Echoes of Creation

Fractal Recursivity in Mythic Discourse

FROG

ABSTRACT: *Fractal recursivity describes the fractal-like projection of a pattern and associated evaluative framework on different orders of scope. The concept has been developed for the analysis of semiotic ideologies, but is here applied to mythology as a sign system. It provides a new tool for approaching echoes of cosmogonic events on a localized scope. The phenomenon is illustrated through cases in both narrative and ritual from non-Christian Scandinavian religion. The study reveals that fractal recursivity operates in relation to conceptions of time as organized into periods or temporalities. These are ideologically structured as governed by different ranges of what is possible, approached through Bakhtin's concept of chronotope. Fractal recursivity's transpositions can interfere with the chronotope in which they occur. Comparison with Finno-Karelian and Christian traditions shows that the phenomenon is shaped by ideologies through which the complexity and organization of temporalities are organized.*

RESUME: *Fraktal rekursivitet beskriver en semiotisk proces, hvorigennem et betydningsmønster og dets rammer for evaluering projiceres over på forskellige anvendelsesområder. Begrebet er udviklet til analyse af semiotiske ideologier, men anvendes her til analyse af mytologi forstået som et tegnsystem. Det udgør et nyt værktøj til at analysere ekkoer af kosmogoniske begivenheder på forskellige lokale niveauer. Fænomenet illustreres gennem en række casestudier med fokus på narrativer såvel som ritualer fra ikke-kristen skandinavisk religion. Undersøgelsen viser, at fraktal rekursivitet optræder i relation til bestemte opfattelser af tid, hvor forskellige perioder er ideologisk struktureret. Disse perioder (eller temporaliteter) beskrives med henvisning til Bakhtins begreb om kronotoper. Overførelsen af et betydningsmønster fra én temporalitet til en anden kan forstyrre den kronotop, som det overføres til. Sammenligning med finsk-karelske og kristne traditioner viser, at fænomenet er ideologisk formet med hensyn til den måde, hvorpå temporaliteter er organiseret.*

Introduction

One never knows which events and encounters may seem meaningful in retrospect. A decade ago in Rzeszów, Poland, in those days when every conference was daunting, I sat down to what I imagined would be a three-minute hotel breakfast, planning to scurry back to my room and practice my presentation. I was lost in thoughts of defending my ideas before several leaders in the field, when one of them suddenly sat down across from me. I rapidly lost track of time as Jens Peter Schjødt and I began a conversation on mythic discourse – i.e. mythology as it is used, mediated, and manipulated in situated practices – that eventually had to be interrupted so that we could move to the conference venue. Schjødt has pioneered the shift to a discourse-centered approach to Old Norse religion and the development of a unified framework that can account for the semantics of both mythology and ritual, as well as their variations (e.g. Schjødt 2008). He has contributed significantly to the tools for analyzing the mechanisms of mythic discourse, like his concept of *semantic center* for the core of an agent like Þórr or a ritual like that of a *vǫlva* around which meanings and variations are woven (Schjødt 2009; 2013). In this *Festschrift*, I would like to contribute another turn to that conversation begun in Rzeszów by advancing a new tool of this sort. Whereas semantic center brings into focus the key features and meaningfulness of mythic signs, I introduce here a complementary concept of *fractal recursivity* for the reproduction of such signs, their arrangements, and structures at different orders of scope, as when a human hero performs feats attributed to Þórr, affecting only a local society rather than the cosmos.

The following discussion is organized in five parts. The first introduces fractal recursivity and the approach to mythology. Fractal recursivity in mythic discourse is tied up with the periodization of time and respective temporalities. The second part outlines the early Scandinavian periodization of time in order to illustrate fractal recursivity through cases from non-Christian Scandinavian mythology. The central sources for these traditions stem from in or around the thirteenth century, with the overwhelming majority of written sources coming from Iceland. Iceland became a Christian land by law in AD 1000. The spread of the Church with its administrative apparatus carried technologies of writing and manuscript production, which were adapted to the vernacular language during the twelfth century and gave rise to an astoundingly productive written culture. Exceptionally for the time, this literature produced oral-derived texts and includes a compendium of vernacular poetry on mythological and heroic subjects, Snorri Sturluson's *ars poetica* called *Edda*, with its survey of vernacular mythology, a vast saga literature, and so on (see McKinnell forthcoming). The third part reviews a series of empirical cases of fractal recursivity linked to Óðinn's spear-cast, feats of Þórr, Óðinn's riddle contest, and the death of the prime being Ymir, among others. The fourth part turns from specific cases to patterns that emerge from the Scandinavian cases and how fractal recursivity in Scandinavian traditions compares with Finno-Karelian traditions, where temporalities have a much simpler organization, and Christian traditions, where temporalities have a more complex organization. The final part is a brief conclusion to the article as a whole.

Part 1: Fractal Recursivity and Mythic Discourse Analysis

Fractal Recursivity

Recursivity refers to a property of being recursive – i.e. that something repeats or recurs. Forms of recursivity are commonplace in all sorts of discourse and such recursivity is relevant to the creation of meanings, interpretations, and associations, from verse parallelism to a narrative series of challenges faced by a hero (Frog with Tarkka 2017). The concept of *fractal recursivity* was developed by Judith T. Irvine and Susan Gal (2000, 38; 2019, 20, 43–46, 71–75, 127–32) for the fractal-like reproduction of a pattern on different orders or levels of scope. Observing mythic patterns manifesting at different orders of scope is not new (e.g. Eliade 1991 [1954]); following Margaret Clunies Ross (1994–1998, II), these are often referred to as "echoes" in Old Norse scholarship, but the phenomenon remains undertheorized. Adapting the concept of fractal recursivity brings this phenomenon into focus.

The focus of Irvine and Gal (2000; Gal and Irvine 2019) was shaped by their development of fractal recursivity among a set of tools for the study of language ideologies. Language ideology research concentrates on how people link languages and language varieties to people in society and how this relates to perceptions and evaluations of differences between languages and ways of speaking (Kroskrity 2001). Consequently, Irvine and Gal conceived fractal recursivity in terms of reproducing an ideology of difference at additional orders of scope, like reproducing ways of looking at differences between languages at the order or level of differences between dialects. They have further developed the concept on this trajectory for the study of semiotic ideologies (Gal and Irvine 2019). Semiotic ideologies encompass all types of signs and sign behaviour (Keane 2018), making its concepts relevant for mythic discourse, when mythology is approached in terms of systems of signs.

Gal and Irvine built the concept on the study of ideologies of difference. Ideologies of difference map easily onto the relationship between gods and giants in cosmogonic time, and also between Norsemen and *Finnar*;[1] it structures these as replications at different orders of scope. The opposition of cosmological scope can be viewed as reproduced on the level of human societies on the Scandinavian Peninsula, although the cosmological model may ultimately be structured through human social experience. In mythic discourse, however, much recursivity is simply the reproduction of particular units of the tradition that yields an identity or sameness. Following John Miles Foley (1996), such units can be described as *integers*, which underscores their unitary nature and potential to be organized in *equations* within a *mathematics* of meaning-making. For example, Ragnarr *loðbrók*'s slaying of a dragon that encircles a princess's bower (*Ragnars saga loðbrókar* 2) is transparently recognizable as a reproduction of the god Þórr's battle with the serpent that encircles the world. The

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[1] *Finnr*, plural *Finnar*, is commonly translated "Sámi", but the word refers mainly to a broad culture type or category of otherness in an extensive geographical area, not to a language or particular culture.

adaptation to mythic discourse analysis does not strain or revise the concept of fractal recursivity; it simply shifts focus from differences between two things and how they are distinguished, as different dialects may be to different languages, to one thing which is distinguished from alternatives on the basis of internal features, leading it to be identified with another, like Ragnarr's dragon-slaying with that of Þórr.

