienced (and we get an impression of Oppenheimer's entire life in just 3 hours).

This complex yet actual scenario of (created, creative, creating) *worlds within worlds* provides the framework for varied yet concrete experiences which serve to enrich the human understanding of time/space, since during aesthetic experiencing, all three time/spaces must exist in the actual world 'at the same time' (as implied by the spiral in Figure 1). This enrichment of time experience occurs in three main ways. First, by means of the freedom from ordinary (creating) time/space that is afforded by the creative world. Second, by virtue of the capacity to construct and manipulate the time and space *of* the created aesthetic world. And third, by means of the contrasts these worlds afford with respect to the time/space of the wider creating life-world.

As Bakhtin (1996, p. 253) puts it: "Out of the actual chronotopes of our world (which serve as the source of representation) emerge the reflected and *created* [созданный хронотоп] chronotopes of the world represented in the work." A creating chronotope thus influences and 'enters' an aesthetic object, becoming a created chronotope on completion of this process. Any created image is necessarily the creation of an actual living, creating imagination, proper to a creating chronotope. Once created, however, the aesthetic object has become an object of a special kind, available for a new episode

of creativity. But this process whereby an aesthetic object is created (by an artist) and re-created (by an appreciator) is possible only thanks to the mediation of creative chronotopes. The novelist or film maker must enter a creative time/space when creating the novel or film, but equally, so must the appreciator enter a creative chronotope if they are to appreciate the novel or film by imaginatively breathing their own life into it (here we cannot properly address the creative chronotope of artistic creation and concentrate mostly on the appreciator's creative chronotope). Creative chronotopes are part of the creating world, enclaves, as it were, within it which are designed to cultivate reverie and other unusual experiences usually precluded by mundane practicalities. It is only from inside these 'third time/spaces' (Zittoun & Stenner, 2020) that the exchange between art work and life, which "constitutes the distinctive life of the work" (Bakhtin, p. 254), can occur. Bakhtin considers the chronotope to be a 'gate' of sorts: "every entry into the sphere of meaning is accomplished only through the gates of the chronotope" (p. 258). Entering through the gates of the creative chronotope, the created chronotopes of literature can act as a shaping force transformative of the creating chronotopes of the historical reality (including existing worldviews outwith novels) which gave birth to them. Creative chronotopes, to our knowledge, have been completely neglected in the literature, and yet the time/space of a creative chronotope is a gateway for the incessant process of exchange between (created) art and (creating) life.

Chronotopes and film: Aesthetic objects as liminal affective technologies

Films arguably overtook novels as the dominant storytelling medium during the 20th century, and remain hugely popular today. Like novels, films are highly syncretic aesthetic objects, capable of absorbing multiple influences, including chronotopes taken directly from novels, plays, biographies, etc., and fusing them into new major chronotopes unique to cinema. Considered as affective technologies, aesthetic objects of all kinds operate with time and enable its manipulation and appreciation in virtual form. But unlike a novel or a painting, where the *composition* is static, the compositional form of a film is mobile (as with music or dance). The speed of its unfolding can be fixed, and this in turn transforms the possibilities for its *content*, and hence the capacity to directly impact the audiences' direct experience of temporality (Kuhn, 2013; Mitry, 2001; Persson, 2003).

The differences and similarities between novels and films can be clarified using Bakhtin's (1990, p. 267) theoretical distinction between formed material (forming the *composition* of an external material work) and formed content (forming the *architectonics* of an aesthetic object proper). For Bakhtin, any aesthetic object is *also* an external material work in so far as it includes the formed material (paint, sound, words, film, etc.) out of which it is *composed*. But to be an aesthetic object the material work must be *formed* by its creator(s) in a manner that expresses *content* for its appreciator(s). The *Pietà*, for example, is not just formed marble. It is marble formed according to a specific 'architectonic' capable of expressing the tragic content of the dead Christ held on the lap of his mother. This content, to put it briefly, is an *event* (the 'Pietà event,' we might say). In distinguishing the material work from the aesthetic object, Bakhtin is indicating two types or processes of *forming* that are simultaneously at play both in the production of

any aesthetic technology (by its creator) and in its use or reception (by an appreciator): one plane forms the 'material' and another forms the 'content.' The formed material is the *composition* of the external work (formed on what we will call the *plane of composition*) and the formed content is the *architectonics* of the aesthetic object (formed on the *plane of content*). Compositional and architectonic planes work together because the forming of the material is not itself the *aim* of the artist but the technical means for embodying the *content* of an aesthetic object in the medium of an external work. Each aspect of the material composition must serve (as a complex symbol) to express the *event* of artistic content.

If the goal in creating an aesthetic object is thus to form material in a manner that forms the content of the aesthetic object, then the nature of the material to be composed is obviously of crucial importance. In the case of novels, the 'external material' at play in the work is written language, words being the compositional medium for expressing the content of the chosen aesthetic object (which might be the event of an entire historical era, as with Tolstoy's *War and Peace*). The same event might also be the subject of a film, but the aesthetic object will nevertheless differ because the material at play in the technology is so different. The arrival of film required some technical innovations (as, for that matter, did writing). A strip of light-sensitive film bearing a sequence of photographic images was mechanically moved across a light source and high-speed shutter such that a simulacrum of a moving slice of life can be shown on a film of determinate duration (and after the invention of projectors, the moving images could be projected onto screens). Forming the material of film means that time and space can be 'indicated' using not just written words but also recorded moving images and, after the silent era, sound. This means that, unlike novelists, film makers are not restricted to *telling* time; they can also *show* it. Film thus opens a unique and distinctive relationship to time, and this is a key to its massive popularity.

In addition, the relationship between the duration of the film as a material object (the film may take 3 hours to unravel) and as aesthetic content (the event it presents may take 45 years to unfold) can be lightly 'played with' in multiple ways, especially by means of editing, such that Tarkovsky (1986) could refer to filmmaking as 'sculpting in time.' Tarkovsky's analogy is evocative because of its implicit contrast between the solid heaviness of stone or wood (the usual sculpted material) and the mobile lightness of a film. Film thus has a different relationship to time because the compositional medium serving as 'material' for forming is itself already a moving *process*. Bakhtin's chronotope concept has therefore been considered especially applicable to films (Flanagan, 2009). Indeed, in the very first days of cinema when the Lumière brothers presented *L'Arrivée d'un train à la Ciotat* (Lumière & Lumière, 1896), there is a popular legend that some members of the audience reacted with fear as if the arriving train might crash through the screen. It is likely that this reaction was exaggerated for promotional purposes, but as the continued importance of 'jump-start' moments in horror films today shows, the 'temporal realism' lightly exploited by film encourages this kind of blurring of the created chronotope with a possible creating (in this case destructively so) chronotope. Understood in Bakhtinian terms, this blurring capacity, attributable to the mobile lightness of film, lent films the power to modernise and amplify the efficacy of the Adventure Time chronotope (being 'suddenly' assailed by unexpected

chance events) of the Greek Romance (Flanagan, 2009, p. 53; Vernant & Vidal-Naquet, 1988). The Action Film genre, for example, in which abduction is followed by car chase, followed by crash, followed by fight, followed by escape and pursuit, followed by, etc. etc., has long seen box-office success, and it builds on the older Cowboy Western adventure genre in which comparable events occur by means of horses and wagons. Nolan, as we will see, exploits this agile potential of film to the full, and takes it in remarkable new directions.

