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Using *rolling.classify* on the Sagas of Icelanders:
Collaborative Authorship in *Bjarnar saga Hítdœlakappa*

This poster will present the results of an application of the *rolling.classify* function in *Stylo (R)* to a source of unknown authorship and extremely poor textual history – *Bjarnar saga Hítdœlakappa,* one of the "family sagas" or "sagas of Icelanders" (Ice. *Íslendingasögur*). This case study sets the usual *Stylo* authorship attribution goal aside and concentrates on the composition of the main vitness of *Bjarnar saga*, ms. AM 551 d α, 4to (17th c.), which was the source for the most existing *Bjarnar saga* copies. It aims not only to find and visualise new arguments for the working hypothesis about the AM 551 d α, 4to composition but also to touch upon the main questions that rise before a student of philology daring to use *Stylo* on the Old Icelandic saga ground, i.e. what *Stylo* tells us, what it does not, and how can one use it while exploring the history of a text that exists only in one source.

It has been noted that *Bjarnar saga* shows signs of a stylistic change between the first 10 chapters and the rest of the saga – the characters suddenly change their behaviour (Sígurður Nordal 1938, lxxix; Andersson 1967, 137-140), the narrative becomes less coherent and, as it seems, acquires a new logic of construction (Finlay 1990-1993, 165-171). More detailed narrative analysis of the saga showed that there is a difference in the usage of some narrative techniques in the first and the second parts, i.e., for example, the narrator's work with point of view and the amount of their intervention in the saga text (Glebova 2017, 45-57). Thus, the question is – what is the relationship between the first 10 chapters and the rest of *Bjarnar saga*? Is the change entirely compositional and motivated by the narrative strategy of the medieval compiler or it is actually a result of a compilation of two texts that have two different authors?

As it often happens with Old Icelandic sagas in general, the problem aggravates due to the *Bjarnar saga's* poor preservation. There is not much to compare and work with; the most of the saga vitnesses are copies from one 17th c. manuscript, AM 551 d α, 4to (Boer 1893, xii-xiv; Sígurður Nordal 1938, xcv-xcvii; Simon 1966 (I), 19-149). This manuscript also has its flaws: it has two lacunae, one in the very beginning of the saga (ch. 1-5,5 in *ÍF III*) and another in the middle (between ch. 14-15 in *ÍF III*). The second lacuna is irreconstructable while the first one is usually substituted by a fragment from the saga's short reduction that was preserved in copies of 15th c. kings' saga compilation, *Separate saga St. Olaf* in *Bœjarbók* (Finlay 2000, xlvi), and that actually ends right on the 10th chapter of the longer version. It seems that the text of the shorter version is a variant of the longer one (Glebova 2017, 13-17); precise relationships between the short and long redactions, however, are irreconstructable due to the lacuna in AM 551 d α, 4to. The existance of the short version with these particular length and contents is indeed very important to the study of *Bjarnar saga* composition in AM 551 d α, 4to as it creates a chance that the first 10 chapters of AM 551 d α, 4to could exist separately at some point of the *Bjarnar saga*'s text history or at least that these chapters were seen by the medieval compilers as something solid and complete. This is as far as traditional philology can go in this case – the state of the sources does not allow saying more. However, is there anything else that could shed some light on whether these chapters existed separately or were written by the same hand?

In this study it was decided to try sequential stylometric analysis available in *Stylo* package for *R* (Eder, Kestemont, Rybicki 2013) as a function *rolling.classify* (Eder 2015). As we are interested in the different parts of the same text, rolling stylometry seems to be a more preferable method to cluster analysis, which takes the whole text as an entity and compares it to the reference corpus; alternatively, in case with rolling stylometry the text is divided into smaller segments which allows for a deeper investigation of the stylistic variation in the text itself

(Rybicki, Eder, Hoover 2016, 126). To do the analysis a corpus was made from the two parts of *Bjarnar saga* and several other Old Icelandic sagas (not only Sagas of Icelanders, but also Kings' sagas) used as a context; the whole corpus was taken from sagadb.org in Modern Icelandic normalised orthography. Then, a reference set was built out of a sample from the 1st part of *Bjarnar saga* and a sample from the 2nd part as well as samples from other sagas. This reference set was used to train a classification model using support vector machines (SVM). Finally, the model was applied to the whole *Bjarnar saga* that was then tested against the reference set. A series of tests was conducted with different slice sizes (5000 words to 2000) and different amounts of MFW (most frequent words). The preliminary results show that there is a stylistic division in the saga as the style of the first part is not present in the second one at all. See an example in Fig.1 where the red colour corresponds to the 1st part.

Fig.1. Slice.size = 5000, slice.overlap = 4500, MFW = 100
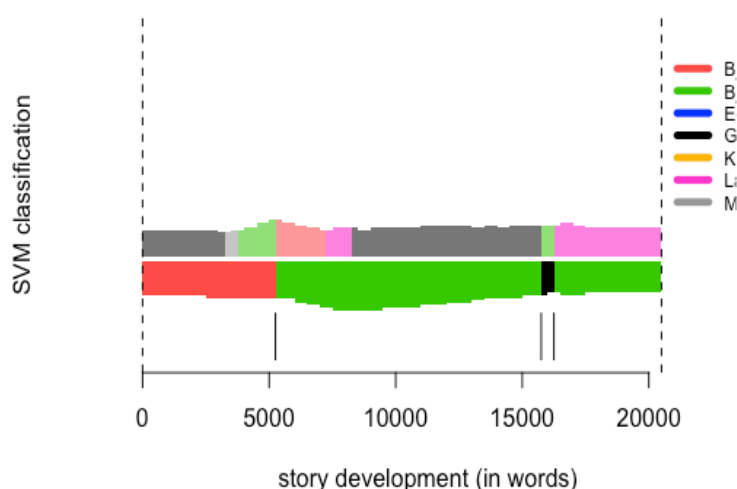
This would be an additional argument for the idea that the first 10 chapters existed separately and were added by the *Bjarnar saga* compiler during the saga construction. *Stylo* counts the most frequent words, which are not so generically specific (like *og*, *að*, etc.); thus, the collaborative authorship still could have taken place. However, the previous results of the narratological analysis make us think further – if the structure of the saga shows traces of very careful planning and mirror composition (Glebova 2017, 18-33), most probably it is not the case of a clumsy compilation. Even if the first part and the second part could exist separately, they were *chosen* to be put in this order and this particular form. So what could the stylistic change mean then? One could argue that it could be a generic division as the first part is set in Norway and deals a lot with St. Olaf; the change of genre could result in the change of style. On the other hand, the reason also could be pragmatic – the first part could be seen as an introduction and the second part as the main narrative. Whatever be the case, while sewing together the existing material the medieval compiler made an effort to create a solid text and this effort is worth studying with more attention.

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