That integers of tradition are reproduced is generally recognized for Old Norse traditions, from individual narrative elements (Boberg 1966) and narrative patterns (McKinnell 1994, 57–86; 2003) to representations of idols and ritual paraphernalia (Price and Mortimer 2014). Many of these are, however, reproductions of the same story pattern or other element in connection with different events in human history on the same order of scope (e.g. Power 1985). The fractal quality emerges through an asymmetry of scope, like when Þórr's feats of cosmological scope are enacted as a human's encounters with local trolls, even when performed by Christian agents (Kaplan 2008). Furthermore, the fractal quality is distinguished by the asymmetry manifesting through inherent characteristics of the enacted behaviour or feats rather than by formulating metaphorical or analogical comparisons. Thus a statement comparing a person in the local society to Óðinn among the gods (e.g. *Sǫgubrot af fornkonungum* 3) does not qualify as fractal recursivity because it is not a *reproduction* of an event, identity, or role relations *per se*.

An Approach to Mythology

The modern origin of the terms *myth* and *mythology* and their history of use produce a popular tendency to view mythology as constituted of "stories" and interpreting them with an epistemological bias as "not true" (Frog 2018). From this perspective, the relationship between Ragnarr *loðbrók*'s dragon-slaying and Þórr's battle with the World Serpent reduces to a form of rhetorical reference or intertextuality. When the epistemological bias is put aside, *Ragnars saga* and stories of the cosmogony and eschatology recount *events* – things that happened in the past. A story organizes events into a linear sequence linked to interpretation, yet the same events may be linked to others in complex ways, forming different narratives that reflect other interpretations. Mythology is here reconstituted as knowledge or knowledge-of through which the world and experience are understood as well as providing models for action and anticipation of outcomes (see also Cassirer 1955–1957 [1923–1929], II, 3; Leenhardt 1971 [1947], 306; Doty 2000, 55–56). What makes the fractal recursivity of mythology interesting is precisely that it is *not* necessarily a literary device: it connects to ways of thinking about the world and how it is organized. In this respect, fractal recursivity in mythology can directly parallel its role in ideologies of difference discussed by Gal and Irvine.

Mythology is here considered as localized in discrete, socially accessible signs that hold mythic quality to groups in society. Although it is practical to approach mythology as a modelling system for the empirical, social, and unseen worlds and things that transpire in them, mythic quality describes emotional investment in the signs, resulting in convictions about the world and things in it. At its most basic,

mythic signs are considered as "reality", although they vary in their degree of vitality as the degree to which they are engaged non-reflectively or open to interpretation (Doty 2000, 137–40). Mythic signs thus equate to knowledge-of things in the world, whether things in the past or in the present. Empirical perceptions become icons of mythic signs – i.e. recognizing a flash in the sky as lightning makes the flash an icon of the mythic sign LIGHTNING (small capitals are used for mythic signs). The flash signifies and is interpreted *as* LIGHTNING, the sign that provides an understanding of what the phenomenon is, whether a falling spark, a flying weapon, or electricity. The mythic sign LIGHTNING, in its turn, is nested in a network of relations to other signs, which it indexes. *Indexicality* refers to a sign's capacity to "point to" other things owing to its patterns of usage. In the Baltic Sea region, for example, when the image LIGHTNING is conceived as a spark, it will index the motif imagined to produce that spark and the associated agent who produces it. Nevertheless, LIGHTNING=SPARK could index a model of forging iron in heaven, wheels of a god's wagon on stony roads in the sky, or the grinding of millstones. Whatever the associated system of signs, like the image LIGHTNING, the signs constitute knowledge-of. In people's discussion and narration, the mythic signs rather than empirical perceptions come into focus, making things meaningful and able to create relations that can be described as *intertextual*.

Mythic signs are here distinguished according to formal types. Basic types are modelled on a metaphor of language and complex types are constructed of combinations or systems of simple elements. Both simple and complex elements are *integers* of the tradition. The terms used for different types of integer have been defined in various ways within different theoretical frameworks (see Frog 2015; 2018; 2021a).

Basic types of integer:
- An *image* is a static unit equivalent to a noun, like LIGHTNING or ÞÓRR.
- A *motif* is dynamic, incorporating the category of a verb, like ÞÓRR SLAYS MONSTER.
- A *symbolic partial* is a constituent feature of an image or motif that remains meaningful independent of it. A partial may be equivalent to an adjective or adverb that never occurs independent of an image or motif, such as SUPERNATURAL˳STRENGTH˳

Complex types of integer:
- A *diagrammatic schema* is a static arrangement of integers in a relation that reciprocally informs meanings or interpretations, like ÓÐINN|ÞÓRR=FATHER|SON or ÞÓRR|GIANT=ENEMIES˳
- A *theme* is a conventionally associated system of images and motifs or equivalent sets of these that regularly form a discrete unit of narration or activity; simple themes are commonly constituted of a motif followed by its causal outcome, like BERSERKR WALKS THROUGH FIRE → FIRE DOES NOT BURN {← BERSERKR~FIRE-IMPERVIOUS}
- A *narrative pattern* is a formally more complex unit that may incorporate themes and their repetition, whether in narrative or (e.g. ritual) enactment

(more complex units that incorporate these are also called narrative patterns rather than being terminologically distinguished).

A coding system is used so that each syntagm is represented through a single character string, which allows the complexity of an integer to be easily assessed in terms of the number of syntagms (adapted from Lamb 2022):

- . connects descriptors within constituent (SUPERNATURAL.STRENGTH)
- : follows prepositions (ÞÓRR SLAYS MONSTER WITH:MJǪLLNIR)
- | indicates the structure of a diagrammatic schema (ÓÐINN|ÞÓRR)
- = indicates a direct correlation of a sign or schema (=FATHER|SON)
- ~ indicates an inferred or weaker correlation (see below)
- arrows indicate connections between motifs or complex integers
- { } indicate that an integer is implicit

Distinguishing many basic integers is straightforward, but making such distinctions can become quite complex and differentiation can become fuzzy. An independent mythic sign may be a partial of another, such as Þórr's hammer MJǪLLNIR as a partial of ÞÓRR – MJǪLLNIR is an attribute assumed present when ÞÓRR is recognized unless its absence is explicit (an absence which constitutes a crisis situation in narratives where it occurs). Indexicality can lead, for instance, a motif to operate as a partial of an image of which it is considered characteristic, such as ÞÓRR SLAYS MONSTER becoming a partial MONSTER-SLAYER. ÞÓRR SLAYS MONSTER thus becomes an *immanent motif* – i.e. that a situation in which Þórr and a monster are brought together may lead the motif to be actualized (a principle also underlying, for example, taboos, where a violation is expected to actualize an undesired motif as experience). It is important to acknowledge that the limitations of the Old Norse corpus with so few examples for comparison can leave it unclear, for example, whether something is a motif, theme, or a narrative pattern, although this does not create problems for the present study.

Mythology versus Ideology

Fractal recursivity is drawn from approaches to semiotic ideologies while mythic discourse analysis builds from research on mythology, so it is relevant to distinguish mythology and ideology, here considered distinct concepts, even if they often blur into one another or get used to discuss equivalent things in non-modernized and modernized cultures, respectively. Mythology as a sign system constituted of mythic signs and conventions for their combination has potential to vary by register and dialect. Although mythology can be viewed in terms of ideas, interpretations, associations, and evaluations, these are localized in mythic signs individually, even when the signs may collectively form complex networks of understanding, as in the case of lightning and thunder being produced by a god doing certain things. Ideology is considered as a framework of ideas, understandings, and evaluations in relation to which signs and sign systems are used and interpreted, such as distinguishing certain mythic signs as "pagan" or "Christian" and linking these to contrasted religious identities (cf. Gal and Irvine 2019). Whereas signs may index one another or be

conventionally combined into more complex units, ideologies map over signs like lenses linked to perspectives. In mythic discourse, those perspectives include emotional investment in certain signs as representing realities while others are considered emotionally invested by others.

