The journal SMIL – Statistical Methods in Linguistics (1962–1976) – some notes about the history of quantitative linguistics in Scandinavia and beyond

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ABSTRACT

This article deals with the history of quantitative linguistics. The focus of this paper is the journal *SMIL – Statistical Methods in Linguistics*, which was published by Hans Karlgren in Stockholm from 1962 to 1976 (with a short interruption between 1966 and 1969). SMIL is a representative example of the process of differentiation in quantitative linguistics during the seventies and can be seen as one early major "Scandinavian" contribution to statistical and quantitative linguistics.

Key words: history of quantitative linguistics, statistical linguistics, *SMIL*, Hans Karlgren (1933–1996)

A scientific discipline needs not only a group of researchers but also a corresponding institutional organisation. In particular, possibilities to disseminate current research results and to promote the exchange of information and scientific knowledge are required. While there are currently several journals explicitly devoted to questions of quantitative linguistics (*Journal of Quantitative Linguistics*, *Glottometrics*, *Glottotheory*, and many others), a look at the more recent history of science shows that the establishment of journals with such a focus is quite laborious and that, overall a corresponding infrastructure in this field has only developed slowly.

Some years ago, the editor of *Glottometrics* called for contributions on the history of quantitative linguistics and/or to introduce individual researchers who have worked in this field. We are happy to comply with this request in this article and would like to take a closer look at a small cornerstone in the history of modern quantitative linguistics in Scandinavia. It is about the journal *SMIL – Statistical Methods in Linguistics*, which was published under this title from 1962 to 1976; the successor project *SMIL Quarterly: Journal of Linguistic Calculus* was then to appear until 1981, but with a clear and explicit focus on computational linguistics only. *SMIL* was founded in 1962 by the Swedish linguist Hans Karlgren (1933–1996) and published by the privately financed publishing house *Skriptor* (the full Swedish name is *Stockholm Språkförlaget Skriptor*). Karlgren himself was interested in the application of

statistical methods in linguistics, but was later to make a name for himself in computational linguistics, and is for instance regarded as the initiator of the well-known COLING conferences. Hammarström (2012: 84-87) describes Hans Karlgren in his memoirs as "[...] the most friendly, generous, intelligent and original person one could meet". In particular, he also refers to Karlgren's good organisational skills. Despite his relatively young age (he was "only" thirty years old when he founded *SMIL*) he was able to acquire papers from linguists who were quite well-known at that time. For further details about this see below.

The founding of *SMIL* coincided with the information-theoretical or so-called cybernetic "revolution" in the sciences, which also left its mark on linguistics. This information-theoretical enthusiasm also lead to a boost in the application of statistical methods in language and text analysis in general. This, in turn, led to the question of "how to name the child", and this is precisely the period when terms such as *statistical linguistics*, *mathematical linguistics* and *quantitative linguistics* were coined and then, after long-lasting discussions, were differentiated. As one reads in the preface to *SMIL* 1 (cf. Karlgren 1962a), the founding of *SMIL* was preceded by the First Scandinavian Symposium on Statistical Linguistics in 1960 at Stundyblom Castle, with over 40 speakers and 20 papers presented. At the same time, as the interest in statistics in linguistics grew, it also became apparent that there was a lack of a platform where current contributions could be published, but also where relevant bibliographical information on research literature in this field could be provided. Thematically, Karlgren (1963a: 69) described the focus of the journal in *SMIL* 2, 1963 as follows:

> Statistical linguistics calls for both advanced mathematical analyses of the models employed and for experiments hugging the linguistic ground where the methods are put to test on concrete material. *SMIL* will provide papers of both kinds, averaging, we hope, adequate proportions.

This reflects an incipient process of differentiation, where the application of statistical methods becomes the field of work of so-called statistical linguistics or later then quantitative linguistics, while so-called mathematical linguistics preferred primarily formal mathematical methods. However, *SMIL* was on its way to have two hearts beating in its chest from the beginning on. This is especially evident from the fact that from *SMIL* 3, 1964, onwards, the well-known Hungarian mathematical linguist Ferenc Kiefer (1931–2020) became the co-editor of *SMIL*. Before going into more detail about some of *SMIL*'s thematic focuses, the language policy pursued should also be mentioned. The imprint of *SMIL* explicitly states that "Contributions will be printed in English, German or French. Writers may feel free to submit manuscripts in any reasonable language." This means that a multilingual language policy was followed (and also realised in practice, at least partly). In addition – and one has to remember the political tensions in East–West relations at that time – scientific exchange with the Soviet Union was proactively promoted by translating the titles of selected interesting articles into Russian and in the other direction by referring to important publications in the field of language statistics or automatic language processing from the Soviet Union (later issues of *SMIL* would feature articles by prominent Soviet authors). All in

all, *SMIL* developed over time from an initially Scandinavian-focused journal into a truly international publication, which can also be seen in the successive expansion of the authorship and the readership.

In the following, an attempt will be made to present some main thematic focuses, with our interest directed exclusively towards contributions that correspond to the focus of today's quantitative linguistics.

