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Thomas Mohnike

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Abstract

The article explores the main structuring elements of the national mythology of Sweden as promoted in Selma Lagerlöf's Wonderful Journey through Sweden (1906/07), understood as mythemes of social knowledge. After a perhaps too short discussion of the main theoretical and methodological choices, including the concept of mytheme and homo narrans in the context of general narratology and media change, the article proceeds in the discussion of the results obtained by a computational method developed by Ludovic Stappazon and the author. 196 common mythemes are mapped as a network of units representing the probability of co-occurrence in the narrative. Most Central Chronotope mythemes are Forest, Way, Water, Farm, Land and Lake, which are until today main elements of a national imaginative geography. Action mythemes relate to the idea of education, related in turn to the concept of family. Human and non-human actors and chronotopes are clearly divided as two spheres in the narrative grammar, underlining the nature-culture-divide central to the narration.

Résumé

L'article explore les principaux éléments structurants de la mythologie nationale de la Suède telle qu'elle est promue dans le Merveilleux voyage à travers la Suède de Selma Lagerlöf (1906/07), entendus comme des mythes du savoir social. Après une discussion peut-être trop courte des principaux choix théoriques et méthodologiques, y compris le concept de mytheme et d'homo narrans dans le contexte de la narratologie générale et de l'évolution des médias, l'article passe à la discussion des résultats obtenus par une méthode computationnelle développée par Ludovic Stappazon et l'auteur. 196 mythes communs sont cartographiés sous la forme d'un réseau d'unités représentant la probabilité de cooccurrence dans le récit. Les mythes de chronotope les plus centraux sont la forêt, le chemin, l'eau, la ferme, la terre et le lac, qui sont jusqu'à aujourd'hui des éléments principaux d'une géographie imaginative nationale. Les mythes d'action sont liés à l'idée d'éducation, elle-même liée au concept de famille. Les acteurs et les chronotopes humains et non humains sont clairement divisés en deux sphères dans la grammaire narrative, soulignant la division nature-culture au cœur de la narration.

Keywords

Mythemes – Nils Holgersson – Selma Lagerlöf – cartography – narrative knowledge

Mots-Clés

Mythèmes – Nils Holgersson – Selma Lagerlöf – cartographie – savoir narratif

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Nils Holgersson's Wonderful Journey through the Mythemes of Sweden. Using Computational Methods to Explore Selma Lagerlöf's Narrative Geographies for Everyone

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Without a doubt, *Nils Holgersson's Wonderful Journey Through Sweden* (1906/7) by Swedish Nobel Prize winner Selma Lagerlöf is one of the most read and best researched single literary works in Scandinavian literature. The book had sold over 500,000 copies by 1959 in a country of at the time approximately 6 million inhabitants. It was used as a textbook in schools and can be described as an important vector for the construction of the Swedish welfare state and its imagined political community as a nation. The book conveyed knowledge about not only physical, natural, and cultural geography, but also aesthetic and ethical values and categories. It participated decisively in the cultural construction of a national mythology of Sweden – both inside and outside of Sweden.¹

The term "national mythology" here implies that we are dealing with a set of myths, i.e. narratives organized in a specific way, which in turn participate in what could be called the narrative structure of the nation as a belief system. These myths can be expressed through various media, and this is certainly the case with *Nils Holgersson*. Even if the book is mostly known for its text, it was conceived as a multimedia object with illustrations accompanying the narration, designed for both quiet reading and interactive teaching situations.² In the first editions, a series of 57 photos and 15 mostly realistic paintings and drawings were reproduced in the book. Apart from three of the 72 illustrations in total, none of them illustrated the story directly, but they reproduced the frequent narrative elements by depicting realistic exemplary details mostly from Swedish natural scenery, creating an effect of authenticity.³

As the mostly photographic illustrations suggest by focusing on specific landscape features, it appears that it was not so much the individual myths that counted in the book, but rather their components, or basic units. I propose that we might call these units 'mythemes', inspired by French anthropologist Claude Lévi-Strauss. Consequently, it is not the story of Nils Holgersson *per se*, which became influential, but rather its components, its mythemes, and the way they were combined. It was not so much the wild geese and the little boy that became the main elements of the national mythology, but a standardized representation of a specific ecological system of Swedish nature, its flora and fauna, including its farmers and ordinary Swedes. It is these elements of national myths, these mythemes, that

¹Gunnar Ahlström, *Den underbara resan: En bok om Selma Lagerlöfs Nils Holgersson*, Stockholm, Bonnier, 1958; Erland Lagerroth, *Landskap och natur i Gösta Berlings saga och Nils Holgersson*, Stockholm, Bonnier, 1958; Annelie Jarl Ireman, "Le merveilleux voyage du livre de Selma Lagerlöf," in *Cahiers Robinson*, 29, 2011, p. 97–112; Bente Heian, *Skolebok og diktverk. En analyse av pedagogiske mål og litterære virkemidler i Selma Lagerlöfs Nils Holgerssons underbara resa genom Sverige*, Oslo, Univ. i Oslo, 1983; Bjarne Thorup Thomsen, "Lagerlöfs Relative Landskaber. Om Konstruktionen Af et Nationalt Territorium i Nils Holgersson," in *Edda* 91/2, 2004, p. 118–33; Annelie Jarl Ireman, "Lire et relire 'Le merveilleux voyage de Nils Holgersson à travers la Suède,'" in *Nordiques*, 23, 2010, p. 67–79; Anna Bohlin, "Nils and the Social Mother as a Migrating Goose," in *Tijdschrift Voor Skandinavistiek* 36/2 2018, <https://rjh.ub.rug.nl/tvs/article/view/31573>; Thomas Mohnike, "Nature, Work, and Transcendence. Christian Intertexts in Selma Lagerlöf's Nils Holgersson's Marvelous Journey through Sweden and the Modern Swedish Welfare State," in *European Journal of Scandinavian Studies*, 52/1, 2022, p. 6–25, <https://doi.org/10.1515/ejss-2022-2067>

²In fact, there was a teacher's manual that suggested different ways of using the book in teaching. See Valborg Olander and Selma Lagerlöf, *Handbok till Nils Holgerssons underbara resa genom Sverige*, Stockholm: Bonniers, 1918.