A basic difference of fractal recursivity in mythology versus ideology is that it is tied to particular signs rather than sign systems and their categorizations. Mythic signs may also be categorical identities, but these are concrete and delimitable like PAGAN as a category of embodied agent, giving the sign a formal aspect. In contrast, "pagan" as a category of culture may include any type or category of sign assigned to it according to principles of an ideology, for instance negatively defined in relation to Christianity. The image PAGAN is an agent category linked to things considered "pagan", but the image is a product of discourse that minimizes actual diversity into a socially recognizable identity with a unified core. Fractal recursivity in mythology manifests through mythic signs operating within one or more ideologies. When the phenomenon is not natural but a product of discourse, fractal recursivity reflects how ideologies link events or events of certain types.

Hierarchical and Non-Hierarchical Referential Relations

Images, motifs, and other units of tradition develop connotative meanings, associations, evaluations, and interpretations through their use *as* recognizable units. These bundles of potential for meaning production can be described as the indexicality of the signs. In literature studies, Julia Kristeva (1984) coined the term *intertextuality* to describe this phenomenon, although her framework has the weakness of situating meaning making as something that occurs between texts. I prefer John Miles Foley's approach (1991; 1995), which situates meaning in the integers of traditions as signs that are encountered across different texts. People then access meanings according to experience-based frameworks. In research, access to those meanings is built on an analytical process. The analysis of fractal recursivity has a concern for identifying and analyzing the respective patterns, which in some cases may be rather subtle.

In mythic discourse analysis, the question regularly arises whether uses of a mythic sign are in a hierarchical or non-hierarchical relation of reference. In other words, does the significance of the sign take shape more or less uniformly through its individual uses, like some recurrent narrative patterns in the sagas, or is there a particular use that forms a dominant referent through which other uses receive meaning, as seems to be the case when a human hero in a saga performs a feat that seems to re-enact or parallel one by Þórr. In a large corpus, a hierarchical indexicality can be assessed on a scale of 0 to 1. This is calculated as a total number of examples divided by the number that either represent or seem to refer to a particular dominant referent. Such a calculation is complicated in the Old Norse corpus where variants of particular poems and stories are often both limited and text-dependent. Indications may be present in the texts themselves, such as characters with only one eye being recognized as Óðinn (rapidly by audiences and in retrospect by other characters) and eye modification appearing in iconographic representation as a distinguishing feature of the particular

figure's identity (Frog 2015, 42–43). Collectively, the evidence points to ONE-EYED as an emblematic partial of the image ÓÐINN. The manner of reference may also offer indications of dominance: as a rule, non-hierarchical reference will exhibit a regular unit or system of elements that is reproduced and manipulated, whereas a hierarchical referent may be engaged with an emphasis suggestive of a relation to a dominant referent. A concentration of motifs may be accompanied by additional indicators, such as names. For example, the names of the giants Geirrøðr and Guðmundr encountered by the hero Þorsteinn in *Þorsteins þáttr bæjarmagns* make the relationship to Þórr's adventure transparent, even if Guðmundr is not mentioned in the account or poetry in *Snorra Edda*. Of course, referential practices may also evolve locally and historically. In Christian culture, for example, the mythic pattern that people could be elevated to divine status – i.e. sainthood – by dying for their faith is a reproduction of the model of Jesus, but this paradigm became so fundamental that the link to Jesus's sacrifice correspondingly became less transparent.

Calculating indexicality is complicated by an ideological component, which may be particularly significant for consideration where a corpus is limited. For example, we intuitively predict that an act performed by Þórr will not refer to an act of Sigurðr the Dragon-Slayer as an exemplar event, even if the latter is more widely attested, much as we predict that an act of a saint or prophet will not be interpreted as the referent for an act by Jesus. Such predictions are structured by ideologies that provide lenses of interpretation. Fractal recursivity provides a theoretical framework for considering potential hierarchies of reference.

Part 2: Approaching Temporal Periodization: The Scandinavian Case

Fractal recursivity concerns reproduction on different orders of scope. In mythic discourse, relevant orders of scope seem to be commonly linked to ideologies that structure time into periods, both differentiating periods from one another and structuring their relationships to one another. *Temporal periodization* describes the breaking of the continuum of time into periods, differentiating them and making generalizations about them, like the Viking Age versus the Scandinavian Middle Ages. In most non-modern cultures, however, such periodization is not tethered to an absolute chronology. Different periods are centrally structured through social imagination, for example about the world of the Vikings and what belonged to it as opposed to the medieval world of knights, chivalry, and romance, rather than by the number of the year in which things occurred. Ideology structures the significance of a period, what characterizes it as opposed to something else, and how the period or things in it relate to other periods and things in them. Temporal periodization is complementary to what Jesse Barber (2019; forthcoming) describes as a *cosmological timeline*, which refers to the organization of particular events into a chronology. Temporal periodization is concerned with the imagination of reality as different in different periods as a framework and context for events rather than the organization of the events *per se*.

The Viking and Early Medieval Scandinavian Periodization of Time

Current Western epistemologies operate on a premise that different periods of the past were governed by the same principles as the present. This view traces back to ancient Greece, where the intellectual revolution commonly identified with the birth of scientific thinking was centrally characterized by a change in intellectual paradigm that demanded that the past be governed by the same principles, both physical and moral, as the present. Mythic events had to be interpreted through those principles or their plausibility was questioned (see Harran 2018). Scandinavian cultures maintained what can be described as a periodization of temporalities (sometimes called "ages"), and the vernacular physics of the world are not uniform across these. They may be loosely summarized with emphasis on Icelandic sources as:

- *Pre-Creation Time: the era of the cosmogonic being Ymir*. This is the time of Ymir, a being literally of cosmological scope, from whose body the world is eventually created; events of this era are surreal in the extreme.
- *Cosmogonic Time: the era of the gods before human actors*. The gods perform acts affecting the created world on a cosmological scope (setting stars, giving birth to monsters, etc.), as they do not do in later eras before eschatological time; many feats involve transformations.
- *Mytho-Heroic Time: the era of ancient human kings and heroes*. Human agents are in focus, operating within the world organized by the gods, although geography is often vague; supernatural encounters and magic are relatively commonplace, including encounters with especially Óðinn, although gods do not generally take other-than-human forms; gods shape human fates and establish lineages but the gods' fates are unaffected, except insofar as dead human beings will eventually participate in the battle of *ragna rǫk*.
- *Historical Time: the era beginning from roughly the settlement of Iceland*. Human agents are in focus and magic is common but supernatural encounters are predominantly with the dead, land spirits, trolls, and *blámenn*, devils, or Christians' encounters with pagan gods/devils; topography tends to be more specific and encounters with more fantastic agents tend to be geographically remote from Iceland; Þórr and perhaps other gods may affect things in the world remotely.
- *Eschatological Time: the era of ragna rǫk and the rebirth of the world*. Gods are in focus as in cosmogonic time, but the period is characterized by a breakdown of ordering principles and the world is destroyed and reborn.

Chronotopic Characterization and Otherworlding

These different temporalities can be approached through Mikhail Bakhtin's concept of *chronotope* (1981, 84–159). Bakhtin coined the term to describe the conception of space and time characteristic of a genre of literature. A chronotope can be more broadly conceived as a dominant model for the world as it operates for a particular place or

type of place in a particular period, whether the model is bound to a particular category of discourse like a genre or operates across discourses.