It is particularly noticeable that in the initial phase, among the so-called statistical works, there was definitely a focus on phonetic-phonological issues. Sigurd (1963) should be mentioned, who dealt intensively with the modelling of the frequency of phoneme inventories. This topic was later addressed again by Altmann/Lehfeldt (1980), among others, and the statistical modelling has not found a satisfactory solution to this day. The contribution by Ladefoged (1970), which deals with the quantitative measurement of phonetic similarity, raised an important research question which would also stimulate research in quantitative linguistics. Other topics included the measurement of entropy as an information-theoretical measure based on phoneme frequencies (cf. Piotrowsky 1969). The functional load of phonemes (cf. Rischel 1962) was discussed from a quantitative point of view. Weiss (1962) reported on phoneme frequencies in Swedish, an investigation mainly motivated by applied aspects (speech therapy). Other "applied" works dealt with experimental-phonetic questions on the speed of speech in syllables and words spoken in speeches given in the Hungarian Parliament (cf. Nosz 1964), where the motivation for investigating this was stenographical[1] issues.

Beyond that phonetic-phonological focus, however, no particularly strong focus of content can actually be detected based on the statistical contributions published in *SMIL*. Among other things, "classical" questions of stylometry (cf. Anttila 1963, who refers to the different distribution of indigenous and borrowed lexemes in Early Modern English), of automatic speech recognition (with the help of multivariate procedures, see Mustonen 1965) and those of "language mixture" were presented. The latter aspect was dealt with by a well-known representative of quantitative linguistics, namely Gustav Herdan (1897–1968), who attempted to investigate (cf. Herdan 1963) the degree to which texts are influenced by other languages with the help of the frequency of initial letters of a word occurring in particular text samples. One of the few contributions to syntactic analysis with the help of statistical methods was made by Uhlířová (1969), an important representative of Czech quantitative linguistics, who continued to deal intensively with this question.

The first years of *SMIL* (1962–1965) provided good insight into the statistical and quantitative linguistics of the 1960s. Although the organisational centre of the journal was in Sweden and in the hands of Hans Karlgren, *SMIL* succeeded in providing a platform for international authors who played an important role later on in statistical linguistics. From 1964 onwards, statistical linguistic research has been

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[1] Interestingly enough, Hans Karlgren was also occupied as a stenographer in the Swedish Parliament in the beginning of his career. Maybe his interest in the statistical analysis of language was triggered there.

institutionalised in Stockholm in the form of the Research Group for Quantitative Linguistics (*KVAL – Forskningsgruppen för Kvantitativ Lingvistik*). In *SMIL* 4, 1965, the imprint refers to the fact that contacts were also established with the Mathematical Society of Japan and that Mizutani Sizuo became one of the co-editors of *SMIL*. With regard to *SMIL* and KVAL, Hammarström (2012: 84) reports that Hans Karlgren chose the respective titles or abbreviations in Swedish with care and supposedly also with some ironic purpose; while *SMIL* can be interpreted as "smile" in English, KVAL – as in the German *Qual* – is to be read as "pain". When one considers how time-consuming and financially expensive any statistical evaluation with the help of computers was at that time, then humour, irony, and perseverance were certainly good companions of statistical linguistic research. Another point worth mentioning is that *SMIL* and its editors (Ferenc Kiefer may have played a major role as co-editor in this respect) sought, as already pointed out above, close contact with Eastern European and Soviet colleagues from the very beginning. This is evident not only from the bibliographical references to works from this field, but also from the fact that, for example, several synoptic works by Soviet colleagues, especially from the field of formal mathematical linguistics (e.g. Šrejder 1971, Rozentsveig 1971), appeared in *SMIL* 7, 1971.

At this point it should be mentioned that, contrary to a prior announcement, *SMIL* did not appear from 1965 to 1969 at all. The editorial from 1969 (cf. Karlgren 1969a) notes that there were financial reasons for this, but also problems with the acquisition of explicitly "statistical" works. However, Karlgren (1969a: 2) nevertheless "decided to make another attempt to fulfil the promises to regularly bring out a publication on statistical methods in linguistics" and he also specified that "statistical methods must not be understood as opposed to mathematical methods but as a subset of these", and that generally there is no strict demarcation line between these two disciplines.

This is reflected in the works published in *SMIL* from 1970 onwards. The high number of reviews by the editors themselves (H. Karlgren and F. Kiefer) published from the 1970s onwards is striking. Furthermore, the editorial of 1972 states that "[...] some of the papers treat problems which are not conspicuously statistical in nature. We do not regret this; in fact, it is one of our major points that there is no sharp demarcation between statistical and other mathematical linguistics" (Karlgren 1972a: 3). In fact, this shows that successive statistical-quantitative works are indeed more and more in the background of *SMIL*. Nevertheless, Karlgren (1972b) presented current works that deal with Markov models in linguistics, or he refers to works that deal with the incipient automated creation of concordances (cf. Karlgren 1972c). What is noticeable when reading the papers that appeared in the 1970s in *SMIL* is an increasing perspective towards application, although the contribution by Szanser (1973), for example, provides interesting quantitative insights into the quantitative structure of paragraphs, where the problem of a theoretical frequency distribution of the length of sentences in paragraphs is addressed.