One last theoretical distinction that must briefly now be introduced is the contrast between *fabula* and *syuzhet* or subject proposed by the Russian formalist movement as cinema was beginning to rival literature (Shklovsky, 1923/2008). The *fabula* is the abstract chronology of 'what happened' in a slice of life. The *fabula* serves as 'raw material' for the *subject*, which is how this fabula is organised or *treated* in a given play, story, novel, or film plot. For example, if we take Oppenheimer's life, the *fabula* would be the key events in his life following the chronology in which they actually unfolded in real irreversible time (starting with his birth in 1904 and ending with his death in 1967). The treatment of this life as a *subject* in the content of an aesthetic object, by contrast, can organise this temporality differently (for example, to create specific aesthetic effects, the *subject* might begin with his death and end with his birth). The *fabula* can thus be considered the medium that is formed into the *subject*. The *subject* is a re-working of chronological time into new shapes. As we shall see, Nolan regularly exploits this temporal contrast along with the other contrasts we have introduced.

Christopher Nolan as chronotopic artist

Having prepared the theoretical basis for our argument, we now pursue the empirical question of how chronotopes are artistically rendered and articulated in films directed (always, of course, with a team of artistic collaborators) by Christopher Nolan. Nolan is noted as a film maker who has consistently pushed the cinematic limits for depicting time and space (Zemler, 2020a, 2020b). From the beginning up until his most recent critically acclaimed *Oppenheimer* (Nolan, 2023), the films he directs have been strikingly non-linear in their narration, demanding the creation of complex formal arrangements (Nolan, 2000, 2006, 2010, 2020). We have therefore come to consider Nolan as a *chronotopic artist* able to 'lightly' convey insights about time that are otherwise difficult to intuit, let alone formulate into the 'heavy' and wordy theoretical language of psychology. Engaging with his films provides a means to explore experience with time and expand theoretical imagination about the varied 'shapes' through which time can take place (Valsiner, 2020; Vygotsky, 1971; Zittoun, 2021; Zittoun & Gillespie, 2016). Nolan's films certainly incorporate and further develop the adventure time chronotope of the classic Action Film genre, especially his blockbusters like the *Batman* trilogy (Nolan, 2005, 2008, 2012). But in the selection of films we examine, he appropriates this breathlessly action-packed species of thrilling adventure time as a minor chronotope within the broader framework of a major chronotope that is very much his own. The main task of our analysis is to analyse and describe the chronotope of permanent liminality that Nolan has made distinctively his own. This in turn will yield insights into time that are relevant to psychology.

Methodology

Data. Our analysis is based on a selection of Nolan's films spanning a period of 23 years, including *Memento* (2000), *The Prestige* (2006), *Inception* (2010), *Tenet* (2020), and *Oppenheimer* (2023), which we refer to as TIMPO for convenience (note the temporal refashioning of the *fabula* MPITO into the *subject* TIMPO). We deliberately leave out other films such as the *Batman* trilogy, which is based on a predefined structure and follows a different production logic (Nolan, 2005, 2008, 2012), even though it clearly conveys some of Nolan's preoccupations and it enabled him to develop some of his cinematographic language. For space reasons we also leave out the remarkable science-fiction *Interstellar* (Nolan, 2014), and *Dunkirk* (Nolan, 2017), a historical drama, although they both use the cinematographic experience to explore the materiality and malleability of time. Written and directed a few years apart, each film in our sample creates a new aesthetic impression and generates a unique cinematographic experience.

Analytical procedure. Our analysis used a bespoke version of a qualitative methodological procedure called 'thematic decomposition' which was originally developed in social psychology to analyse interview transcripts 'processually,' with reflexive attention both to content and to discursive dynamics (Stenner, 1993). Using this technique to analyse films demanded important adaptations to accommodate the multi-layered nature of film as a complex datum (see Holland, 2006). To this end, we found great value in the Bakhtinian theoretical distinctions discussed above, but we did not begin with those distinctions fully in place. Rather, our analysis of the films involved a process of cycling *abductively* between careful 'bottom-up' empirical observations of the structure and content of the films and the use of findings to fine tune our theoretical framework. After watching each film multiple times and taking notes, we first generated a table (available from the authors on request) indicating and comparing key aspects of the content of each film, and describing candidate created chronotopes. This process involved taking careful account of our subjective responses (following Vygotsky's procedure as described in Zittoun and Stenner (2021), especially note 2) as we watched and entered into dialogue with the films based on our interest in the aesthetic experiencing with time/space that they provide. Our initial analysis thus highlighted those aspects of our cultural experiencing that relate to the filmic chronotopes identified. We then pursued two related analytical pathways. First with respect to architectonics, we sought to produce a synopsis of each film and to decompose the content of the films into themes. Second, we investigated how the 'anatomy' of the material composition informs the 'physiology' of the architectonic content provided to the appreciator (Stenner & Zittoun, 2020; Zittoun, 2013b). This required researching the filmic techniques used to make the films and generating, where possible, diagrams of the various 'planes' at play in their formed material and content (e.g., Figures 2–4). To this end, our analysis attends both to the compositional and architectonic planes of each film. Because of their tight relationship, these two pathways are not presented separately. Rather, the five main themes identified in our analysis involve a mixture of the two planes. Together, the

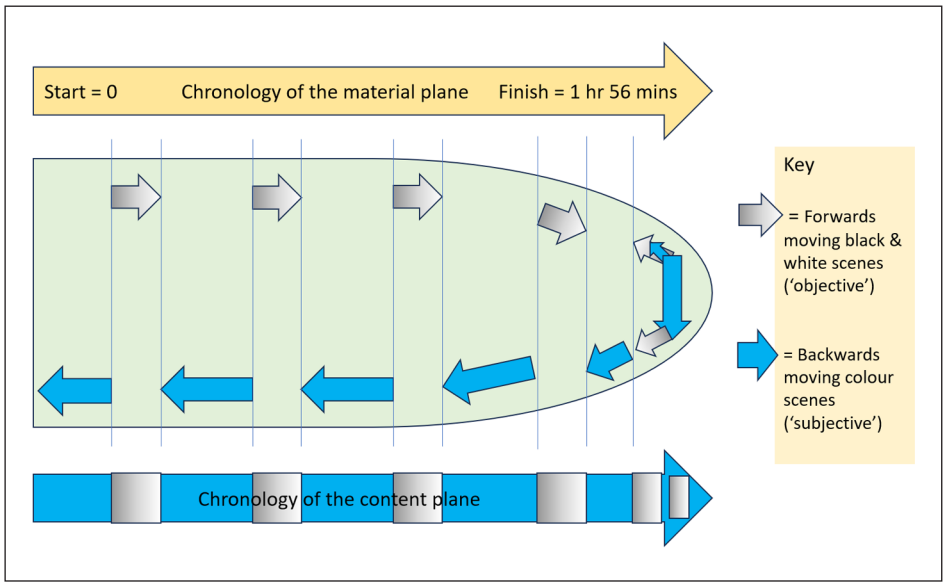

Figure 2. Schematic summary of Nolan's hairpin structure for *Memento* (2000).

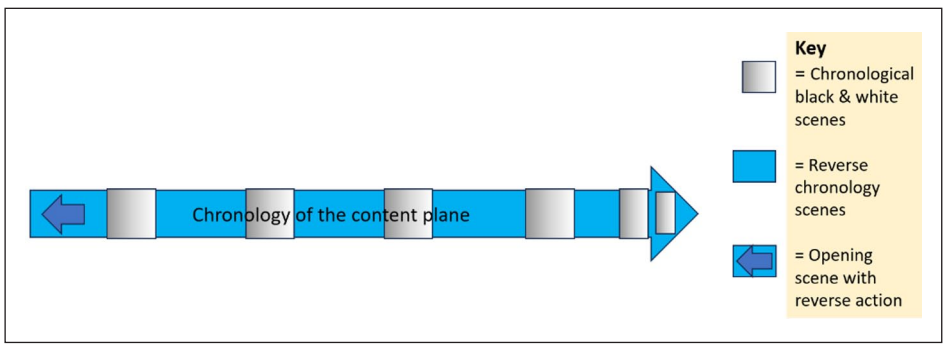

Figure 3. Two types of temporal reversal in Nolan's *Memento* (2000).

themes summarise Nolan's major chronotope, which by presenting characters stuck in permanent liminality, draws the appreciator's attention to the complexities of created, creative, and creating time.