³This calculation is based on my copy, which I acquired antiquarian and belonged to the first ten thousand copies of the first edition. Since the images were printed separately and then inserted into the book layers during binding, errors are not excluded and variations are possible. The use of photos was apparently a stopgap solution, as the desired illustrator, Bruno Liljefors, was not available. Liljefors was known for his depictions of nature, in which animals were shown in their natural habitat. The reproductions in the book of some of his paintings confirm this exemplarily. John Bauer, who developed a style of enchanting reality through references to folklore, was rejected by Selma Lagerlöf. It was not a matter of distancing oneself from the world, but on the contrary of anchoring the narrative in the real world as a narrative of reality. On the motives to choose Bruno Liljefors, see Christopher Oscarson, "Nils Holgersson, Empty Maps and the Entangled Birds-Eye View of Sweden," *Edda* 96/02 (2009): 105–6.

became influential, and the way they were combined. They became part of the “horizon of expectation”⁴ of readers and amateurs of the European North, shared social knowledge that any other text and narrative media had to relate to when referring to the Sweden and – in an international perspective – Scandinavia.

But which are the most significant mythemes in this context? It is my ambition here to identify them not by qualitative analysis, but by using a set of computational methods. As a result, some of the observations from previous research using qualitative methods will be confirmed by a quantitative approach, thus validating other findings by different means. When doing so, I am not so much focusing on *Nils Holgersson* as a single work, but as expression of narrative knowledge about Sweden, supposed to be shared by its implied reader at the beginning of the 20th century. When referring to “narrative knowledge”, I do this in reference to the work of several scholars modelling the human species as *homo narrans*, that is to define our species by its ability to circulate knowledge through narration, fiction or non-fiction. Some of the underlying narratological ideas were presented in an article published in 2020, along with some preliminary computational experiments.⁵ Since then, the computing methodology has been thoroughly revised and enhanced by data engineer Ludovic Strappazzon and myself, and a publication that discusses its premises, choices and pitfalls in detail is in preparation.⁶ Meanwhile, the following overview will have to suffice.

What is a Mytheme? Some Comments on Theory

In recent years, several scholars from different fields have suggested changing the name of our species from *Homo sapiens*, the ‘wise, discerning man’ to *homo narrans*, the storytelling man. Evolutionary theorists, information and communication experts, linguists, scholars from religious and literary studies as well as sociologists note that most human knowledge transfer is based on narration; decision making is often more reliant on narrative framing than on facts and rational argument.⁷ Based on this and his own research into cognitive and neuroscience, Fritz Breithaupt shows that we have a “narrative brain”, that the latter is actually constructed in order to process information in a way that can be described as having a narrative structure.⁸ The concept of narration is here not restricted to literature or text, but englobes all media used to transmit narratives, that is accounts of at least one “change from one state of affairs to another”⁹. Obviously, narratives can only be studied on the basis of their realization in specific media, be it oral, comic, film or novel, and the characteristics of each media form have an influence on the narration.

The research of Breithaupt and others explicitly links new experiments and results from cognitive science to the long tradition of poetic and narratological reflection. In fact, already Aristotle had underlined the advantages of the narrative form, saying that narration helps to transmit what is probably going to happen by focusing on the typical – and not the accidental, on “what is possible according to the law of probability or necessity”¹⁰. Aristotle thus suggests that narratives are devices for understanding and coping with the complexity of life, or to put it anachronistically: they are algorithms that prepare us for what we will encounter. He is consequently preparing the field for a modern

⁴Hans Robert Jauss, “Literaturgeschichte als Provokation der Literaturwissenschaft“, *Literaturgeschichte als Provokation*, ed. Hans Robert Jauss, Frankfurt/M, Suhrkamp, 1970, p. 144-207, here especially p. 175-189.

⁵Thomas Mohnike, “Narrating the North. Towards a Theory of Mythemes of Social Knowledge in Cultural Circulation,” in *Deshima. Arts, lettres et cultures des pays du Nord*, 14, 2020, p.9–36.

⁶ Another case study using the present method in order to trace change in Narrative grammar in a bigger corpus is published as Thomas Mohnike, “Tracing the Grammar of Old Norse Myth. Mapping Mythemes in English Language Young Adult Literature from the Second Half of the Long Nineteenth Century”, *Påttasyrpa – Studien zu Literatur, Kultur und Sprache in Nordeuropa. Festschrift für Stefanie Gropper*, eds. Anna Katharina Heiniger, Rebecca Merkelbach, and Alexander Wilson, Beiträge Zur Nordischen Philologie 71, Tübingen, Narr, 2022, p. 367–78.

⁷ Walter R. Fisher, “The Narrative Paradigm: In the Beginning,” in *Journal of Communication* 35/4, December 1985, p. 74–89, <https://doi.org/10.1111/j.1460-2466.1985.tb02974.x>; John D. Niles, *Homo Narrans: the poetics and anthropology of oral literature*, Philadelphia, University of Pennsylvania Press, 1999; Pascal Boyer, *Religion explained: the evolutionary origins of religious thought*, New York, Basic Books, 2001; Alain Rabatel, *Homo narrans: pour une analyse énonciative et interactionnelle du récit*, Limoges, Lambert-Lucas, 2009; Brian Boyd, *On the Origin of Stories: Evolution, Cognition, and Fiction*, Cambridge, Harvard University Press, 2009.

⁸ Fritz Breithaupt, *Das narrative Gehirn: Was unsere Neuronen erzählen*, Berlin, Suhrkamp Verlag, 2022.

⁹ Shlomith Rimmon-Kenan, *Narrative Fiction: Contemporary Poetics*, London, Routledge, 1999, p. 15.

¹⁰ Aristotle, *The Poetics*, trans. Samuel Henry Butcher, Project Gutenberg, 1999, book IX, <https://www.gutenberg.org/ebooks/1974>.

understanding of the function of narration and narratives. Narratologists like Käthe Friedemann would in the beginning of the 20th century describe this approach as “the epistemological conception familiar to us since Kant that we do not grasp the world as it is in itself, but rather as it has passed through the medium of an observing mind”¹¹ - narratives thus being part of human processing strategies. As such, the concept of *homo narrans* is both an invitation to reconsider the way human beings function and an invitation to revisit narrative theory.

Such discussions about whether narration is a dominant form of information processing and transmission are, of course, part of the social and media transformation that we could call the “electronic age” with Marshall McLuhan. At the latest in the 1950s,¹² literature as a leading medium for cultural negotiation was beginning to lose its status, when screen-based information media started to come to the fore – along with numerous more or less new forms of narratives. With these transformations, the world of the “typographic man” disappeared, i.e. the human being determined by a media configuration based on the printing industry, and questions of the interrelation of different media became evident, especially how narratives changed when passing from one media to another.¹³ The advent of the Internet has exponentially accelerated these trends. These transformations have invited us to reflect on the nature of narrative knowledge and the specific laws of expression in different media. This relates to all the different works on the narratology of the realistic novel, folklore, comics, and their declinations in cinema studies, game studies or politics, marketing and academic practice as historiography, and so on.