SMIL 11, 1975, contains one of the few explicitly theoretical contributions on the question of the epistemological orientation of quantitative linguistics in general. This is the contribution by Hans Karlgren entitled *Quantitative Models – of What?* (Karlgren 1975b), which deals explicitly with the question of

what status quantitative methods can have in contemporary linguistics. What is noticeable – at least one can read this between the lines – is a certain disillusionment[2] or ambivalence about the significance of quantitative methods. In general, however, the right questions are asked and the proper keywords for a certain kind of quantitative linguistics are provided. It is said that quantitative approaches promote "thinking in hypotheses" (examples are given that deal with the similarity of languages or authorship determination) and that an independent description of quantitative phenomena does indeed produce exciting results per se. As an example, the study of lexical frequencies, including the length of units, or word abbreviations in the context of language change are named, which need to be, according to the author's point of view, interpreted in terms of modern information theory. At the same time, however, the fear is expressed that an explanation of these phenomena based on communication theory falls short and that other[3] explanations should therefore also be considered. In any case, quantitative methods are seen as having great potential for achieving generalizations, but at the same time it is emphasized that quantification is a reduction of phenomena. Furthermore, it is generally stated rather pessimistically that a "shift of interests" has taken place in linguistics and that quantitative linguistics "treats problems which are no longer in vogue" (Karlgren 1975: 29). In the same issue from 1975, however, one finds two – methodologically seen – publications of quite high quality. Powers (1975) analyses active/passive constructions in English with the help of Bayesian statistics. Lee/Ross (1975) present an interesting contribution on the order of monosyllabic and polysyllabic words in texts, which they contrast with a theoretical card-shuffling model for the word length distribution.

With *SMIL* 12, 1976, it became clear that the journal was giving up its focus on statistical-quantitative linguistics (which had never actually really taken place), stating that "Our journal, once dedicated to statistical methods in linguistics, has successfully widened its scope and from next year the scope will be officially defined as computational linguistics in general" (Karlgren 1976a: 3), making statistical methods a sub-discipline and auxiliary discipline of computational linguistics. In order to meet the new requirements, *SMIL – Statistical Methods in Linguistics* was renamed *SMIL Quarterly: Journal of Linguistic Calculus* in 1976. From 1977 onwards, the journal appeared quarterly, albeit with a clear focus on computational linguistics, and in 1981 it finally ceased publication.

As an irony of history, it should be mentioned that the last "genuinely" statistical contribution in *SMIL* 12 is Muller (1976), who gives a good overview of the state of quantitative lexical studies, not only

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[2] Interestingly enough in this paper Karlgren (1962) is not mentioned, where already a „modern" outline of statistical linguistics as autonomous discipline has been proposed. There also some ideas about the relevance of (text) statistics for diachronic problems are given.

[3] The contributions of *SMIL* certainly deserve the predicate international, but there is no evidence that, for example, the text by Altmann (1972) on the status and aims of quantitative linguistics, which is important from today's point of view, would have been received at the same time. There, the advantages of measurement at different scale levels were discussed, and it was said that statistical procedures should not only be used inductively, but that deductive hypotheses are also of interest (an aspect that G. Altmann later developed more precisely). In particular in Altmann's paper the idea of uncovering latent dependencies, which was later to lead to the formulation of a synergetic view, is also given.

with regard to French, but he also refers in general to mean frequency, repetition rate, to statistical modelling of vocabulary richness etc., and thus summarises well the theoretical state of the art in quantitative lexicology of the 1970s. In addition, Muller reflects on many future tasks of statistical linguistics, which he sees primarily in depicting linguistic facts at the model level or in pointing out discrepancies between model and text.

In summary, the following can be said. The journal *SMIL* (1962–1976) brought together a rather heterogeneous linguistic spectrum in the 12 years of publication examined here. This oscillates between application, utilisation of statistical procedures, the emerging formal mathematical linguistics and also application-oriented computational linguistics. The contributions to statistical/quantitative linguistics form a relatively small part of the total number of published articles, but are nevertheless to some extent representative of the state of affairs in the 1960s and early 1970s. This period is accompanied by a permanent search for the "essence" of quantitative linguistics, which is ultimately understood by the editor Hans Karlgren in the sense of an integrative approach, i.e. in fact a reduction to the application of statistical methods as a subfield of computational linguistics. This approach has, to a certain extent, become entrenched, since statistics are nowadays used in many sub-fields of linguistics. At the same time, from a contemporary perspective, the contributions show the beginning of an independent quantitative linguistics as we know it today. In any case, *SMIL* is one of the first publication forums that actually had a designated focus on statistical/quantitative methods only. Thus, at least in terms of intention, the journal succeeded in overcoming the particularism in quantitative linguistic research of that time. Moreover, it is clear that Hans Karlgren succeeded in acting beyond the Scandinavian area and skilfully stimulated international exchange in the field of statistical and quantitative linguistics.

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