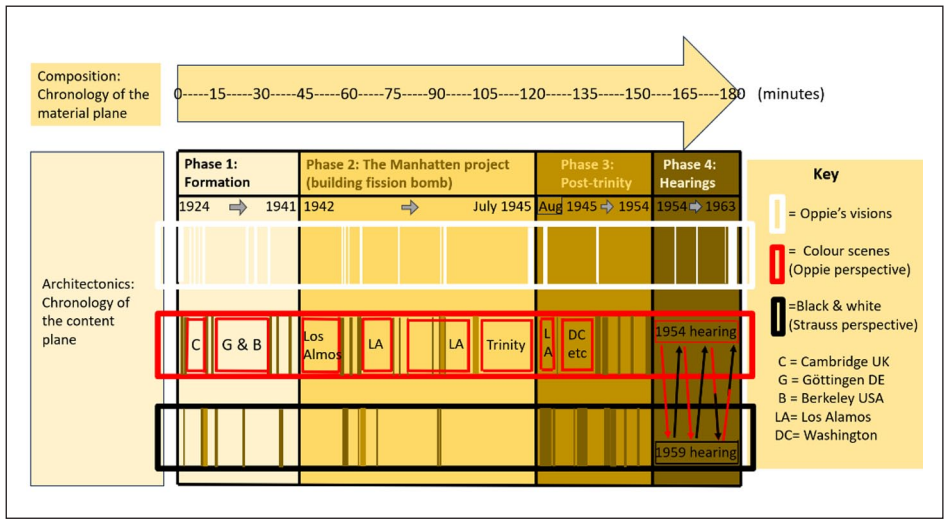

Figure 4. Schematic summary of the basic composition and architectonics of Nolan's *Oppenheimer* (2023).

Film synopses

First it is important to affirm that as a collection of films TIMPO are quite diverse. They represent a number of different genres, each with distinct plots, set in a range of different times and places. The synopses provided below give a flavour of that diversity:

- *Memento* (**M**) (Nolan, 2000) is a psychological revenge thriller set mostly in motel rooms in contemporary (ca. 2000) Los Angeles and featuring a hero called Lennie whose anterograde amnesia interferes with his efforts to avenge the murder of his wife. Lennie develops a method for finding the perpetrator despite the unreliably discontinuous nature of his mind: he creates a kind of secondary, substitute memory by tattooing relevant facts and instructions onto his body. The film ends with the suggestion that the chronology inscribed on his skin actually misleads Lennie. It turns out that, after a certain point, the tattoos had been designed, not to inform but to deceive his naïve waking self, and the false memories thus created lead him to act more and more erratically.
- *The Prestige* (**P**) (Nolan, 2006) is a costume drama set mainly in 1890s London whose main characters are Robert Angier and Alfred Borden, two stage magicians locked into a deadly rivalry. Angier holds Borden responsible for the death of his wife during a magic show. Both seek an ultimate magical trick, involving apparent movement at an instant from one place to another, to guarantee their success, but take different paths to this objective. Borden perfects his modest craft of disappearing from a box on one side of the stage, only to seemingly reappear at the other side (in fact this is done using a lookalike double). Angier visits Professor

Tesla who produces a machine that, rather than teleporting the same individual, really creates a new double. Their rivalry grows to mutual mortal hatred.

- *Inception* (**I**) (Nolan, 2010) is a science fiction action heist that flits between present-day (ca. 2010) Paris, London, Morocco, Japan, and the United States and features a hero (Cobb) who specialises in entering and influencing dreams. In the case dealt with in the film, an idea is 'incepted' into the mind of the CEO of a multinational corporation with the aim of subverting a company merger plan. A high-tech dream-sharing device allows Cobb and his group to enter the dreams of the individual targeted for inception. The inception is achieved during a transcontinental flight on which Cobb and his team share a dream, and then a dream within a dream, with the sleeping CEO. Throughout, Cobb both grieves and feels guilty for the death of his wife, Mal, under suspicious circumstances.
- *Tenet* (**T**) (Nolan, 2020) is a science fiction action thriller whose hero is a former CIA agent called 'The Protagonist' who is recruited to a secret organisation seeking to counter an attack from the future. The action flits between Kiev, Estonia, Denmark, the UK, Siberia, Mumbai, and the Amalfi Coast of Italy and also between the present (ca. 2020) and the future. To stop a Russian mafia leader from using a weapon that could mean the end of the world, the protagonist traverses action scenes involving car chasing, yacht diving, exploding planes, and shoot-outs. He discovers that the weapon is actually a circular machine that produces negentropy which enables whoever enters it to move in a reverse time-space. As the protagonist enters it mid-way into the film, the second half of the film becomes his progression backwards in the scenes of the first half. Next to this main plot, the protagonist also decides to liberate the beautiful wife of the mafia leader, held captive together with their son.
- *Oppenheimer* (**O**) (Nolan, 2023) is a biographical epic (biopic) based on the historical life of J. Robert Oppenheimer, the Director of the Manhattan Project's Los Alamos Laboratory and so-called father of the atomic bomb. The young theoretical physicist visits Europe before returning to the United States. During World War II, he leads a team of scientists to develop an atomic bomb before the Nazis do. The bomb is tested and dropped over Hiroshima and Nagasaki to end the war. Later, Oppenheimer is accused of collaboration with the USSR—partly under the instigation of a power-thirsty politician, Mr Strauss, before being reinstated as national hero. In mastering the lethal power of atoms, Oppenheimer also gives humanity the capacity to destroy itself. Next to this main plot, Oppenheimer has complex stories with fragile and clever women, the last one remaining his wife through his ordeal.

Results of the thematic decomposition

Without losing sight of the spatio-temporal and genre diversity illustrated by the synopses above, our thematic decomposition uncovered a set of five themes common to all films. The section below outlines those themes in detail.

Theme 1: The hero of the created world gets permanently stuck in a troubled and traumatised experience with time and space. The architectonic plane of the content in all five films delivers to the appreciator events involving a *preoccupation with problems connected to the experience of space, and especially of time*. A first simple dimension of this is the creation of a high-pressure 'adventure time' typical of the action thriller genre. The hero is confronted with obstacle after obstacle 'against the clock' in their efforts to meet significant challenges. Hence in **O** the US A-bomb must be built before the German; in **P** Angier must better Borden in the rivalrous race to be the greatest stage magician; in **I** the dream of Robert Fisher must be manipulated during a short transatlantic flight just before he inherits his father's company; in **T** the protagonist must quickly work out and counter a high-tech attack from the future; and in **M** Lennie, a hero with anterograde amnesia, must take revenge before his memory inevitably escapes him. The 'tag line' for **T** ('time runs out') captures this chronotope of the hero's intensely time-pressured *present*. The sense of thrill created in these films is thus associated with an extraordinary chronotope of emergency time.

More fundamentally, a further dimension to theme 1 is that in all the films this thrilling emergency time chronotope is extended into something approximating a chronotope of *permanently unstable spatio-temporal liminality*. The collapse of a previously familiar order is depicted at personal, interpersonal, and societal scales. At the personal scale, to give just two examples, Cobb (**I**) lives a life in enduring exile, wandering between vaguely specified locations in which he meets fellow spies and conducts his criminal activities. His ambition throughout is to break out of this condition of permanent spatio-temporal instability. In **M**, although Lennie's body remains in the same place (often the temporary and anonymous space of a motel room), his amnesia prevents him from extending 'himself' over that space, as it were, for more than a few minutes, and so he cannot 'hold onto' this space as part of the same enduring temporal episode. He is obliged to perpetually rediscover his (lost) past in order to reinvent his (lost) future. Meanwhile, at the interpersonal level there is a cyclical dynamic of escalating vengeful rivalry at the heart of this chronotope of permanent temporal instability. In **M** Lennie seeks revenge on the killer of his wife but is also instrumentalised as a tool in the blood feuds of other characters (Teddy, Natalie, and the hotel concierge). In **O** it is Oppenheimer and Strauss who become enmeshed and 'stuck' in an escalating rivalry. In **P** the rivalry between Angier and Borden escalates into an enduring condition of mutually guaranteed instability.