Many approaches to narration in this general sense are primarily interested in where and when narrations and narrative framings are used with which poetical or narrative figures; they focus on intertextuality or the techniques of medial storytelling. Others, and this is obviously the case with the approach I am proposing here, seek to apply ideas from classical general, mostly structuralist, narratology, which had some of its beginnings in the beginning of the 20th century in Germany and Russia and then developed especially in the 1950s and 1960s, to the new media situation. The recourse to these approaches is not accidental, since many of the theories and methods of this period respond precisely to the invention of first the cinema, television, and then the computer, and to the theorization of information and knowledge that underlie the technical solutions of our electronic age. An interesting effort in this context was for example the collective volume *Narrating Complexity*, edited by Richard Walsh and Susan Stepney in 2018, bringing together complex systems scientists and narratologists.¹⁴ Mark Alan Finlayson's work on “Inferring Propp's functions from Semantically Annotated Text” or on automatically identifying narrative diegesis and point of view¹⁵ are similarly interesting approaches, as are Timothy R. Tangherlini's explorations into creating a generative model of what he calls “the legend”, i.e. popular storytelling, to cite just a few inspiring examples from the vicinity of the present project.¹⁶

In the context of the *Mythemes of the Knowledge* project, however, I propose not to focus as much on narrations or genres of narrations as such, but on what social anthropologist Claude Lévi-Strauss called the “constituent units” of narrations: mythemes.¹⁷ It is from these basic units of narrations that I suggest starting – just as a chemist would start rather with atoms than with molecules, even though the rarely come isolated. Lévi-Strauss in fact insists that mythemes are to be defined as “bundles of [...] relations and it is only as bundles that these relations can be put to use and combined so as to produce a meaning”¹⁸. It is important to note that mythemes are elements at the level of diegesis in a narratological

¹¹ Quoted after the English translation in Wolf Schmid, *Narratology: An Introduction*, Berlin, De Gruyter, 2010, p. 1.

¹² Lev Manovich suggests that this starts even earlier with the advent of cinema. Lev Manovich, *The Language of New Media*, Cambridge, MA: MIT Press, 2002.

¹³ Marshall McLuhan, *The Gutenberg galaxy: the making of typographic man*, London, Routledge & Kegan Paul, 1962, passim.

¹⁴ Richard Walsh and Susan Stepney, eds., *Narrating Complexity*, Cham, Springer International Publishing, 2018, <https://doi.org/10.1007/978-3-319-64714-2>.

¹⁵ Mark Alan Finlayson, “Inferring Propp's Functions from Semantically Annotated Text,” *The Journal of American Folklore* 129/511, 2016, p. 55–77, <https://doi.org/10.5406/jamerfolk.129.511.0055>; Joshua Eisenberg and Mark Finlayson, “Automatic Identification of Narrative Diegesis and Point of View,” In *Proceedings of the 2nd Workshop on Computing News Storylines (CNS 2016)*, Austin, Texas: Association for Computational Linguistics, 2016, p. 36-46. <https://doi.org/10.18653/v1/W16-5705>

¹⁶ Timothy R. Tangherlini, “Toward a Generative Model of Legend: Pizzas, Bridges, Vaccines, and Witches,” *Humanities* 7/1, March 2018, <https://doi.org/10.3390/h7010001>.

¹⁷ In what follows, it will appear evident that I do use Lévi-Strauss' approach only as an interesting point of departure, using his ideas in a manner that I want to describe as “productive misunderstanding”.

¹⁸ Claude Lévi-Strauss, “The Structural Study of Myth,” *The Journal of American Folklore*, 68/270, 1955, p. 428–479.

sense, that is the narrated, not narration per se, and they produce meaning not necessarily through temporal vicinity in the narration but through connecting through patterns of similarities and opposition on what Roland Barthes called a “second-order semiological system”. In fact, in his book on *Mythologies*, Roland Barthes defined myth as “a peculiar system, in that it is constructed from a semiological chain which existed before it [...]. That which is a sign (namely the associative total of a concept and an image) in the first system, becomes a mere signifier in the second.”¹⁹

So what we are dealing with here is not identical to a linguistic semantic analysis, even though in this case we are studying a text that is accompanied by realistic illustrations. When interpreting the narrative as expressed in a text, we use linguistic units (words) as signifiers for narrative units. We seek to describe phenomena not at the level of language, but of narration. This means moving to a second level of the text, the narrative level that potentially would be identically to the narrative level in a faithful film adaptation, even though of course the medium would have an impact on the narration. This distinction is important to the understanding of the result that I present below: the network of probable relations between mythemes is not identical to the linguistic patterns, although of course, we have to refer to words in a text and thus to language-based narratives when analyzing narrative texts. Mythemes exist at the level of narrative knowledge, detached from its medium, even only tangible in specific media.

Each mytheme is characterized by its capacity to relate to other mythemes – as “bundles of relations”.²⁰ In consequence, I have defined the narrative grammar in my above-mentioned article “as the probability of connectivity of mythemes in narration”.²¹ That means that we expect some mythemes to be used together – this often creates an effect of authenticity, while other co-occurrences are considered to be improbable. In a realistic novel of the turn of the 19th century, men would meet in coffee shops and discuss life and literature, but a dragon would be unlikely to make an appearance. However, in fantasy novels published after Tolkien’s *The Lord of the Rings*, one would not be surprised to meet a dragon in a pub. Narrative grammar – the probability that some mythemes are used together with others, thus changes and depends on contextual elements such as time, genre and many more.

In this perspective, mythemes can be understood as the narrative units that Selma Lagerlöf uses to tell in a fascinating way the story of Nils Holgersson exploring Sweden on a goose’s back, thereby creating a “national mythology”, that is a repertory of narrative elements that can be used to imagine, and especially narrate, Sweden as a nation. She uses mythemes and groups of mythemes that were already known to her readership, combining them in a new and productive way that then became canonical. By studying how Lagerlöf combines certain mythemes – and avoids combining others, we can trace how her book is conceptualized to evoke a unified national geography out of a multiplicity of regionally-based episodes. This narrative geography should potentially be able to be explored in a variety of media – the illustrations are one beginning, the maps used in the classroom another, the board games and journeys later developed to walk in Nils Holgersson's footsteps are still other media variants.

The concept of mytheme is known to be difficult to define in a way that avoids arbitrariness and thus comparability of results. In addition, the same author sometimes uses different definitions of the term. Often, a means to identify mythemes in a given text, events are used, that is “a change from one state of affairs to another” in the narrative flux,²² combined with a character and some themes. However, it seems to me that it is more helpful to discriminate these elements as constituent entities and define the combination of them as a complex of mythemes. In previous studies, it proved to be helpful to distinguish four types of mythemes. This proposal is based on classical narratological concepts, but attempts to reduce them to a few abstract units for our needs.