That the period described as historical time begins roughly with the settlement of Iceland seems to reflect a grounding of this knowledge of the past in oral history of families of Iceland. Mytho-heroic time may be linked to the present through genealogy but the events belong to a broad collective heritage of the Old Norse world rather than being tethered to the present by recounting events that directly lead up to the settlements of the people talking about them. The chronotopes of the first three eras each appear relatively stable, which may give the impression of uniformity. However, the *dominant chronotope* of an era is linked to the in-group community as the default of places associated with them, while the realm of Hel, of giants, the wilderness, the interior of a burial mound, and so on may be differentiated from the dominant chronotope by fractions of otherness, a process that I have elsewhere described as *otherworlding* (Frog 2020). Within the dominant mytho-heroic chronotope, variation by place tends to correlate with a difference in the inhabitants controlling that place, who may be supernaturally other (Frog 2020, 460–61; see also Asplund Ingemark 2004). Variation may also occur in relation to temporal cycles, such as between day and night or during Yuletide, affecting what is possible or probable to encounter or occur in the place (Asplund Ingemark and Ingemark 2020, ch. 8).

The complexity of both diversity in otherworlding and sensitivity to distinctions between temporalities increases closer to the present. This is particularly apparent for historical time, which, viewed from the perspective of Icelandic sources, divides temporally into several sub-periods:

- *Pre-Christian time* – up to the conversion of Iceland in AD 1000.
- *Early Christian time* – roughly the eleventh and twelfth centuries.
- *Contemporary time* – roughly the thirteenth and fourteenth centuries, at which point the society appears completely Christian (as reflected in narrative discourse).

The transitions between these periods are somewhat fluid, as is that between mytho-heroic and historical time. Nevertheless, the presence of supernatural agents and forces gradually disappear through the progression of chronotopes. In the dominant chronotope of contemporary time, the supernatural generally seems more absent than is likely for lived experience, and most likely reflects an ideology that considers the supernatural more appropriate for eras of the past than for the present.

This description may suggest a clear, linear progression, and the thresholds between the first three eras as well as before the last seem relatively stable. But the chronotopes otherwise appear to be organized relative to the perspective of Icelandic society and discourses of their own contemporary time. Places that are unsettled, explicitly non-Christian, or simply geographically remote from that dominant chronotope are subject to otherworlding, which allows saga narration about remote places to shift to the dominant mytho-heroic chronotope or that of a supernatural otherworld. Polarized conflicts between Christianity and paganism stand out, because

they may span temporalities and they may exhibit their own shifts in chronotope or at least in chronotopic features, such as the physical appearance or exercise of agency of non-Christian gods, of other supernatural beings, or of practitioners of magic.

Eschatological time exhibits complexity comparable to that of historical time but is structured quite differently. The eschatology is a progressive breakdown of order and rebirth of the world. *Ragna rǫk* is harkened by the collapse of the human social order of mytho-heroic and historical time, although this is not narrated. Then follows the collapse of the order established in cosmogonic time, including the opening of the realm of the dead and the return of agents of cosmological magnitude like the wolf Fenrir. The world is destroyed in a return to basic elements of pre-creation time and then arises again, beginning a new era of cosmogonic time. Like historical time, eschatological time subdivides into periods or stages, which can be loosely described as a reverse progression through chronotopes of earlier eras to the pre-creation state, followed by a new era of cosmogonic time, in which the world is presented as self-organizing without orchestration by the gods.

The complexity of historical time appears to result from the series of radical changes affecting Icelandic society being upheld in social memory through rich traditions of oral history. This was complimented by Icelanders' wide-ranging mobility, which was closely tied to narrating the past. Rather than a discourse centered on the local society and contrasting this mainly with wholly imaginal otherworlds, some places visited abroad could align better with temporalities of the past (e.g. pre-Christian time) than that of Icelanders' present, and the Icelandic discourse on more distant travels engaged the chronotope of mytho-heroic time as a framework for conceiving the fantastic dimensions of such places.[2] The dominant chronotopes of cosmogonic and mytho-heroic time appear relatively regular in the sources. In contrast, historical time is characterized by variation, both between sub-periods as well as in relation to geography and cultural encounters. As an integrated part of Icelandic discourse, this variability seems to have allowed individuals to draw on and manipulate chronotopes and their features in order to position events of the past and produce meanings. In other words, some chronotopes became frameworks used as resources in narration. The outcome is that mytho-heroic and historical time, with its sub-periodization, form a broad era of human time between cosmogonic and eschatological time.

Dynamics of Differentiation and Recursivity

The temporalities and their chronotopes reflect ideologies of time that structure certain things as appropriate to one era as opposed to another. Even if some of these temporalities may overlap and interpenetrate, they retain predictable differences. Thus, Þórr always acts as an embodied agent in cosmogonic time; in historical time, he

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[2]   Thus sagas identified as *fornaldarsögur* ("sagas of ancient times" or "mytho-heroic sagas") include both those handling heroes of the remote past and more recent adventures in remote locations (Lindow 2001, 26; Phelpstead 2009).

is embodied only when independently confronting Christians, and otherwise acts on behalf of non-Christians *in absentia*, exercising supernatural agency remotely. These ideologies create links between particular events and the respective temporality, which may seem intuitive from the source corpora, yet the logic in the corpora reflects the ideologies' structuring of temporalities. It seems natural to situate Þórr's fishing for the World Serpent in cosmogonic time, but it is only the logic of the dominant ideology that seems to exclude such an adventure in the otherworld from mytho-heroic or historical time. The periodization of time in the Icelandic sources is extremely complex, and it may have varied, yet the difference between a temporality of the gods and those of humans was probably widely upheld through Scandinavian cultures (Harris 2009, 470–71; cf. Finno-Karelian temporalities below).

In addition to temporalities becoming more nuanced, fluid, and interpenetrating nearer to the present, their events' scope of impact progressively narrows. The pre-creation establishes the universe as the environment for cosmogonic time. Cosmogonic time establishes the worlds of gods and humans relative to other worlds (e.g. Hel's realm) and establishes the conditions of mytho-heroic time. Events in mytho-heroic time are restricted to the human social world and establish the environment for historical time; although they may concern particular kingdoms, they form a collective heritage. Events in historical time are tied to particular geopolitical contexts, although the progressive spread of Christianity holds a collective relevance. Ideologies distinguish temporalities, but the boundaries between them seem more or less open. The strongest distinction is between temporalities concerning gods and cosmology and those concerning humans, while the boundary between mytho-heroic and historical time exhibits the greatest fluidity, presumably because the chronotope characteristic of mytho-heroic time also provided a resource for conceiving geographically remote places in historical time.

Part 3: Scandinavian Examples

There are many examples of fractal recursivity from Late Iron-Age and medieval Scandinavia, and many more may be identified as the phenomenon comes into focus. The following examples are selected with the strategic aim of illustrating different aspects of fractal recursivity and its analysis, juggling what examples can illustrate on the one hand with the amount of space required to introduce them on the other.