At the societal scale, in **O** the rivalry between Oppenheimer and Strauss expresses the growing nuclear arms race and the increasingly controversial relationship between science and politics as the United States decides between international cooperation and global supremacy. In this way, the *personal* chronotopic instability of the hero (**O**) is connected both to that of the escalating *interpersonal* rivalry and to a global *societal* scale (the spatio-temporal instability of the escalating Cold War arms race). Hence the three levels are layered upon each other to create a comprehensive sense of the profound temporal instability of the present personal, interpersonal, and societal order of things. Oppenheimer, for example, finds himself caught in the unstable temporal space between the end of World War II and the beginning of the Cold War. **T** features an escalating 'arms race' which takes over the entirety of time itself (as technologies from

the future invade and destabilise the past). The present-day society is literally under attack from the future and on the threshold of destruction. In **I** the motivating rivalry is capitalistic at source rather than military (**O** and **T**), personal (**M**), or 'artistic' (**P**), the aim of Cobb's team being to destabilise one multinational corporation to the advantage of another. The 'film noir' ambience of **M** generates a sinister sense of the corrupt personal basis of the social order, while the plot of **P**, despite being set in Victorian times, is haunted by the world-changing powers of Tesla's secret technology. This technology makes space and time newly flexible, allowing one of the two main characters (Angier) to move at an instant from place a to place b. Hence in all five films the chronotope of enduring extraordinary (liminal) time is thus 'scaled up' from the personal and interpersonal levels and enveloped within a chronotope of escalating societal 'permacrisis.' We therefore use the disturbing phrase 'permanent liminality' (see Szakolczai, 2017), which at first glance might appear simply oxymoronic (can a transition that never ends be a transition, and can a permanence of change be permanent?), to describe how these films depict, at multiple scales, something deeply paradoxical on a chronotopic level.

Theme 2: The hero's trouble with time (in the created world) is doubled by a troubled experience with time/space devised for the appreciator (in the creative world). In each film it is not simply that the plane of content is formed to present heroes having encounters involving unusual experiences with time during times of societal unsettlement: It is also that the material plane is formed to present that content in a way that affects the appreciator by giving them experiences of time comparable to those had by the heroes depicted in the content. The appreciator's own troubled experience of time is not produced by simple empathy with that of the main protagonist (who is never very sympathetic), but directly by the film's combination of compositional form and architectonic content. This technological design allows the adventures and experiences depicted in the *created* world of the film to be doubled by the fostering of comparable experiences on the part of the appreciator within the creative chronotope (of the cinema or home screening).

For example, we just noted that on the content plane of **M**, Lennie's amnesia leaves him lost in a temporal 'no man's land' which prevents him from keeping his own identity day to day. Meanwhile, via the material plane of the film, this content is presented to the appreciator using compositional and architectonic structuring devices designed to provide them with a liminal experience matching that of the hero in the created chronotope. Using the conceptual vocabulary outlined so far, we now detail how Nolan achieves this disorientating effect by exploiting tensions created between the different planes. Tensions can be generated between the temporality of the composition and that of the architectonics, for example, and further contrasting planes can be constructed (coded, as we will see, by colour and its absence, and by music) and contrasted in the architectonics of the content (including tensions between the *fabula* and the *subject*). Since Nolan further develops this technique in his other films, we will concentrate here on his early innovation in **M** (but Figure 4 shows how the black and white / colour contrast is used in **O** to contrast the subjective perspectives of Oppenheimer and Strauss).

In making **M**, Nolan needed new techniques to give the appreciator an experience of time comparable to Lennie's amnesia (i.e., to suspend the appreciator in a

temporally disorientated state resonant with that of the hero). This confused sense of time is generated by juxtaposing and playing two distinct series of scenes against one another. The difference between the two series is marked by the fact that one series is black and white and one colour (the music, composed by David Julyan, further accentuates this contrast, as do the voiceovers). Because all films were black and white before the commercialisation of the use of colour around 1909, so black and white sequences have long been used symbolically to indicate 'the past' in films which are otherwise in colour. Nolan could presuppose this chronotopic convention for symbolising time using the visible medium of colour (and its absence) and play in novel ways with it. For example, in **M** the symbolic meaning of colour (and its absence) is no longer 'the present' (and 'the past'), but something much more complex. First, the difference between colour and black and white scenes is used to symbolise the difference between relatively subjective and objective viewpoints. Throughout the film colour scenes alternate with (shorter) black and white scenes. This is designed to accentuate and play with the tension between Lennie's (traumatically distorted) subjective view of reality (emphasised in the colour scenes, which are filmed with intimate closeness to Lennie) and faith in a more objective sense of reality beyond the subjective (emphasised in the black and white scenes, which are filmed in a more neutral, third-person 'documentary' style). Second, taken as a whole series, the short black and white scenes run forwards chronologically whilst the series of longer colour scenes runs backwards (see Figure 2, drawn after Nolan's explanation in Thippani, 2015). Towards the end of the film there is a blurring and merger of the two series. Scenes previously shown in black and white are now shown in colour (and vice versa). This device fosters temporal disorientation on the part of the appreciator because: a) the story is presented both forwards and in reverse order, b) most of it is delivered in reverse order (as if a series of Lennie's flashbacks), and c) the two orders are then deliberately confused in the last part of the film. Together this double meaning of black and white (subjective/objective, forwards/backwards chronology) allows Nolan both to provide the appreciator with an approximation of Lennie's amnesic liminal experience and, as the film progresses, to gradually cast doubt on the objectivity of Lennie's motives.

This innovative chronotopic device for playing with time is announced in the opening scene of **M** (with the opening credits). The appreciator is shown a polaroid photograph of a murdered man. Seemingly the photo is in process of development, but as the hand of the person holding it shakes the photo dry, so the image becomes progressively blurred and fluid as if it were developing in reverse, against the flow of time (un-developing). As indicated in Figure 3, the opening scene is part of the colour series and so it shows, from Lennie's subjective perspective, the last event of the story as *fabula* (see the first section). Hence at first the appreciator (like Lennie in every fresh scene) has no idea who the dead man is, why the polaroid has been taken, or whose hand is shaking it. The sequence of around 20 colour scenes that follow proceeds to unfold Lennie's story in largely linear fashion, but backwards (and interspersed with the forwards running black and white scenes). Hence the appreciator gradually learns that the murdered man is Teddy, a crooked cop, and that he was killed by Lennie, who takes photos to remember events but whose memory constantly decays like the undeveloping photo image. The film subject does not end, however, with the revelation of the beginning of Lennie's story/*fabula*. It

ends with a colour scene showing the same photo but preceded by Lennie's murder of Teddy and his taking of the photo. The initial 'uh oh!' experience of temporal disruption is thus brought 'full circle' to deliver a final 'ah ha!' experience of new sense made (Stenner, 2017) (although Nolan's trademark, as discussed further below, is always to leave room for doubt).