- Actor Mythemes - narrative entities that can function as the object or subject of action. This category unites all possible expressions of actants in the sense of Greimas.
- Action mythemes define the narrative relationship between actor mythemes. This category often relates to events, that passing an actor from one state to another.
- Chronotope mythemes define the place and time of an action.

¹⁹ Roland Barthes, *Mythologies*, trans. Annette Lavers, New York, The Noonday Press, 1972, p. 113.

²⁰ Claude Lévi-Strauss, “The Structural Study of Myth,” *The Journal of American Folklore*, 68/270, 1955, p. 428–479.

²¹ Mohnike, “Narrating the North. Towards a Theory of Mythemes of Social Knowledge in Cultural Circulation,” p. 322.

²² Rimmon-Kenan, op. cit., p.15.

- Concept mythemes structure the plot through abstract ideas, most often not directly engaged in narration except in the case of allegories. They represent the themes related negotiated in the narrative.²³

Evidently, the categories are not as clear-cut as they might seem. A specific mytheme can, for example, sometimes be classified as an actor and a concept at the same time; we can think here of Amor as a figuration of Love. A mytheme can be both a chronotope and an actor – a stone can be a place to meet or a tool to hurt somebody. As long as these ambiguities do not affect the value of the analysis, it seems to me that they have no effect on the validity of the approach. In the analysis that I present here, such mythemes were defined in the database as belonging to several categories. In my study, I will map mythemes that can be categorized as actors and chronotopes alongside chronotope mythemes proper when mapping the narrative geography of *Nils Holgersson*, and the same mythemes will appear on the maps of actors describing the projected social network of the imaginative community of the Swedish nation according to the book.

How can mythemes be traced computationally? Some comments on method

I need to start this part with a disclaimer. For two reasons, the approach used here is deliberately low-tech. First, we have not yet asked for or received any significant financial support. The project therefore relies mainly on what is at hand, to paraphrase Claude Lévi-Strauss, in everyday university life. It is a testimony to bricolage in the positive sense. Second, the project is guided by the conviction that one must first conceive the model as simply as possible and then develop it in the same spirit, perhaps refining it later technically. We draw on techniques from semantic text analysis and network analysis, and add a step that may take us to the second semiotic level described above. Other studies in computational literary studies are sometimes more technically complex, but do not have the same epistemological goal. As the lengthy introductory remarks suggest, this project is hypothesis-driven rather than technology-enabled.²⁴

The data has been generated by the Mytheme Laboratory, a software that Ludovic Strappazon and I have developed for this purpose, and which of course relies on several open source elements developed by others. The Mytheme Laboratory is accessible online as is the statistical data calculated.²⁵ As the Laboratory is a work in progress, the accessible data might differ slightly from what I use here when the reader accesses it. It is therefore stored in its current state in an archive at Nakala.²⁶ The text file analyzed was created by the Litteraturbanken project.²⁷ For the present analysis, the two text files created from the two volumes of the book have been merged into one single file and cleaned of paratext and secondary commentaries such as, for example, frequent indication of blank pages and illustrations.

The analytical algorithm of the Mytheme Laboratory is programmed in Python. It first lemmatizes the text with the help of the Spacy-Library.²⁸ It then searches for Mythemes in the text. Mythemes are defined as independent objects in the laboratory, composed by a label in English, a definition of the type and lists of lemmas (i.e. dictionary form of a word) in different languages that can be seen as traces of mythemes. A trace is a lemma that indicates with high probability the presence of a mytheme in a passage of text. In the case of the protagonist of the book, Nils Holgersson, this can be three different words [nils; pojke; tummetott], as he is addressed by the narrator with one of these words. Of course, the word “pojke” (boy) can signify yet another protagonist in the story, but as a short look at the result table shows, this is rather seldom. To avoid “pojke” being used as a trace for the mytheme of Nils

²³ See Mohnike, p. 18–136.

²⁴ Some fascinating, but rather technologically driven studies include Martin Paul Eve, *Close Reading with Computers: Textual Scholarship, Computational Formalism, and David Mitchell's Cloud Atlas*, Palo Alto, Stanford University Press, 2020, <https://doi.org/10.21627/9781503609372>; Anne-Sophie Bories, Petr Plecháč, and Pablo Ruiz Fabo, eds., *Computational Stylistics in Poetry, Prose, and Drama*, Berlin, De Gruyter, 2023, <https://doi.org/10.1515/9783110781502>.

²⁵ Ludovic Strappazon and Thomas Mohnike, “Mytheme Laboratory” (Université de Strasbourg, 2021), <https://mythemes.u-strasbg.fr/w/>.

²⁶ Thomas Mohnike, “Graphml and Gephi-file of Mytheme Networks in Selma Lagerlöf's book Nils Holgerssons underbara resa genom Sverige (1906/07)” [Dataset] NAKALA, 2022. <https://doi.org/10.34847/nkl.5fcfyz71>

²⁷ Litteraturbanken, “Litteraturbanken | Svenska klassiker som e-bok och epub,” accessed July 20, 2022, <https://litteraturbanken.se>.

²⁸ Ines Montani et al., “Explosion/SpaCy: V3.0.6: Assemble CLI, Matcher Alignments, Training from Streamed Corpora and Many Bug Fixes” (Zenodo, April 23, 2021), <https://doi.org/10.5281/zenodo.47154479>.

Holgerson even in other works in the laboratory, a filter is implemented: if there is no [holgerson] in the text, the trace will not be accounted for.

Then, in the 120 words around the mytheme trace, the Laboratory calculates which lemmas are more frequent. Lemmas with a frequency of less than 5 are discarded from further analysis as statistically irrelevant. Lemmas with a Coefficient of Overrepresentation (CSR) greater than 1.2 are considered significant. The slightly different Coefficient of Representation (CR) is later used as a normalized CSR.²⁹ Mythemes that share significant surrounding lemmas are supposed to share characteristics as they are evoked using similar words or in similar narrative contexts. After having noted the link, all lemmas found from this point on are excluded from further analysis as we move to the second semiotic level; they were only necessary to trace mythemes in the text and as traces for probable relations. They will be saved in the definitions of the edges in the resulting graph-file, but of no further relevance to the analysis. The laboratory then generates a network with mythemes as nodes and edges with the help of the Python library NetworkX. It uses the total CR as a means to calculate the weight of the edge, implying that the edge between two mythemes with many shared traces with high significance is weightier than those with few shared traces with a low CR. Additionally, it calculates the probability that the link is significant.