Óðinn's Spear-Cast

Vǫluspá 24[3] describes Óðinn casting a spear over the force of the god's adversaries in the first war in the world. In *Styrbjarnar þáttr Svíakappa*, King Eiríkr seeks aid from Óðinn for a battle; Óðinn appears, provides him with a reed, and instructs him to cast it over the opposing force. When he does so, the reed transforms into a spear and the army is supernaturally affected. That Óðinn appears and provides both the instrument

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[3]   Eddic poems are cited according to Neckel and Kuhn 1963 unless otherwise noted.

and instructions for the act makes a connection between Eiríkr's use of the reed in a battle and Óðinn's spear-cast in the world's first war unambiguous. They exhibit parallels in the object, act, and context (X CASTS SPEAR OVER:ENEMY IN:WAR), while Óðinn performs the act in one and instructs the actor in the other:

(1)   ÓÐINN CASTS SPEAR OVER:ENEMY IN:FIRST.WAR
        ÓÐINN GIVES EIRÍKR REED &INSTRUCTIONS
        → EIRÍKR CASTS REED OVER:ENEMY IN:WAR
        →   REED BECOMES SPEAR
        →   ENEMY IS.DESTROYED

The two events also remain distinct: Eiríkr's act is a separate event and the saga context points to its presentation to the audience as an event in historical time rather than purely fictional and literary artifice. Neil Price describes Eiríkr's act as "an active war-spell that results in the destruction of an army" (2002, 355). The supernatural effect of this act appears directly connected to the act attributed to Óðinn in the cosmogony. That Óðinn orchestrates Eiríkr's act suggests a hierarchical relation between the two events – i.e. that the cosmogonic act is the prime event to which Eiríkr's is secondary. The latter's significance and supernatural efficacy is thus seen as shaped by or derivative of the cosmogonic event, for instance as an exemplar, rather than vice versa or viewing the two acts simply as parallels without directional reference or a hierarchical relation. Whereas Óðinn's act concerns an event of cosmological scope among the gods and their adversaries, Eiríkr's concerns an event on the scope of a single kingdom in the human world and the event has no potential for direct impact on the gods.

Several inhumation graves at Birka seem to have had a spear stuck into the wall close to the bottom or into the base of a platform in the grave (Gräslund 1981, 30). In grave Bj. 605b, the pit of the grave was slightly extended to accommodate the spear rather than shortening its ca. three-meter shaft, details that point to the "symbolic meaning" of the spear being stuck into the grave in this way (Gräslund 1981, 31). Price has discussed this act in grave Bj. 834, arguing that the spear was cast by someone standing above the open chamber and behind and to the left of the couple in the grave who had been set up in a chair. He argues that this must have been done at a late stage in the burial because the long spear lodged in the base of a platform in front of the couple at roughly a forty-five degree angle and would have interfered with the arrangement of the burial if lodged there earlier. Price associates this with Óðinn's spear-cast in *Vǫluspá* and King Eiríkr's in *Styrbjarnar þáttr Svíakappa,* as well as with the statement in *Ynglinga saga* 9 that those who should go to Óðinn after death should be marked by the spear:

(2)   ÓÐINN CASTS SPEAR   OVER:ENEMY   IN:FIRST.WAR
        EIRÍKR CASTS REED>SPEAR   OVER:ENEMY   IN:WAR
        BURIER CASTS SPEAR   OVER:DECEASED   IN:BURIAL

Price concludes: "There would seem little doubt that its [the grave's] occupants were dedicated to Óðinn" (2002, 139).

Óðinn and Eiríkr are said to cast their spears over the enemy, which situates them in an equivalent schematic relation, whereas the relationship of the burial's spear-caster to the deceased would seem the opposite. However, the difference in social relation co-varies with a difference in the relative physical positioning of the spear-caster, who faces adversaries but stands behind the deceased, which would be equivalent to facing the same adversary in a situation of battle:

(3) *Social Relation*   *Physical Relation*
 ÓÐINN | OPPOSING.ARMY=ENEMIES   ÓÐINN FACING:OPPOSING.ARMY
EIRÍKR | OPPOSING.ARMY=ENEMIES   EIRÍKR FACING:OPPOSING.ARMY
BURIER | DECEASED=ALLIES   BURIER BEHIND:DECEASED

Although there are formal differences between the cases, the spear cast in the burial appears to reflect a ritual act that operates in the same framework. This act can be considered an additional manifestation of the cosmogonic event now reproduced on the much more localized scope of individual burials. Like Eiríkr's spear-cast, the ritual act appears to be in a hierarchical relation to Óðinn's in cosmogonic time. The spear-cast in the burial appears as a ritualized act that was reproduced across multiple burials, presumably with at least some variation (Gräslund 1981, 30). The multiple ritual enactments would thus be perceived in relation to one another, so that each enactment would index other enactments of the same ritual, which creates ambiguity concerning whether the event in cosmogonic time was necessarily viewed as the hierarchically dominant referent. The social significance of the ritual would develop through the recognizability of its patterns of use, while variations would become interpretable in relation to those patterns and the meanings and interpretations conferred on the ritual and its variations through discourse surrounding them (Foley 1991; 1995). Generally speaking, interpretations change faster than motifs (Siikala 1990; 2002b, 29), and formal rites may be reproduced as socially significant without everyone in a community having clear or shared interpretations (Bell 1992; see also Huntington and Metcalf 1979). In this case, however, if the local form of the cosmogonic event held an established position in basic expectations for cultural competence, the association would presumably be both salient and stable, even if there were variation in interpretations locally or over time.

Þórr the Monster-Slayer and Ritual Specialists

Þórr's feats of slaying agents of chaos in cosmogonic time retain distinct identities, distinguished by their situational features and other details, and narrative-worthy adversaries are consistently named. These can be distinguished as *centralized* mythic signs, commensurate to proper nouns. Collectively, a pattern becomes abstracted that can be described as a *decentralized* mythic sign, which is recognizable even when the particular event is unfamiliar. The understanding of the decentralized sign emerges as an indexical nexus of the different centralized events of which it is an abstraction:

(4)	ÞÓRR	SLAYS	GEIRRØÐR	Centralized
	ÞÓRR	SLAYS	HRUNGNIR	Centralized
	ÞÓRR	SLAYS	…	Centralized
	ÞÓRR	SLAYS	MIÐGARÐSORMR	Centralized
	ÞÓRR	SLAYS	MONSTER	Decentralized

The decentralized sign can also be reproduced in different temporalities, as when Þórr is said to slay a giant in mytho-heroic time (e.g. *Heiðreks saga* U 1). The decentralized sign of Þórr's battles also connects with its broader equivalent that extends to human heroes. This equivalent also undergoes variation by chronotope. For example, cosmological giants are generally absent from human worlds, and, in historical time, the supernatural dimensions of the adversary may be attributed to support from a magic-wielding relative or be entirely absent:

(5)	ÞÓRR	SLAYS	MONSTER
	HERO	SLAYS	MONSTER
	HERO	SLAYS	SUPERNATURAL.WARRIOR
	HERO	SLAYS	OUTLAW
	HERO	SLAYS	AGENT.OF.CHAOS

Alaric Hall has argued that runic charms invoking Þórr against a *þurs* (commonly translated 'ogre') reflect a correlation of the healer with Þórr and the agent causing illness or harm with a supernatural adversary of Þórr (2009). In this case, a healing ritual becomes an enactment of Þórr's expulsion of an agent of chaos from domesticated space for the restoration of order on the scope of the human body.[4] Þórr's conflicts on a cosmological scope thus can be reproduced on the scope of local human societies and households and also on the scope of the human body.

(6a)	ÞÓRR	OVERCOMES	GIANT
	HERO	OVERCOMES	AGENT.OF.CHAOS
	HEALER	OVERCOMES	ÞURS

(6b)	*Cosmological*		*Human society*		*Human body*
	ÞÓRR|GIANT	~	HERO|AGENT.OF.CHAOS	~	HEALER|ÞURS

I have elsewhere argued that *berserkr* warriors were a type of ritual specialist and that their imperviousness is rooted in an image of a penetrable body, of which the boundary is made "hard" and impenetrable through *berserksgangr* (literally: the going of one who is a *berserkr*) (Frog 2019b, 276–77). Price has previously discussed *berserkr* warriors in terms of "the supernatural empowerment of aggression" (2002, ch. 6). This connects to vernacular conceptions of the body and how emotions relate to both its penetrability and ability to affect other things, whereby the "hardening" of the body

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[4] This type of fractal recursivity is salient in Finno-Karelian healing rituals (Siikala 2002a, 100–01; Frog 2013, 66–67), which seem to be historically rooted in Scandinavian models (Frog 2013).

boundary and elevated power to affect things outside of it are linked to aggression and anger (Kanerva 2015; Frog 2019a, 267–74). Þórr presents an exemplar of the interconnection between the dynamic force called *megin*, anger, and the capacity to overcome an attack and destroy an adversary in *Skáldskaparmál* 18, where his power threatens to swell as high as heaven (Frog 2019a, 272). The swelling of Þórr's power and agency for supernatural efficacy may have been a model for, or at least directly linked to, understandings of the heightened power of *berserksgangr*:

(7)   ÞÓRR BECOMES MEGIN-SWOLLEN   ~   BERSERKR ENTERS BERSERKSGANGR

Although conjectural, the god's *megin* operated at the order of cosmological scope, whereas that of *berserkr* warriors operated at the order of conflicts among human warriors. If the theory is roughly accurate, *berserksgangr* and the swelling of Þórr's *megin* are related through fractal recursivity.