We have described Nolan's chronotopic use of an architectonic tension between colour and black and white planes (giving a double-planed 'hairpin' [see Kaufman, 2009] chronology of the content or *subject*), but earlier we noted a more generic contrast between material and content planes. We described the black and white sequences as 'chronological,' but 'chronology' also means, on the material plane, the physical movement through time of the film as it is passes mechanically across a light source and high-speed shutter (whilst bearing a sequence of photographic images). Hence, run at the correct speed, **M** takes 1 hour 56 minutes to complete. Its chronology thus starts during the first second of this process and ends with the last. Anything within the plane of its composition must 'take place' within that chronology. The term 'chronological' applied to the *content* that is carried by that composition is something quite different, though of course related. This concerns the sequence of events forming the *slice of life* depicted on a film of determinate duration. Hence, understood chronologically, the *fabula* that Nolan treats as the *subject* for **M** starts, not with the undeveloping photo scene (which as the beginning of the film is the start of the *subject*), but with the traumatic violent event that changed Lennie's life (the attack on his wife and the blow to his head) and initiated both his amnesia and his revenge quest, and *ends* with his murder of Teddy (the event to which all the events *in between* lead up). Understood as *fabula*, Lennie's head injury comes chronologically *before* his amnesia and was a causal factor producing it. But, as already discussed, there is nothing to stop an artist presenting that plot information proper to the fabula at the end of their story, or anywhere else, for aesthetic effect. The *fabula* of **M**, as we have seen, is treated by Nolan (in the subject) both 'chronologically' (in the black and white series), and 'backwards' or 'reversed' (in the colour series). Hence in this context 'chronological' means: a) the subject of the black and white scenes follows the chronological order of the *fabula*, and thus also b) the subject moves in the same temporal direction as the material plane of the film (as shown in Figure 2).

In sum, we have seen that Nolan's treatment of the **M** *fabula* yields a complex *subject* for creating, for the appreciator, a series of disorientated 'uh oh!' time experiences which can then be manipulated by gradually providing new information allowing new realisations about how Lennie's past (with its past futures) relates to his present (with its present and future futures). Especially in the scenes which mix black and white with colour, Nolan is able to bring the appreciator to what Vygotsky (1971) called a 'catastrophe' (turning-point) moment. This is a climax or pivot point when the appreciator comes to realise that their understanding of the narrative has been partial and opaque but is now becoming clear as new meaning about what has happened and is happening floods in, as it were, to their 'new' eyes. The 'catastrophe' moment is precisely that which 'spoils' the film if revealed in advance (hence 'spoiler alert'!). In all five films, Nolan develops and sometimes re-uses versions of this filmic device for creating chronotopic disorientation in the appreciator, followed by 'catastrophe' moments of partial reorientation. In **P** a

comparable temporal disorientating/reorientating effect is created through gradual revelation of hidden background about Borden's and Angier's stage 'transporter' methods (*spoiler alert!*—the 'catastrophe' is also doubled, since it occurs once when the appreciator learns of Borden's twin, and again when Angier's self-duplication and self-murder is revealed). In **I** it is achieved by use of a complicated architectonics of multiple dream worlds, each its own chronotope, and each chronotope nested in another for which time and space behave very differently (Fisher, 2011; Tan, 2016).

The case of **T** must be described in a little more detail. Above we distinguished two different types of 'reversed' chronological time in **M** (see Figure 3). In the first type the sequence of the colour scenes was arranged to flow backwards in time: the start of the film (i.e., the material plane chronology with which the *subject* begins) shows the end of the story (considered as the chronology of the *fabula*). The second type was used only in the opening colour scene, where the actual events of the scene themselves run backwards. In fact this scene showed not just the 'undeveloping' polaroid but also blood flowing back into Teddy's body, and a bullet flying back into Lennie's gun. Twenty years later, Nolan greatly develops both types of reversal in *Tenet* (which benefited technically from the largest of his budgets so far—US$205 million). **T** features extended sequences in which bullets appear to fly backwards against time, and rather than simply use computer effects, Nolan actually had some of his actors move themselves backwards when being filmed[1] so that the impression could be gained when watching the film that they were travelling back in time relative to the rest of the cast who were moving normally (i.e. forwards into the future). This development of 'type 2' reversal in **T** allows Nolan to create disorientating effects using differently composed architectonic planes of content. Hence by the second half of the film, the appreciator comes to the 'catastrophic' realisation that they are re-watching scenes from the first half. Now, however, they view from the perspective of the time-reversed main protagonist as they swim, as it were, against the standard one-way flow of irreversible time (risking encounters with their normal entropic other self). The protagonist does not simply go back in time but goes forward in a time now shown in reverse direction.

In **O** Nolan accomplishes a comparable effect by revisiting his innovative use of colour and black and white scenes, this time to convey the subjective perspectives of Oppenheimer and Strauss respectively. The colour scenes predominate, and the black and white scenes are cut into them (see Figure 4). At the film's start these are labelled 'fission' and 'fusion' respectively, to reflect the growing disagreement between Oppenheimer and Strauss over developing a more powerful fusion bomb (the hydrogen bomb). The film reaches a climax after roughly 2 hours with the Trinity test explosion. Before Trinity, Oppenheimer had thrown himself into developing the fission bomb, but after it he became concerned about having inaugurated unstoppable nuclear escalation (symbolised by 'fusion' and by Strauss' will to US Cold War military supremacy). As the rivalry dynamic is fully expressed towards the end of the film, a final scene involving Einstein serves as the catastrophic pivot of temporal orientation. A version of the scene had been shown earlier from Strauss' (black and white) perspective, but now we see it in colour along with Oppenheimer's apocalyptic parting words to Einstein (now a 'flashback' since they were uttered shortly post Trinity). This leaves the appreciator wondering what Oppenheimer means by telling Einstein that the bomb

he created had indeed set of a chain reaction that will in fact destroy the world (since we know from the climax of phase 2 (Figure 4) that it did not). To hammer the point home, the film ends with a series of terrifying visions of a global nuclear inferno. As shown in Figure 4, this completes a third plane of 'visions' which accompanies the black and white and colour planes from the beginning (showing Oppenheimer's extraordinary subjectivity). Using this catastrophe device, the appreciator is given a concrete 'oh my God, what have we done?!' moment that is comparable to Oppenheimer's own realisation during the post-Trinity phase (i.e., Oppenheimer's subjective viewpoint in phases 1 and 2 of Figure 4 was radically different to his viewpoint in phases 3 and 4). In this chronotope of escalating criticality, it is as if the runaway time of micro-physical chain reaction had precipitated the societal chain reaction of an arms race stoppable only by total destruction. The point, to close this section, is that in each film *qua* liminal affective technology, temporal disorientations on the content plane are doubled by means of filmic techniques designed to induce temporal disorientations as part of the creative experience of the appreciator.

Theme 3: In the created world of content, a central role is given to technologies which alter and manipulate time/space. The crux of this third theme is that the content of each film features a machine (or technique) for manipulating time and space which can therefore be called a *chronotopic technology*. In **I** the chronotopic technology is a high-tech dream-sharing device (called PASIV or Portable Automated Somnacin IntraVenous) that allows its users to enter the dreams of individuals targeted for 'inception.' Inception is the name given to this activity of dream manipulation whereby the future plans of the 'targets' are deliberately altered by changing their sense of crucial past events in their lives, as these are inscribed deeply in the unconscious. In **M** the chronotopic technology is the technique devised by Lennie of tattooing facts (he would otherwise forget) onto his own body as a 'memento.' Using this mnemonic-based skin-tattooing technics, Lennie aims to capture enough of the time lost through amnesia to generate and coordinate time for revenge. In **T** the word 'tenet' is a palindrome (it reads the same backwards as forwards) and names both the film and a circular machine capable of reversing time by producing negentropy. Whoever enters this chronotopic technology can move in a reverse time/space. The protagonist enters the tenet machine mid-way into the film, allowing the second half of the film to become his progression backwards in the scenes already shown during the first half.