In a last step, the laboratory calculates the betweenness centrality and the closeness centrality for each mytheme. Betweenness centrality is defined, according to Graph Theory, as the number of shortest paths between every node in the network that passes through the node. Closeness centrality, on the other hand, can be described as the average distance from one node to all other nodes. The two values appear to be good measurements for the importance of a mytheme in the narrative grammar of a given text. Mythemes with high betweenness centrality are the central nodes that connect all parts of the narrative texture, mythemes with high closeness centrality structure the different subcomplexes. The results are documented on the wiki-pages, and the laboratory creates a graphml-file containing the information described. It can be downloaded for further exploration.

For the purpose of this article, I imported the graphml-file produced into the network visualization software Gephi.³⁰ However, there is also a very simple visualization-module implemented in the laboratory. With the algorithm Force-Atlas-2 or its variation Multigravity Force-Atlas-2 that seeks to organize the graph according to proximity and distance between nodes based on a gravity model,³¹ I generated the visualizations of the network that I present in the following section of my paper. If not otherwise mentioned, mythemes with high closeness centrality are represented with larger fonts and circles. Colors can either represent types of mythemes or communities of nodes. Communities are calculated using the Modularity algorithm implemented in Gephi.

Mapping Narrative Geographies

The Laboratory identified 197 frequent mythemes for which it could establish 2358 relations (edges) to other mythemes. In the calculated network, I deleted the mytheme “folk” as there was a very similar mytheme defined as “people”, resulting in a network of 196 mythemes with 2298 edges. The next step was to filter all edges with a probability of a link calculated as less than 0.99, resulting in a network with 1632 edges. Then, the graph was organized using the algorithm Multigravity ForceAtlas 2. Different mytheme types received different colors; the font size was adapted to the closeness centrality calculated. The thickness of the lines is calculated proportionally to the total CR. Illustration 1 shows the result. As the mythemes in the laboratory are defined as objects with labels in English, they appear in English in the map even though the analyzed text was in Swedish.

²⁹ Formulae: Coefficient of Representation (CR) of a distinct lemma = number of occurrences of the Lemma in the sample divided by the number of occurrences of the lemma in the work. If all occurrences of a lemma in the work are part of the sample, consequently, the CR equals 1. The Coefficient of Overrepresentation (CSR) is calculated based on the CR, multiplied by Number of distinct Lemma in the work divided by Number of distinct Lemma in the sample.

³⁰ Mathieu Bastian and Gephi Consortium, “Gephi,” 2017, <https://gephi.org>.

³¹ Mathieu Jacomy et al., “ForceAtlas2, a Continuous Graph Layout Algorithm for Handy Network Visualization Designed for the Gephi Software,” ed. Mark R. Muldoon, *PloS One* 9/6, June 10, 2014, p. 12, <https://doi.org/10.1371/journal.pone.00986736>.

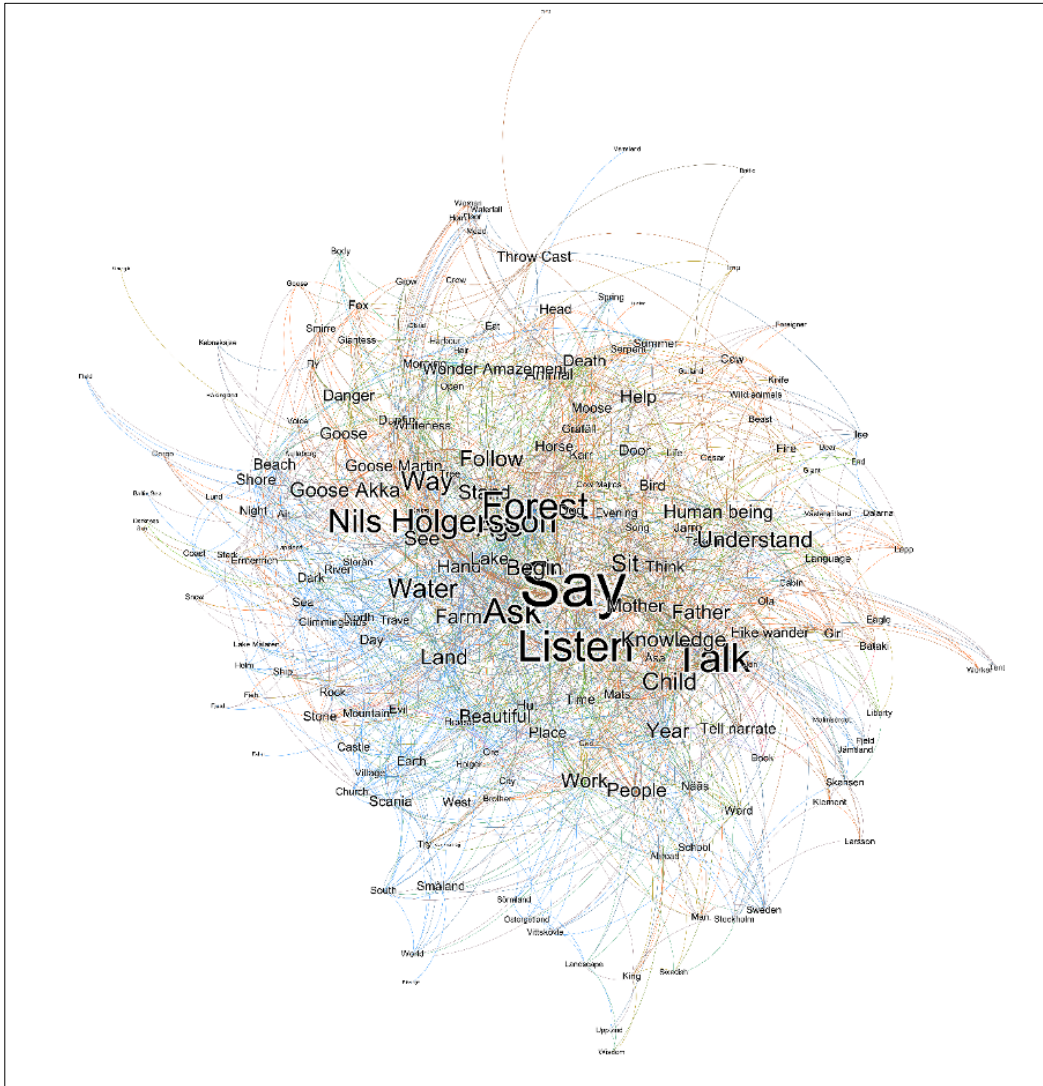


Figure 1: Map of all mythemes identified, colored according to mytheme type

A first reading of the generated map shows that action mythemes like "talk", "ask", "listen", "understand" and "think" seem to be of central importance for the narrative grammar, as the corresponding nodes have a high closeness centrality. This fits well with the overall idea of the book – to tell the story of a school of life. The character of Nils, who is discovering Sweden, and the activities mentioned fit with the theme of learning. Interestingly enough, in the triangle between “say”, “listen” and “talk” are “Mother” and “Father”, “knowledge” and, in close neighborhood, “Child”, “Åsa” and “Mats”, relating to the family as the core place of transmitting knowledge. This is closely related, of course, to the parallel story of the two children Mats and Åsa who make the same journey as Nils, just not on a goose’s back, but on foot, trying to find their father after losing their mother to tuberculosis. They will meet him in Lapponia where even Nils’ journey will have its turning point. This story is represented on the map by the smaller nodes to the right “Hike”, “Ola”, “cabin”, “Lapp”, as they meet him, after wandering to the North, in a cabin owned by the Sami man called Ola.