The hierarchy of indexicality is complicated in repeated ritual performances. As with the spear-cast into graves, the performance events of healing rituals in example (6) and *berserksgangr* in (7) would index other performance events of the same type, and they would no doubt do so quite strongly as the events would be more frequently occurring. The perception and interpretation of indexicality thus becomes potentially variable, and the salience of fractal recursivity may not have been uniform between performers and may also have changed over time, for example with the Christianization of society.

Commenting on Culture: Óðinn and Heiðrekr

As a phenomenon, fractal recursivity describes reproductions on different orders of scope irrespective of whether or not this is unconscious or literary artifice. Conscious adaptations are clear, for instance, in sources such as *Þorsteins þáttr bœjarmagns*. There, the narrator has transparently adapted the story of Þórr's visit to Geirrøðr by recounting it about a human Christian *Þórr*-named hero. Nevertheless, events of cosmogonic time are reframed in a setting with a human hero (see also McKinnell 1994, 57–86; Kaplan 2008). In some cases, fractal recursivity appears as an instrument for commenting on "pagan" traditions. In *Heiðreks saga*, for example, Óðinn enters King Heiðrekr's court in disguise and engages him in a contest of secular riddles. The event parallels his contest of wisdom with the giant Vafþrúðnir in the poem *Vafþrúðnismál*, in which the questions concern knowledge of the cosmogony, cosmology, and eschatology. The connection with *Vafþrúðnismál* is foregrounded in the concluding question, which is the same in both narratives: what did Óðinn whisper to Baldr on Baldr's funeral pyre. In both cases, the interlocutor is unable to answer the question, but, through it, realizes that Óðinn is the questioner. Vafþrúðnir concedes his defeat without protest, although the consequence is his death. Heiðrekr calls Óðinn a *rǫg vættr* (wicked creature) and attempts to strike him with his sword. Óðinn transforms into a *valr* (hawk) and flies away. Heiðrekr's stroke cuts through the bird's tail feathers, and Óðinn curses him (see also Lassen 2011, 152–55).

(8)   DISGUISED ÓÐINN VISITS VAFÞRÚÐNIR'S HALL
       → ÓÐINN CHALLENGES VAFÞRÚÐNIR TO:KNOWLEDGE.CONTEST
       → VAFÞRÚÐNIR ANSWERS QUESTIONS
       → ÓÐINN ASKS WHAT:WHISPERED.TO:SLAIN.BALDR
       → VAFÐRÚÐNIR DOES.NOT.ANSWER QUESTION
       → VAFÞRÚÐNIR RECOGNIZES ÓÐINN
       → VAFÞRÚÐNIR CONCEDES DEFEAT
       {→ VAFÞRÚÐNIR DIES}

       DISGUISED ÓÐINN VISITS HEIÐREKR'S HALL FOR:RIDDLE.CONTEST
       → HEIÐREKR ANSWERS RIDDLES
       → ÓÐINN ASKS WHAT:WHISPERED.TO:SLAIN.BALDR
       → HEIÐREKR DOES.NOT.ANSWER QUESTION
       → HEIÐREKR RECOGNIZES ÓÐINN
       → HEIÐREKR STRIKES AT: ÓÐINN WITH:SWORD
       → ÓÐINN TRANSFORMS INTO:HAWK
       → HEIÐREKR CUTS HAWK'S FEATHERS
       → ÓÐINN CURSES HEIÐREKR
       & ESCAPES

Óðinn's escape through transformation into a bird of prey is also paralleled in cosmogonic time, where it is associated with the acquisition of something from a giant adversary, accomplished by Óðinn in the case of the mead of poetry and by Loki in the case of recovering the goddess Iðunn. In both cases, however, rather than the giant attempting to strike them as they depart, the giant pursues in the form of an eagle and is destroyed by the gods.

Heiðrekr's response to Óðinn's final question by calling him a *rǫg vættr* and striking at him with a sword, making no attempt to answer, suggests that the question itself is unfair or unjust (see also Lassen 2011, 152–77). The transparent parallel with *Vafþrúðnismál* makes the contrast of reactions a commentary on the event on cosmogonic time. Reproducing the event of cosmogonic time in mytho-heroic time may thus be considered a Christian, literary device. However, such a view underestimates the potential for the riddle contest with a human king to be established in the oral tradition. For example, *Sǫrla þáttr*'s presentation of the *Hjaðningavíg* can also be interpreted as a Christian commentary on "pagan" traditions. The *Hjaðningavíg* is a battle between two human armies that are cursed to fight each day and their dead are resurrected each night. This parallels the otherworld existence of the *einherjar*, who battle one another each day and party in Valhǫll each night. *Sǫrla þáttr* presents the cursed battle as enduring until the intervention of Christianity, thus excluding this type of ongoing battle from Christian time, which suggests that the coming of Christianity is a blessing and that the type of ongoing battle of the *einherjar* is a curse. This interpretation is not unreasonable for *Sǫrla þáttr*, but *Hjaðningavíg* is found already in Bragi Boddason's *Ragnarsdrápa*, where a Christian interpretation can be excluded, and *Skáldskaparmál* 50 reports that the battle will continue until *ragna rǫk*.

Sǫrla þáttr can thus be considered to reinterpret the tradition of *Hjaðningavíg* in a way that reframes it as a commentary on its counterpart of cosmological scope. Conversely, the serpent encircling the maiden's bower in *Ragnars saga* makes the hero's dragon-slaying a fractal recurrence of Þórr's battle with the World Serpent, characterized as encircling the earth, but the partial ENCIRCLING is not in all sources and could have been introduced into the written saga (McTurk 1991, 74–77). Thus, the riddle contest of *Heiðreks saga* might reflect a long-standing tradition of which the interpretation was reframed from a Christian perspective, as in *Sǫrla þáttr*, or fractal recursivity may have been introduced as in *Ragnars saga*.

Recognizability: Echoes of Pre-Creation

Pre-creation time concerns the existence of the cosmological being Ymir, the ancient giant, and initial events that establish agents and lineages in the world. In this time, animate beings are spontaneously produced from inanimate matter and Ymir's own limbs display independent agency and the ability to produce offspring (see Clunies Ross 1994–1998, I, 152–59). The central event is the murder of Ymir by Óðinn and his two brothers, resulting in the sea from the effusion of his blood, the formation of the earth from his corpse, stones from his bones, the vault of heaven from his skull, and so forth. Ymir and this event are thus a fundamental point of reference in knowledge about the world. The creative event of the giant's murder is widely echoed. In cosmogonic time, it is echoed through the murder of the being Kvasir, whose blood then becomes the coveted mead of poetry, eventually acquired by Óðinn for the divine community (Clunies Ross 1994–1998, I, 197–98), and it may even be echoed in the slaying of Baldr (Frog 2010, 264–67). Although pre-creation time contains relatively few events, the prime nature of those events has the potential to make them key points of reference, as seen in Old Norse poetry's kenning system (Clunies Ross 1987, 112–13), much as *Let there be light* and *In the beginning was the word* are common idioms in societies with a historical Christian background today. The limitations of the sources, however, make these challenging to interpret and raise important questions about the operation of fractal recursivity.