The film titles of **T** and **M** are thus directly named after the featured chronotopic technology, and **I** is named after the dream inception technique afforded by the PASIV technology. This pattern also applies, though less directly, to **P** and **O**. In **P** the chronotopic technology is the teleportation machine made for Angier by Tesla. This machine allows Angier to present himself on stage in the phase of a magic trick called 'the pledge' (the phase where something ordinary is presented), only to disappear during 'the turn' (the phase where something extraordinary happens), and to reappear in another location for 'the Prestige' (the name both of the final phase of a magic trick where normality is reestablished, and of the film). In **O** the chronotopic technology is the atom bomb the primary inventor of which the film is named after. A key point of the film is that this bomb, after altering the course of Oppenheimer's biographical time ('I am become death,

destroyer of worlds'), forever altered the course of historical time, creating a new present for humanity.

Theme 4: The effects of the chronotopic technologies are fundamentally ambivalent. In **T**, the time reversals made possible by the negentropy machine are initially thoroughly destructive (the machine is the basis for an attack on the global present), but as the main protagonist and his helpers come to master it, it becomes the sole basis for defending the world. In **I** the PASIV machine allows unprecedented access to dream worlds, including the power to intervene and create new dreams, which opens new and exciting creative and practical possibilities, but it is also weaponised as a method of espionage. Furthermore, it becomes possible for those who enter them to get permanently stuck in dream worlds, especially in the deepest dreams of 'limbo,' where time moves very slowly. A key danger, which proves lethal to Cobb's wife Mal, is losing the capacity to tell the difference between dreaming and being awake, and **I** offers a deep meditation on this blurring of the sense of reality. Likewise, much of the dynamism of **M** concerns the theme of whether Lennie's technology of self-tattooing actually aids his lost memory or fundamentally deceives him. Following the film's 'catastrophe' moment, it becomes clear, not just that the 'facts' he inscribes on his body are unreliable, but that Lennie has decided to weaponise his tattoos to lead himself to kill Teddy (once he has realised that Teddy has been manipulating him to kill 'John Gs' of his choice).[2] As with **I**, the positive effects of the technology of **M** become negative as a function of the distorted sense making of the main protagonist, who in both cases is traumatised by a combination of mourning a deep loss and seeking vengeance. As Lennie puts it in **M**, 'how am I supposed to heal if I can't feel time?'

The magic tricks of **P** begin as amusing entertainment, but the rivalrous magic technology race escalates, starting with the death of an assistant (Angier's partner) and then to the injury, imprisonment, and execution of Borden and the death of Angier. In **P** the trope of the danger of an ever more blurred sense of reality is developed by means of exploiting the difference between an unreal effect created using magic trickery (Borden's teleportation was a trick involving a hidden twin brother) and a real effect created using scientific technology (Angier's Tesla machine could 'actually' create living doubles of himself). Tesla warns Angier to destroy the machine before it destroys him. In both cases (magic and science) the technology had dire consequences in the lives of Angier and Borden (Borden is shocked to see Angier alive after he has seen him drowned, and Angier is shocked to see Borden 'return' after death by hanging, although actually it is his twin brother Fallon). In **O** the ambivalence of the atomic bomb technology (which is scientific but also, as noted above, of 'theatrical' importance on the new 'global stage' it helped create) is thoroughly exploited, with the first half of the film generating breathless excitement about needing to build it quickly to avoid defeat by the Nazis, and the second half drawing attention to its world-destroying potential as it is instrumentalised for political and military purposes.

Theme 5: Each chronotopic technology featuring as content is analogous to the film itself as a liminal affective technology. This feature is least obvious in **M** (where the medium of the created chronotopic technology is the skin of Lennie—where the skin could figure

the film reel[3]), and most obvious in **I**. *Inception* systematically fosters a direct analogy between the scenario of using technology to enter a dream world and the scenario of using film to create for (or with) the appreciator, an aesthetic experience (indeed dream-like and enjoyed by suspending disbelief) involving the manipulation of time (as examined in theme 2 above). In this analogy, the hero, Cobb, is like Nolan himself, the director of a team of experts unified by the task of creating an intense and moving experience for an appreciator. Just as Nolan's team included a producer (Emma Thomas), cinematographer (Wally Pfister), effects supervisor (Chris Corbould), production designer (Guy Hendrix Dias), composer (Hans Zimmer), stunt people, actors, etc., all working intensely together to create a unified filmic effect, so Cobb's team includes a researcher and project manager (Arthur), a specialist identity forger (Eames), a pharmacist to sedate the appreciator (Yusuf), a dream architect (Ariadne), etc. The PASIV machine in turn is analogous to the physical apparatus needed by film makers, and the dream team must sit together connected to the PASIV much like film goers sitting in a film theatre.

The systematic development of this thematic feature is less obvious with **O**, **T**, and **P**, but still clear in outline. In **P** it is the technical devising of the spectacular magic tricks that provides the analogy with film *qua* affective technology. This analogy is recurrently hinted at by characters offering observations about how magical entertainment depends upon skilful manipulation of the perceptions and beliefs of the theatre audience (e.g., revealing the 'trick' *spoils* the magic effect). In **T** the capacity of the negentropy machine to permit the reversal of time (with characters swimming back in time like salmon, as it were, against the normal temporal current) echoes the capacity of film—and Nolan's in particular—to play with time, reversing and re-traversing it, and creating effects in history. Oppenheimer too is the director of a team of experts working with a technology which, precisely because of its deadly nature, also serves as a global spectacle 'showcasing' the power of planetary destruction and serving as a performative 'statement' both of deterrent and of impetus for nuclear escalation. For example, at 1.39 the hero warns officials not to underestimate the "psychological impact" of the nuclear blast, "a pillar of fire 10,000 feet tall . . . the atomic bomb will be a terrible revelation of divine power." From this perspective, Hiroshima and Nagasaki were like the catastrophe of a theatre performance signifying the last act of World War II and the "first act of the Cold War" (2.18).

One final point concerning **O** is relevant to this fifth theme. **O** constitutes and presents to the appreciator an explicit reflection on the power of film to reconstruct versions of history that have become questionable. Hence, President Truman's version of events voiced at 2.06, near the start of phase 3 ("we have spent 2 billion dollars on the greatest scientific gamble in history, and we won") is pitted against that of the 'become death' Oppenheimer at 2.19 ("the day will come when the people will curse the name of Los Alamos"). The place 'Los Alamos' is thus presented as a chronotope whose meaning over time is in process of transformative contestation. Nolan's film *qua* technology is quite self-consciously *participating* in that creating process of meaning transformation. Nolan cannot change what happened (since time is indeed irreversible), but a film can change what the 'what happened' of an historical event is taken to be. Phase 3 of the film ends (2.30) with an imploring question from Oppenheimer, asked during his security

clearance hearing when he is being portrayed by Borden as a Soviet spy: "Is anyone ever going to tell the truth about what's happening here?" As this question reverberates through the remaining phase of the film it becomes clear that indeed Nolan is aiming to tell precisely *this* truth about this story. Furthermore, he is aiming to do so in a manner sufficiently potent to change the received history of what General Groves describes at the start of phase 2 as "the most important fucking thing to ever happen in the history of the world." **O**, from this perspective, is a chronotopic device designed to perform what might even be called a filmic *inception*; namely, to rescue this aspect of the story of this most globally important event from the "shabby little room, far from the limelight" (2.21) in which Strauss aimed, and for a while succeeded, to contain it.

Discussion and conclusion: Rethinking time

We set out to learn from film about time. To do so, and beginning from a post-Newtonian premise of time-space relationality, we built upon and re-theorised Bakhtin's discussion of chronotopes and embarked upon a thematic decomposition of five films directed by Nolan (TIMPO). The films depict time in multiple ways (adventure time, dream time, revenge time, work time, reversible time, rivalry time, home-idyl time, etc.), but also use interesting techniques to create temporal effects for the appreciator. We have proposed that the multiple minor chronotopes and connective narratives, gathered up into the five themes we have identified, together amount to a description of Nolan's artistic signature in terms of a major chronotope. Before addressing some limitations of our approach, and sketching in conclusion its relevance to psychology, we will first explain why we call this by the paradoxical name of a *chronotope of permanent liminality*.