Table 1 Mythemes with highest betweenness centrality

Say	0,091417	Action
Forest	0,046312	Chronotope
Nils Holgersson	0,045415	Actor
Talk	0,044834	Action
Listen	0,04338	Action

Ask	0,032398	Action
Knowledge	0,02978	Concept
Throw Cast	0,026862	Action
Way	0,025623	Chronotope
See	0,023113	Action
Water	0,022968	Chronotope
Understand	0,022913	Action
Stand	0,021653	Action
Child	0,020429	Actor
Sit	0,020416	Action
Farm	0,019895	Chronotope
Begin	0,018272	Concept
Age	0,017881	Concept
Land	0,017107	Chronotope
Goose Akka	0,017037	Actor
Help	0,016356	Action
Goose	0,015286	Actor
Follow	0,014899	Action
Mother	0,013664	Actor
Work	0,013446	Concept
People	0,01302	Actor
Father	0,013008	Actor
Lake	0,012031	Chronotope
Beautiful	0,011106	Concept
Human being	0,010685	Concept

Furthermore, in the middle of the map we see Nils Holgersson with his goose friends Akka, Martin and Dunfin, Martin's wife. Forests and lakes, Water and Way are around them, with the action mythemes "see" and "follow", confronting Danger in the upper left of the map with Fox Smirre, the Crows etc., all central storylines in the first part of the book. The group around the recomposed goose family, which Nils has joined, and the (human) family seem to mirror each other, and another map will show this even better (illustration 3). The 30 mythemes with highest betweenness centrality, ordered from high to low, represent the central narrative themes, actors and places of the story (see table 1). The main chronotope mythemes are here Forest, Way, Water, Farm, Land and Lake.

Another interesting detail in the map is most chronotopes are concentrated in the lower left part of the map (blue), well distinguished from actors (orange), actions (grey) and concepts (green). Chronotopes form a coherent whole, which actors interact with. Most concept mythemes are concentrated in the upper half. The map appears to suggest that the places are opportunities to reflect and develop concepts, actors and actions connecting places and concepts.