Ritual manifestations of fractal recursivity like those in examples (6) and (7) above are characterized by the potential for variation in individuals' interpretations. Cases such as the ritual manifestation of Óðinn's spear-cast in (2) and (3) can be particularly challenging to identify and interpret where evidence is limited to the archaeological record. In Pre-Roman Iron-Age cemeteries in Västergötland, Sweden, for example, flakes of stone were mixed with bone fragments of remains in cremation burials, in many cases with equal proportions of stone and bone (Sahlström and Gejvall 1948, 131; Artelius and Lindqvist 2005, 30–32). The cemetery fell out of use for roughly seven centuries, at which point it was "colonized" by a new group, and this "tradition connected with pre-Roman Iron Age burials was deliberately imitated in the Viking Age burials" (Artelius and Lindqvist 2005, 33). The origins of different things in the world from Ymir's corpse were integrated into Old Norse poetry's kenning system, where any reference to a bone or organ of either land or sea was transparently

interpreted as STONE. Tore Artelius and Mats Lindqvist (2005) identify the mixing stone flakes and cremated bone fragments with Ymir's bones as the origin of stone, an association built into poetic ways of referring to stones:

(9)   YMIR|STONE   ~   HUMAN|BONE

A continuity of knowledge of the practice across seven centuries can be excluded, so the settlers must have opened one or more mounds, observed the presence of stone fragments in the remains, and interpreted and adopted the practice. The significance of the original rite is obscure, but, at least in the Viking Age, the mixing of stone fragments with bone fragments in cremated remains can, with a fair degree of confidence, be considered linked to Ymir. It might be tempting to view the rite as reflecting a descent from giants, yet kennings for STONE referring to bones or organs always have a cosmogonic base; they are never formed with names or terms for giants, so they do not imply that all giants have stone for bone. Although local beliefs in stone-boned giants are possible, the balance of probability is that the rite was linked directly to Ymir. The context of a funerary rite supports a connection with Ymir's death. The semantic center (Schjødt 2013, 12–13) of Ymir's death appears to be the cosmogonic event, characterized by a release of creative potential for transformation. This invites the conjecture that the Viking Age rite was conceived as conferring some sort of commensurate transformative potential on the deceased through fractal recursivity of the cosmogonic event on the scope of the individual. Nevertheless, the fairly confident correlation of the Viking-Age rite with Ymir only provides a point of reference, from which interpretations of significance currently remain conjecture or speculation.

John Lindow (1997, 456–58) identifies an echo of the cosmogonic event of Ymir's slaying in Ari Þorgilsson's description in *Íslendingabók* 3 of the establishment of the Alþing with its socially unifying laws and legal practices. The account includes what seems a long digression on how Bláskógar (Black-Forests) became public property for collective use, which stands out for receiving more attention that other places connected with the Alþing. Þórir *kroppinskeggi* murdered a slave named Kolr (Black) and was outlawed, although it is unclear why killing a slave would result in outlawry or why the victim's name warrants mention. Lindow observes that the social asymmetry between Þórir and the slave mirrors that between the gods and the giants, giving a structural correspondence between this murder and the murder of Ymir. Both killings are also linked to the establishment of collective land and a new society where society seems to be lacking. Ari then reports the establishment of a new, distinctively Icelandic system of time reckoning, comparable to the gods organizing time following the slaying of Ymir (Lindow 1997, 458 and see also 459–61). Ari also mentions that Þórir's grandson burned his brother in his hall, which seems arbitrary, yet fratricide indexes the slaying of Baldr, a pivotal mythic event that was fractally reproduced across temporalities (Frog 2010, ch. 21).

(10) ÓÐINN&BROTHERS SLAY YMIR   ~   ÞÓRIR SLAYS KOLR

GODS|GIANTS   ~   LANDHOLDERS|SLAVES

SLAYING ESTABLISHES COLLECTIVE.LAND &SOCIETY IN:UNSETTLED.SPACE

GODS ESTABLISH TIME   ~   ICELANDERS ESTABLISH TIME

HǪÐR SLAYS BALDR.ÓÐINSSON   ~   ÞÓRIR'S.GRANDSON SLAYS BROTHER

The concentrated co-occurrence of parallels supports a view that they are not accidental. Ari's inclusion of these events suggests that he saw them as important for the foundation myth of Icelandic society. The motifs and schemata reproduce the cosmogonic events as occurring on the scope of Iceland and its society. However, the parallels are rather subtle, which raises the question of their salience for audiences. More significantly, the case raises the question of whether fractal recursivity here and elsewhere is conscious or is an outcome of the centrality of the mythic models and how people thought through them in making sense of the world, present and past.

Part 4: Temporal Ideologies and Fractal Recursivity

Ideological Structuring of Scandinavian Temporalities

In the Scandinavian material, fractal recursivity manifests most frequently – or at least most saliently – as an act or event known from cosmogonic or pre-creation time in mytho-heroic or historical time. This seems linked to the difference between the temporality concerned with gods and those concerned with the human world being structured with a stronger boundary than the shiftable boundary between mytho-heroic and historical time. Narrative patterns that recur only across both the latter eras usually seem to have a hierarchy of indexicality of 0 (e.g. Power 1986; McKinnell 2003). This may be linked to the fluidity of temporalities of human time. The identification of an event with mytho-heroic or historical time seems not to connote a difference in its inherent quality or magnitude of significance, even if particular events in mytho-heroic time may hold such a quality or status. In contrast, acts and events connected with cosmological agents and outside of the human sphere are subject to the rationale of certain chronotopes, which are in turn correlated with different temporal periods along a so-called *axis of differentiation* (Gal and Irvine 2019, 117–32). The correlation of the types of participants with chronotopes and chronotopes with temporalities leads Þórr's fishing adventure to be conceived as occurring in cosmogonic time because it is an encounter between the god and giants outside of human worlds. The respective chronotope identifies it with the cosmogonic temporality. Just as the mytho-heroic temporality provided a framework for geographically remote places, the cosmogonic temporality could, in principle, be imagined as a more distant reality in the present. However, there is no integrated movement between cosmogonic and human temporalities in the discourse, which conditions interpretation within the ideologies through which the temporalities are imagined. There may not be anything inherently cosmogonic about the fishing event, but cosmogonic time is characterized by establishing the world order through exemplar events. The chronotope's

characterization enables it to reciprocally connote the respective quality and magnitude for events identified with the period. The temporal ideology thus invites the recurrence of respective images, motifs, and so on in human time to manifest fractal recursivity within a hierarchy of indexicality. Put simply, the temporal ideology situates events identified with pre-creation or cosmogonic time as hierarchically dominant referents for counterparts in mytho-heroic or historical time. Events connected to Ymir and thus pre-creation time appear similarly contrasted with cosmogonic time.

Culture-Dependence

The Scandinavian material presents what seems a fairly regular model for the operation of temporalities that correlate more or less regularly with a hierarchy of scope. The model makes fractal recursivity predictable and progressive from earlier to later periods (leaving aside eschatological time owing to limitations of space). Comparison with other traditions reveals that this type of structure is highly culture-dependent, both in terms of complexity and its progressive principle that fractal recurrence in later periods refers back to the corresponding event in an earlier era as the dominant referent.

In Christian traditions, time exhibits periodization into a number of eras comparable in complexity to its Scandinavian counterpart. However, whereas Scandinavian eras seem to exhibit a "natural" hierarchy of narrowing scope, the Christian interpretive lens of *typology* (e.g. Ribbens 2011) is characterized by an inverted order in the referential hierarchy. Rather than later events reproducing earlier events and thus referring back to them, events in the Old Testament are viewed as anticipating those in the New Testament, reproducing them in advance. The temporal ideology centers on the life of Jesus, which is viewed as the event that not only defines the present world order but also restructures that order on a cosmological scope. Everything between the expulsion of Adam and Eve from Eden and the life of Jesus is thus anticipatory of this event. The events establishing Christianity initially affected only a small community, but Christians interpreted those events as defining the universe also for other communities that were unaware of the events or their significance. The example of Christian time highlights that the interpretation of events in different periods is ideologically structured.