TIMPO as a chronotope of permanent liminality

Starting with theme 1, we observed that each film, in its own way, affords a meditation on a *created* world in which characters have a troubled and even traumatised experience with time and space which is permanent in the sense that it never resolves. We noted that liminality has two main senses, one temporal and one spatial, both tightly related.

First, in its temporal sense liminality describes experiences typical of phases of personal and social transition in which those involved are *no longer what they were* but *not yet what they will become*. Usually, these liminal experiences are temporary, but Nolan's heroes are enduringly suspended in transitions and so get stuck in a present that has lost its future and its past. The permanence of Lennie's (**M**) chronotope of liminality is caused by amnesia from a head injury during a fatal attack on his wife. After the death of Cobb's (**I**) wife, he too finds himself endlessly seeking escape from exile via a multi-layered underworld of dreams (the deepest of which is even called Limbo), barely able to discriminate reality from imagination and past from present. The last scene of the film underlines that this condition may not in fact have been resolved by his heroics. Oppenheimer (**O**) is first presented as a permanent outsider, tormented by visions, who temporarily finds a sociality through his leadership of the Manhattan Project. But his hard-won achievements immediately liminalise as his status of war-ending life saviour

morphs into a becoming of death and destroyer of worlds as the modern world enters the permanent liminality of cold war.

Second, in terms of spatial liminality, Nolan's films are full of threshold spaces and situations, such as the dark alleys and hidden back-stage rooms in **P**, the free ports, airports, and international waters in **T**, the motels and anonymous basements in **M**, the van journey, plane trip, and decaying Limbo shoreline skyscrapers in **I**, and the New Mexico desert and hearing interrogation rooms in **O**.

The 'limen' implied in 'liminality' designates a threshold. A limen is chronotopically remarkable in the sense of being simultaneously 'in between' different orders of time proper to different fields of space. Theme 1 shows how that applies to the created order of time-space delivered as the architectonic content of the film *subject*, but it is illustrated in yet another way by our second theme. Theme 2 observed that it is not just the characters of the content that undergo a liminal experience of time-space, but also the films are carefully designed so that their appreciators too get a direct experience, albeit in the comfort of their seats, of similar troubles with time. We have seen that this is not simply achieved by forming the *subject* of the *fabula*, but also by techniques like running film backwards, having actors themselves move backwards, interweaving black and white with colour scenes, and the construction of 'hairpin' temporalities to disorientate and partially re-orientate the appreciator. Theme 2 thus shows how Nolan delivers interesting and unusual experiences of temporality to the appreciator, not just by content, but also by carefully forming the material composition of his films in relation to the architectonics of their content. One may say that Nolan makes maximal use of the fact that, understood as liminal affective technologies, films are themselves liminally constituted out of distinct but related compositional and architectonic orders of time-space. The created chronotopes of content are carefully designed to impact the creative chronotopes of appreciation.

Taken together, themes 3, 4, and 5 play further with the liminal thresholds between created, creative, and creating worlds, drawing attention to the interfaces between their distinct chronotopic orders, and using this to generate further emotionally ambivalent insights for the appreciator. We have seen that the created content of each film features a machine or technology for manipulating time-space (theme 3), the value of which is deeply ambivalent (theme 4). But, as shown by theme 5, each of these machines is designed to operate on another chronotopic register by stimulating a resonant analogy with the nature of cinema itself qua technology, and the process and effects of watching a film. The created time-machine chronotope, in other words, functions as a connective 'gate' which opens to the creative chronotope of the appreciator's 'now' (allowing the film to speak, as it were, to their watching of it). And what the films 'say' when they speak thus, warns of the dangers of time and its capacity for manipulation. Hence the appreciator of *Inception* can view their own process of watching as itself an 'inception' comparable to that achieved by Cobb and his team when they enter and manipulate the dream world of Robert Fisher. In this way, Nolan encourages reflection on film as a liminal affective technology, capable of co-creating remarkable experiences with time, along the lines that we have followed here, yet deeply ambivalent.

Limitations

One criticism of our approach might be that our overarching major chronotope risks concealing from view the particularity of the created chronotopes characterising each film individually. Our response to this criticism is that, indeed, individual analyses of each film are valuable (see Stenner & Zittoun, 2020), and our approach encourages rather than precludes this. Certainly, the minor chronotopes of each are embedded in a distinctive shape of time, and to some extent each film also evokes the timeless time of a distinct mythological source. Hence the mythical scene of the sorcerer's apprentice looms large behind the 'trickster time' of **P**. On the mythical dimension, the doom-laden temporality of exponential chain reactions depicted in **O** evokes Prometheus and Pandora (symbolised by Oppenheimer's preoccupation with the death of stars). **T** stages a broadly Sisyphean contrast between the irreversible and reversible, with irreversible entropic time constantly 'running away' in the face of efforts to create a negentropic time which can recapture and transform it. **M**'s variant on this theme foregrounds the shattered time of amnesia and vengeance yielding a permanent vicious cyclical dynamic reminiscent of tragedies from Orestes to Hamlet (evoking also *memento mori*: the need to remember death given the impossibility of preventing *tempus fugit* or the flight of time). The depiction in **I** of descent into multiple dream worlds-within-dream worlds evokes the myths of the Labyrinth and Orpheus. There is always more to be told in this manner, but added value comes from the synoptic vision afforded by our collective comparison of this set of films.

A second criticism is that a more simple and direct analysis could perhaps be made using, for example, structural analysis (Propp, 1970), or some form of narrative analysis (Bruner, 1986, 2003), perhaps psychoanalytically informed (Campbell, 1949). Of course there are other ways to analyse films. For example, albeit with important variations, the stories broadly fit Campbell's (1949) model of a three-phased *monomyth* starting with 'separation' followed by 'quest' and ending with 'reintegration' into society. Also, aligned with such analyses, the hero of each film could indeed be viewed as a seeker on a personal quest to unlock various problems like memory **M**, magic **P**, the unconscious **I**, time past **T**, and the power of the atom **O**, in order to reach a transformative destination involving maidens in distress or tragically demised loves (Mal in **I**, Lennie's murdered wife and Natalie in **M**, Julia in **P**, Jean Matlock in **O**) with the assistance of 'helpers' (e.g., the characters played by Michael Cain in **T**, **I**, and **P**), and special tools (the various chronotopic technologies) to overcome the inevitable obstacles. Seen from a structural perspective, then, each film has a dominant chronotope proper to the concerns of the hero (unconscious explorer **I**, magic trickster **P**, time traveller **I**, scientific genius **O**, blind seeker of vengeance **M**, etc.).[4] Again, our response to this criticism is that, indeed, more could and should be said. However, we developed our approach to be consistent with our process ontology, and from this perspective the weakness of structural analyses is not simply that they can over-simplify but also that they are inherently static. This is because they treat only what we have called the form of the content, ignoring the problem of the constitution of the aesthetic object as a liminal affective technology, which necessarily includes the role of the appreciator and the aesthetic experience generated for and with them, especially by means of chronotopes. In this respect, we should recall that Campbell

(1949) took his three-fold structure from Van Gennep's (1960) survey of *rites of passage* which introduced the notion of liminal rites (which typically involve quests and ordeals, sandwiched between separation rites and rites of reincorporation). Van Gennep indeed worked with a process ontology and viewed these rites as a kind of technology to manage social psychological experiences of transition. Taking this into account, our approach challenges the simplifications of the structuralists that followed van Gennep, and, we hope, re-vitalises the insight that, in hominid evolution, ritual is likely the most ancient liminal affective technology, arising *prior* to the myths and epics that were unpacked from it (Stenner, 2020). It also questions the static nature of Campbell's trilogy, because we have emphasised that in Nolan's films the middle liminal phase of transition is precisely *not* resolved (there is no orderly reintergration) but endures to the point of becoming a paradox (permanent liminality). We pick up on this in our conclusion.