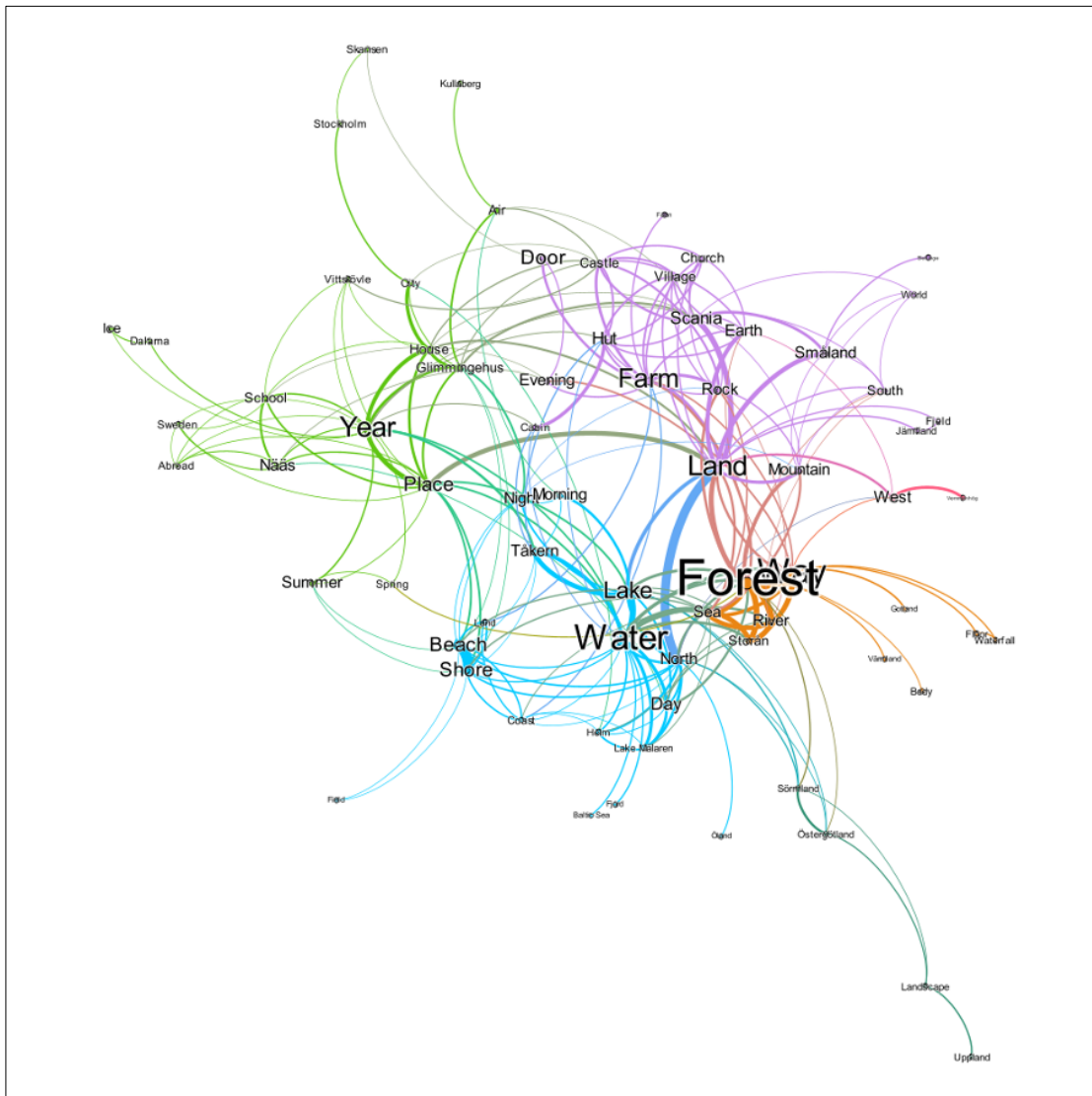


Figure 2 Map of Chronotopes with colored mytheme complexes

Figure 2 shows the map of chronotopes filtered from the previous map and reorganized with the above-mentioned algorithm Multigravity ForceAtlas 2. I used Gephi to reveal mytheme complexes by using the modularity function. Gephi found 5 complexes, rendered in different colors. Interestingly enough, almost no concrete place with a localizable place name has a high closeness centrality in the narrative geography, despite the fact that I had defined all place names with a number of concurrency of five or more as mythemes. On the contrary, generic chronotopes have high closeness centrality and thus high significance for the text's narrative grammar. The book is thus structured around types of landscapes rather than specific landscapes. Forest and Water are typical for the landscape of the journey, water being differentiated in lakes, sea, shores and rivers – in the map rendered in blue and orange, as well as some farms, villages and churches, to be found in the pink area. Cities are almost completely missing except for Stockholm. This can be interpreted as a sign that the actual goal of the book was not to transmit a detailed geography of Sweden, but what seems to be typical for all landscapes of Sweden. The reader is supposed to find in the local description of their own home characteristics of a general, seemingly national character linking all parts of the country. *Nils Holgersson* thus serves as a method for the stereotyping of a national geography, representing what is to be understood as typical of Sweden as a nation, not primarily as a documentation of a diversity of regions: forests, lakes, shores, farms, villages, and churches, a national life closely linked to nature.

The few exceptions confirm the hypotheses: Lake Tåkern is indeed described in the book as representative of the wild Swedish lakes untouched by man. It is actually the story of its threat that is

told, the story of farmers wanting to transform the lake into fields; Nils and the geese intervene at the last moment to prevent the catastrophe, teaching the farmers respect for nature. The river Storån, on the other hand, has a chapter of its own that narrates its coming into being and transforming of the landscape as emblematic for the big rivers of the North.

Another important characteristic of the map is a clear human-nature divide. All chronotopes clearly connected to human activity are in the pink area apart from some exceptions in the green area that we have to discuss separately. Contact between the two spheres is provided by land, farm, cabin, door that lend themselves naturally as zones of encounter. Similarly, we find in the green area Glimmingehus, an old castle that at the time of narration, however, was no longer extensively used by humans and could thus be colonized by Swedish rats, defending themselves from intruding foreign grey rats. The place is thus no longer a place of human dwelling, but a second-hand biotope.

The green area of the map is peculiar. The mythemes Year and Place, the most general chronotopes that one can imagine, dominate this mytheme complex. Linked are the seasons and the mythemes of school, Nääs – the model school narrated in chapter 52, Sweden and abroad on one side and city, Stockholm and Skansen on the other side. If we look at the first map generated, we find these chronotopes in close relation to the mythemes that are used to describe learning – word, book, tell/narrate, as well as to people, king and Swedish. They appear thus to be the places of learning proper – the Nääs and the School, of course, but even Skansen as the famous outdoor museum of Sweden being the most emblematic places of learning; the word and the book, the central media of education, and of course Swedish nationality being an important subject for a book on Swedish national geography. Although not a frequently used mytheme in the book and therefore not in the center of the map, the king is, interestingly enough, very closely connected to Swedishness as a concept, to wisdom of course, Stockholm and Uppland as the capital city and surrounding landscape, and to the people.

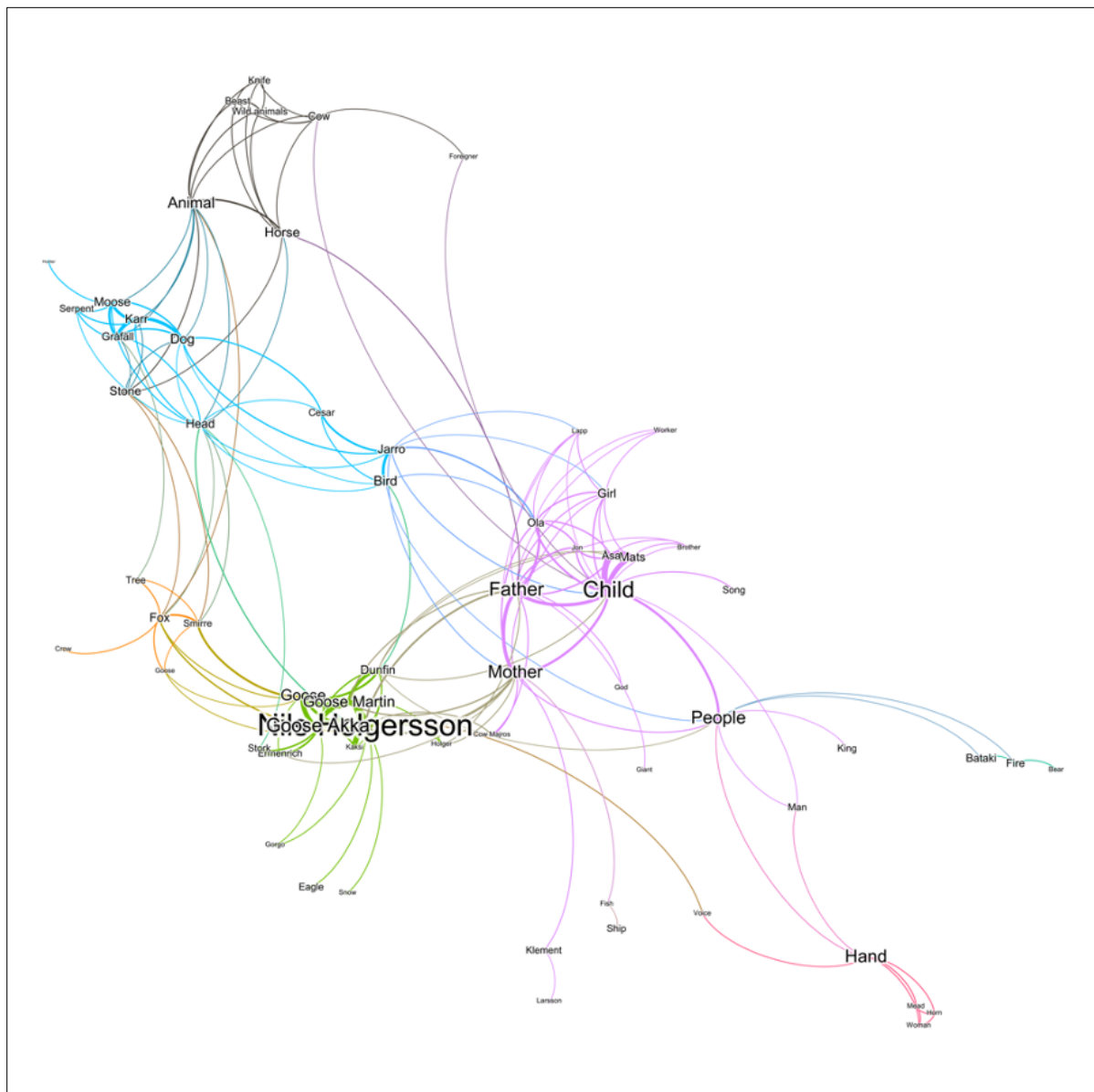


Figure 3 Map of all identified actor mythemes, colored depending on mytheme complex