The complexity of temporal ideologies in Icelandic sources was considered in relation to historical circumstances above, but this mainly concerned the sub-periodization of historical time and the fluidity between historical and mytho-heroic time. Even when these are grouped as a single human era, it is preceded by two eras and followed by one. In contrast, Finno-Karelian temporalities exhibit a simple, binary structure of mythic time and historical time.

Finno-Karelian mythic time is a single broad category. In contrast to Scandinavian temporal ideologies, chronotopes of narration seem to be bound up with the particular epic poems and events that they describe without connoting one temporality as opposed to another. A difference in chronotope corresponding to Scandinavian pre-

creation time is linked to the creation of the world, where the sun and moon are created from a bird's egg by the demiurge Väinämöinen, who forms and shapes the sea floor. Nevertheless, Väinämöinen appears as a human-sized hero on viking-like sea raids in the following episode – or vice versa. The temporality is amorphous: the organization of events varies, so the creation of the world may either follow or precede events characterized by another chronotope, and thus the difference in chronotope does not correlate with a particular temporality in an ordered series. A distinction between a temporality of the gods and of mythic heroes is also absent because divine and human agents *per se* were not distinguished. The word *jumala*, which today means "god", earlier referred to a category of agency also used for powerful, living, ritual specialists (Frog 2021b). Similarly, the counter-roles in the mythology are not distinguished as a particular supernatural race like Scandinavian "giants"; they are simply the inhabitants of a particular otherworld community, like *Pohjola* (North-place), part of the household of an otherworld agent, such as *Tuoni* (Death), or identified as *Lappalaizet* (Laplanders), as in the case of the shooter of the Väinämöinen, whose act sets the creation of the world in motion. Protagonist-worthy agents were distinguished into three main groups that tended not to be conflated, but the structuring ideology was not a temporal one assigning them to different eras in series (Frog 2021b). Finno-Karelian mythic time thus encompassed the equivalent of Scandinavian pre-creation, cosmological, and mytho-heroic time.

Finno-Karelian mythic time is distinguished – or at least distinguishable – from historical time as the time in which the singers lived, but this seems to have a much shallower time-depth than in the Icelandic tradition (at least, a lively oral tradition of a number of generations of ancestors was not documented). Fractal recursivity is prominent in the ritual traditions, where the healing ritual reproduced the thunder-god's expulsion of agents of chaos, as in (6), but this recursivity has a contemporary focus rather than being oriented to exemplar events in mythic time (from which the thunder god is generally absent as an actor). The temporal dimension was also very likely lacking from ritual specialists' understandings in examples (6) and (7) above – i.e. recursivity likely centered on Þórr as a contemporary agent active in the world rather than on Þórr's acts in cosmogonic time, even if these provided specific exemplar events. Incantations could include the recital of a mythic exemplar of the healing act being performed, but they also commonly included recitals of cosmogonic events that, within the temporal ideology of the tradition, seem to have been conceived as having concurrent objective existence as they were being recited (Siikala 2002; Frog 2019c). Finno-Karelian temporal ideologies thus seem to be structured quite differently from their Scandinavian counterparts, even allowing events in mythic time to exist simultaneously in the present.

Chronotope Interference

Although temporal ideologies structure chronotopes and their correlation with different eras, there are a number of cases in which fractal recursivity correlates with anomalies for the dominant chronotope. Among the examples addressed above,

Óðinn's transformation into a bird in example (8) is unique for mytho-heroic time, but familiar in cosmogonic time. When King Heiðrekr slashes at this bird, cutting its tail feathers, this is said in the saga to be why hawks have short tails – a type of aetiological event customary to cosmogonic rather than mytho-heroic time. The transformation of a reed into a spear in examples (2) and (3) is exceptional for historical time but appropriate to cosmogonic time. Similarly, the transformation of Kvasir's blood into poetry as well as his spontaneous origins from spitting into a vat have parallels in pre-creation time but are exceptionally fantastic for cosmogonic time. Rather than anomalies *per se*, fractal recursivity may carry features of the dominant chronotope along with the reproduced image, motif, or narrative pattern, warping what would customarily be considered predictable, probable, or possible in the temporality where it is reproduced (cf. Asplund Ingemark 2004). I describe this phenomenon as *chronotope interference*.

Part 5: Concluding Remarks

Fractal recursivity brings into focus a particular phenomenon in mythic discourse. In Scandinavian mythology, this phenomenon has previously been observed in particular cases but has not received concentrated attention. Fractal recursivity is found in both representations or interpretations of the past and is also actively instantiated in ritual actions. The essence of the phenomenon appears the same in both ritual and narration, with the predictable tendency that recursivity produces directional references from examples in later eras and of narrower scope to those in earlier eras and of greater scope. Approaching the operation of reality of different eras in terms of chronotopes provides a means of talking about them in relation to one another. However, these chronotopes are not strictly bound to chronology: they are both linked to processes of otherworlding and become bound up with agents and events, with the consequence of chronotope interference, when images and motifs carry features of one chronotope into another. Narration of the past differs from ritual in that fractal recursivity opens to rhetorical strategies to vary interpretations. The interpretations asserted for later recurrences of an event can comment on earlier exemplars, implicitly advancing the same interpretation or evaluation. Fractal recursivity thus appears as an instrument for Christian engagements with "pagan" mythology and for both commenting on "pagan" traditions and constructing the image of Christian agents. Although ritual and narration operate within the same framework, narration presents opportunities for rhetorical manipulation. The principles of fractal recursivity in Scandinavian traditions outlined here offer frames of reference in the analysis of the particular tradition, bringing into focus the variation in ideas about reality and how it works in different eras of time.

Examining cases of fractal recursivity in Old Norse literature easily leads to viewing it in terms of literary references. Examples like *Þorsteins þáttr*'s engagement with Þórr's adventures and *Heiðreks saga*'s with *Vafþrúðnismál* foreground the dialogue between the events narrated and those in cosmogonic time. Conversely, Ari's account

about the death of Kolr exhibits a referential relation that may have been very subtle or unconscious. Fractal recursivity does not exclude interpreting reproductions in mytho-heroic or historical time as such events. When fractal recursivity is found widely in the corpus, it suggests that many people would be more sensitive to it and able to pick up on even subtle parallels. This raises the question of whether the survey of mythology in Snorri Sturluson's *Edda*, a pedagogical work, reflects its importance not only for understanding poetry, but also for understanding and narrating history, especially when the phenomenon is richly attested in sagas. On the other hand, it equally suggests that such recursivity was deeply integrated into imagining the past, to the point that, especially in the oral tradition, many people may have produced and interpreted fractal recursivity as a principle of temporal ideology without reflecting on it or even consciously recognizing a correlation with events in pre-creation or cosmogonic time. Rather than being contradictory, conscious manipulation and unconscious reproduction could simply reflect different individuals' interests and orientations when engaging fractal recursivity in a society where it is prominent.

The approach to fractal recursivity presented here is applicable to other traditions and may provide a more general resource for mythic discourse analysis. Comparisons with Finno-Karelian and Christian models of time highlight that the relations between Scandinavian temporalities are ideologically structured and culture-dependent. The Finno-Karelian case highlights that fractal recursivity does not require the referent to be in a different temporality at all. The Scandinavian model cannot be directly applied to other traditions, but its introduction here offers a model for approaching temporal ideologies in a culture and how fractal recursivity relates to it.

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