Concluding comments on relevance for psychology

We have explained our rationale for describing Nolan's major chronotope as a *chronotope of permanent liminality*, and touched upon two limitations. We have not had the space to review how psychologists approach time today, preferring to learn instead from the films of Nolan, and taking our inspiration from Bakhtin. This is not accidental. Unlike Psychology, film can approach time lightly and without imposing a technical vocabulary of allegedly causal variables onto the problem, or immediately converting it into a subjective matter of time 'perception' or 'psychological time' (often defined against the standard of clock time). But what is the value of this for psychological theory? This, of course, is a question that merits another article entirely, so here we provide just a sketch of an answer.

First, building on the bases provided by Block and Hancock (2015), Wittmann (2009), and others, there is indeed scope for an updated critical review of how psychologists typically treat, or fail to treat, time-space. Crudely, the predominantly experimental positivistic and post-positivistic approaches, which tend simply to ignore time-space, can be viewed as imposing their own chronotopic framework in which dependent variables are assumed to be the causal issue of independent variables. Indeed, still today, research will not be considered properly 'psychology' *unless* the artifice of this Fisherian temporal technology is imposed upon a slice of life. Alternative 'phenomenological' approaches, by contrast, tend to individualise time as a structural feature of experience (Giorgi, 2010).

Second, our approach carries implications for a re-thinking of psychological theory along processual and relational lines. G. H. Mead's (1932) neglected work on 'the present' is relevant here as an early engagement with Whitehead's re-thinking of Einsteinian space-time, and provides ways of grasping paradoxes of irreversible and reversible time of direct relevance to people's experiences of significant transition (Stenner et al., 2019). Here our liminality chronotope becomes relevant because the concept of liminality emphasises the real constitutive importance of various relations of togetherness that change through time and that can go through ruptures and transitions. Consider, for example, that mind is a complex of enacted mental processes embodied in organic pro-

cesses, extended by technologies and embedded in the bundles of social practices forming a given culture and society, and as such is a manifold of multiple temporalities.

Third, our approach highlights the relevance of aesthetic experience to psychology via experiences of time-space. Much as Vygotsky approached art as a technique of emotions, our approach thus takes film seriously as an affective technology designed to facilitate the creation of aesthetic experiences with time on the part of the appreciator. Hence a film can only be understood in its relation to its appreciators as a fully dialogical entity. Nolan's films enable their appreciators to creatively generate and enjoy experiences in which temporality emerges, not as a single dimension, but as a complex composition: a symphony of mutually resonant or discordant times (Serres, 2019, p. 53). They create experiential conditions for grasping and enjoying this symphony of times as it informs our lives. Engaging with them thus opens possibilities for getting experiences of passage into new perspectives. This, we think, is the basis upon which Nolan's cinematic experiments can help psychologists to be more reflective and critical about time in their theoretical and empirical work. All art forms can be approached as technologies for generating aesthetic experience, and all aesthetic experience involves a kind of doubling of time. Indeed, it is the relational movement between the three chronotopic moments of creativity that gives this theory a dynamic potential to explain the ongoing historical relations between the becomings of art and life. As we saw, *created* literary chronotopes (созданный хронотоп) gain their genre-creating capacities by virtue of the relations they afford with extra-literary *creating* chronotopes (изображенный хронотоп), while *creative* chronotopes (творческий хронотоп) function as portals for "the assimilation of actual temporal (including historical) reality" (Bakhtin, 1996, p. 252). The three chronotopic worlds are not hermetically sealed off from each other but constitute porous points of passage at the threshold between the worlds of art and life. Thanks to creative chronotopes, the influence of created chronotopes within the world of the aesthetic object transfers over to shape new creating chronotopes within the 'actual' worldviews beyond it, and vice versa. Our approach invites a view of a work of art as: a) emerging in a specific chronological time/space; b) generating new forms of spatio-temporal experience via an encounter with a time beyond the mundane; and c) transforming the appreciator's relation to the social world by re-entering those forms into ordinary life.

Fourth, it seems likely that the chronotope of permanent liminality characterising Nolan's films expresses something important about global society itself, as we accelerate ever faster and further into multiple compounded crises with no seeming end. Liminality, as noted above, becomes a permanent paradox when transition is not resolved, and such lack of resolution is arguably a growing characteristic of our troubled times, and perhaps has long been so for disenfranchised groups. Psychology will quickly need to come to terms with the subjective and personal consequences of this unsettling societal context, including the often non-linear and peculiar time experiences it brings in its wake (Stenner, 2021a, 2021b; Velasco et al., 2023). But Nolan's films do not simply respond to emerging social and historical problems within the creating chronotopes of the actual world, but to a large degree *pre-empt* and *diagnose* these problems before they fully arise. **M** now appears as a remarkably prescient diagnosis of the so-called 'post-truth' crisis and attendant struggle to distinguish reality from fiction, just as **I** speaks to the proliferation

of 'fake news' (the inception of alternative facts into the dream-like worldwide web). The trickster logic depicted in **P** is today an expected feature of political speech and action and the recrudescence of totalising warfare is presaged in **T**. Meanwhile, as the appreciator gets lost and found in the lostness and foundness of the characters, Nolan nevertheless consistently aims to leave them with a disquieting feeling of unfinished, and perhaps unfinishable, business. At the close of **I** it is unclear whether Cobb's spinning device, which is designed to test whether he is awake (it will stop spinning) or still dreaming (it won't stop), will continue spinning or not, and **O** leaves the appreciator hoping that Nolan does not in fact have clairvoyant access to the future apocalypse.

In sum, we hope that the various shapes of time illuminated through our analysis of Nolan's films (and informed by our re-working of Bakhtin's theory of chronotopes) give encouragement to our colleagues to explore the psychological relevance of multiple forms of time, and the role of art in mediating these. This focus on multilayered and nested complexes of time would be relevant across the discipline (Barresi, 2012; Green, 2000; Perret-Clermont, 2005; Pontalis, 2001; Schwab, 2013; Valsiner, 2002; Zittoun, 2013a), including not just pathologies like Lennie's amnesia. It is even possible that such reflection might create the conditions for a veritable paradigm shift that has been slowly reverberating since the early 20th century but is yet to be fully consummated. The novels of Rabelais enabled Bakhtin to rethink time in his historical and cultural location; can Nolan's films help us to rethink time in ours?

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Notes

1. Nolan is a great follower of innovation in film technique; he also has progressively more financial means to develop his project. Over all of his films, he prefers using real special

effects (filming things in real size and real time), although in recent films he has used special computer-based visual effects (though modestly compared to other productions). His use of real-size special effects (e.g., a real Boeing was blown up in **T**) enabled at the time of filming is extremely precise and seems to draw on the best that can technically be done at a given time.

2. Shortly before the film ends, Lennie comes to realise that Teddy (the corrupt police detective) is his enemy and not his helper. Teddy tells him that Lennie has already avenged his deceased wife, but since he remained unsatisfied, Teddy exploited him as a weapon to kill his own enemies. At this tipping point, the appreciators are invited to rethink the whole film, and especially the version of himself narrated by Lennie. Following his discovery of this unpleasant truth about himself, he starts to appear less innocent than he seemed. It is understood that tattooing 'falsifies' his own memories by overwriting the 'facts' on his body. This in turn raises the possibility that Lennie has drifted into the inescapable vortex of an ever more alienating present with a hopeless future.
3. Note that in French, the film or photographic reel is 'la pellicule,' which also designates a thin layer of skin.
4. Interestingly also, over time, there is slow resolution of the basic fabula: If in the first films (in the 2000s) the protagonist runs to his loss, he comes to a certain appeasement in the last two films; if the lost woman remains lost in the early films, there is hope of a salvation (since 2020).

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