Map 3 was generated with the same principles as map 2, except for actors being the object of mapping. Once again, all human actors are in one mytheme complex, rendered again in pink for convenience. We see here, as announced above, the clustering of the recomposed goose family – with its adopted children, Nils Holgersson and the eagle Gorgo, as well as the close friend, a stork named Ermenrich. Mirrored are mother, father and child as the typical human family – at least as the sought for, but not experienced ideal of the book. As readers of the book know, Nils leaves his family because he has difficulties finding his role; and the family of Mats and Åsa is destroyed by a complex story of family catastrophe related to tuberculosis. Jon, the children’s father, is in the center of the net, but not with a high closeness centrality, as the purpose of the children’s journey is to find him, but he is not a very active participant in the narrative. In addition, although God is not important for the narrative, he is connected, as is the case in the Lutheran tradition, to the father.

More important than God is the people – and this is obviously the case as this is a story that serves to define the Swedish nation. The people is linked to the family on one side and the king and man on the other. It seems thus to be defined as part of the collective identity. The collective identity is related to the concept of work: on the map, all humans are related to the mytheme of worker, and in the general map in illustration 1, work is a significant neighbor of the people as well. It is part of the Protestant work

ethic that informed the new idea of a national ethic at the time of writing.³² All mythemes directly connected to “people” are, ordered according to the CR of the edge, Ask, Dalarna, Evening, Farm, Forest, Help, House, Ice, King, Land, Mother, Say, School, Sit, South, Stockholm, Summer, Sweden, Swedish, Talk, Vittskövle, Word, Work, World, Abroad, Hand, Listen, Man, Nääs.

The other mytheme complexes in map 3 relate to specific parts of the story: the conflicts with the fox Smirre (orange), the Kolmården story about the menace of the forest, the domestication of animals such as the moose Gråfäll and his friend, the dog Karr, at one side of the blue area, and the similar story of lake Tåkern with the dog Cesar and the duck Jarro at the other, and so on. Interestingly enough, the two stories are connected by the fact that in both of them dogs figure in prominent places, Cesar and Karr, being in both cases important intermediaries.

Conclusion and Perspective

Taking the maps as a point of departure, it would be an amusing exercise to invent a continuation of the story of Nils. With these maps, we have at our disposal the most important narrative elements and grammar to improvise the continuation of the story in the spirit of Lagerlöf’s book. We would certainly remain in a rural, forest environment, meet more animals – preferably birds and dogs, some cows, horses and bears, but only very few cats and/or exotic animals like lions and rhinoceroses. We would meet people working and carrying out their duties when they are not telling stories or learning, in some corner, a reindeer herding Sami would appear, but very seldom meet workers in industrial or urban milieus. If we were to expand our analysis to the illustrations added to the first edition, we would probably meet the same elements, creating the national mythology of Sweden that we had set out to analyse. In fact, most of the 72 illustrations depict non-urban motifs, most often with forests, lakes and rocks as central elements. If they portray human habitats, they frequently appear without any human beings, often placed in a park or being reconquered by nature. The dominant human activity is farming, besides four illustrations of mining infrastructure. The narrative grammar depicted in the maps above opens the way for imagination and, perhaps, the desire to break up this universe by provoking change and introducing elements which are foreign to this stereotypical, nationalistic world. What would happen if we told the continuation of the story with a young girl riding on an antelope? Would this open up or restrict the national narrative universe?

One might think that all this is speculation, but it says much about Lagerlöf’s book and the narrative grammar used and transmitted. If we expand our analysis to other media from other moments in the Swedish 20th and 21st century, we would probably find that many of these elements constitute stable parts of the national narrative. For example, we could find many of these mythemes in touristic representations of Sweden until today. The internal and external communication of what is Sweden was based almost exclusively on these identified elements except for a slightly evolved openness to variation coming from outside. The urban milieu is almost as absent in these narrations as it was in the text by Selma Lagerlöf, even though the majority of the Swedish population lives in cities. As I have shown elsewhere, the city is often depicted in these advertisement products as a variation on natural landscape.³³

We have thus seen how quantitative methods can reveal the underlying narrative knowledge used to create a universe, which establishes clear references to create a national collective geography and identity. We have seen that the geography is structured around a nature-human divide, which even if the book discusses possibilities to bridge it, is fundamental to its outcome. Additionally, when it comes to social structures, the family is the central pattern, although none of the families in the book correspond to the ideal as it is presented in the course of the narration. However, at the end, as we know, Nils is happily reunited with his family, Åsa with her father, and the geese have offspring. The Swedish king is close to the level of human family, the father of the people.

When studying all four types of mythemes (actor, action, concept and chronotope) together, we have seen that the traveling communities of the wild geese and the new human family are motivated by learning, exchange of knowledge and dialogue. Learning by coming into contact with the world, that is

³² Cf Mohnike, “Nature, Work, and Transcendence”, 79.

³³ Thomas Mohnike, “Raconter la ville dans la nature suédoise. Une forme narrative paradoxale dans les récits identitaires actuels en Suède”, *De la ville durable à la nature en ville*, eds. Isabelle Hajek and Philippe Hamman, Villeneuve d'Ascq, Presses universitaires du Septentrion, 2015, p. 193-209.

developing central concepts in interaction with the chronotopes of the represented landscape, is the central theme. That the landscape is stereotyped, the chronotopes used being quite generic, only reinforces this intention.

Seen from the perspective of *homo narrans*, it seems probable that readers that have learned and appreciated the narrative geography of Sweden in the book will tend to reproduce or reuse it when telling themselves stories about Sweden and Swedishness. These mythemes and their connectivity – narrative grammar – could pass into the horizon of expectation, the canonical way of telling stories about Sweden. Of course, this is a hypothesis that seems probable when using our current knowledge of Swedish national narratives. However, it would be interesting to prove this in a later study by carrying out similar analysis with a large number of texts, comparing Nils Holgersson’s geographies and narrative grammar with other books of the same period and in a diachronic perspective.

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