

Material for the Annual Report 2015

Christer O. Kiselman

1. Writings

1.1. Publications (registered in DiVA)

During 2015 I have published four scientific articles (15-1, 15-2, 15-a, 15-b) and six papers with obituaries, discussion, etc. (15-i, . . . , 15-vi).

- 15-1. Euclid's straight lines. *Nordisk Matematisk Tidskrift (Normat)* **60**, No. 4, 145–169. Published on 2015 April 02 (formal year of publication 2014).
- 15-2. Estimates for solutions to discrete convolution equations. *Mathematika* **61** (2015), issue 02, 295–308 (published 2015 May 07; online 2015 April 16).
- 15-a. Kombineblo de vortelementoj en esperanto – rigardoj malantaŭen kaj antaŭen. *Esperantologio / Esperanto Studies* **7** (2015 July), 73–125.
- 15-b. La lingvoj de Zamenhof (1878, 1881, 1887, 1905). *Literatura Foiro*, No. **277**, 2015 October, pp. 260–265.
- 15-i. Ekstig, Kerstin; Kaijser, Sten; Kiselman, Christer; Lindahl, Lars-Åke; Vretblad, Anders. Sonja Lyttkens. *Uppsala Nya Tidning* 2015 January 14, p. B13, and *Dagens Nyheter* 2015 February 06.
- 15-ii. Matematiska rum. [In Swedish. The title could mean 'Mathematical spaces' or 'Mathematical rooms'.] **In:** Almgren, Mats; Birgegård, Ulla; Glimelius, Kristina (Eds.). *Sundelöfs Societet*, pp. 25–42. Uppsala: Kungl. Vetenskaps-Societeten i Uppsala, 2015. ISBN 978-91-506-2449-6. (Contains the proceedings of a conference held on 2014 June 04 and dedicated to Lars-Olof Sundelöf; published on 2015 May 08.)
- 15-iii. Geraldo Mattos (1931–2014). *Esperantologio / Esperanto Studies* **7** (2015 July), 126.
- 15-iv. Lars Hörmander—some early memories. **In:** Boman, Jan; Sigurdsson, Ragnar; Lerner, Nicolas; Demailly, Jean-Pierre; Atiyah, Michael; Treves, François; Helgason, Sigurdur; Bony, Jean-Michel; Kiselman, Christer O.; Broström, Sofia, pp. 904–905. *Notices of the American Mathematical Society* **62**, No. 8, 890–907 (2015).

- 15-v. Nash i Uppsala. *Bulletinen. Svenska matematikersamfundets medlemsblad*, 2015 October 15, pp. 13–15.
- 15-vi. Hur kommer forskningen i Sverige att påverkas av utvärderingarna? [How will research in Sweden be influenced by the evaluations?]. *Bulletinen. Svenska matematikersamfundets medlemsblad*, 2015 October 15, pp. 16–24.

1.2. Articles accepted for publication

- Joint with Shiva Samieinia. Convexity of marginal functions in the discrete case (20 pages). To appear in a volume dedicated to the memory of Mikael Passare. (Accepted for publication on 2015 April 11.)
- Weak lineal convexity. (Accepted for publication on 2015 May 03; to appear in volume 107 in the series Banach Center Publications.)

1.3. Submitted manuscripts

- 2015-12-17. Akademio de Esperanto fronte al novaj taskoj. 10 pages. Manuscript based on a presentation during the Conference on Esperanto Studies in Buenos Aires on 2014 July 31, organized by Esther H. Schor and José Antonio Vergara.
- 2015-12-23. Matematiktermer för skolan [Mathematical terms for school use]. 1 page.
- 2015-12-31. Domains of holomorphy for Fourier transforms of solutions to discrete convolution equations (17 pages).

1.4. Editorial work

- Editor, *Esperantologio / Esperanto Studies*, Issue No. 7, 2015.
- Editor with José Antonio Vergara of *De esperanta korpuso ĝis islanda lingvopolitiko. Aktoj de la 36-a Esperantologia Konferenco en la 98-a Universala Kongreso de Esperanto, Rejkjaviko 2013*. Rotterdam: Universala Esperanto-Asocio, 2015.

2. Invited talks

2.1. Vivanta lingvo de vivanta kumunumo

I was invited by Kultura Centro Esperantista in La Chaux-de-Fonds (Switzerland) to give talk at a conference 2015 February 27 through March 02. The talk was given on February 28 and its title was “La lingvoj de Zamenhof 1878–2015: rapida trarigardo de rapida lingva evoluo.” (Cf. publication 15-b.)

2.2. University of Iceland

I gave a talk entitled *Discrete convolution operators, the Fourier transformation, and its tropical counterpart, the Fenchel transformation* on May 26, invited by the University of Iceland. Host: Ragnar Sigurðsson.

2.3. The World Congress of Esperanto in Lille (France)

The World Conference on Esperanto was held in Lille 2015 July 25 through August 01.

As President of the Esperanto Academy, I talked at the inauguration on July 26.

I chaired the meeting of the members of the academy on July 26.

On July 28 I gave a talk in Esperanto and French at the entrance of the house where Gaston Waringhien (1901–1991) was born, at 8 place Philippe-Lebon.

I chaired the meeting on July 28 when members of the academy met with congress participants.

2.4. Analysis Day in Memory of Mikael Passare

A one-day conference at Stockholm University 2015-09-16. Invited lecture: *One-sided regularity of lineally convex sets*.

3. PhD thesis advising

3.1. Adama Koné

Since 2011, I am the principal scientific advisor of Adama Arouna Koné, Université des Sciences, des Techniques et des Technologies de Bamako, USTTB, Bamako I (Mali). His advisors in Bamako are Ouaténi Diallo and Diby Diarra.

During 2015 Adama visited Uppsala University for the fourth time, from January 24 to June 12. At the end of the year his thesis, entitled *Géométrie digitale utilisée pour la discrétisation et le recouvrement optimal des objets euclidiens* (114 pages) was ready. He planned to present it on 2016 January 14.

4. Conference organization

4.1. The National Esperanto Congress

The National Esperanto Congress of Sweden was held in Uppsala on May 15–17. I was a member of the Organizing Committee, and the host for Mikaelo Bronštejn, Моисей Цалевич Бронштейн.

5. Committee assignments

5.1. The Reference Group of the International Science Programme

During 2015 the group has not met, but started the evaluation process of the network *East African Universities Programme, EAUMP*.

5.2. Discrete Geometry for Computer Imagery (DGCI 2015)

The next DGCI conference is planned for 2016 April 18–20 in Nantes (France). I am a member of the Program Committee, appointed in September 2015.

5.3. Evaluation of research at Linnaeus University

I was appointed to be a member of a committee with the task of evaluating research at Linnaeus University (Växjö and Kalmar, Sweden). The work was done in August and September. A meeting of the committee took place at the Campus in Växjö on September 02.

6. Participation in conferences without giving a talk

6.1. ISMM 2015

I participated in the *International Symposium on Mathematical Morphology, ISMM 2015*, May 27–29, in Reykjavik (Iceland).

6.2. Seminar on Yiddish

I participated on 2015 October 18 in a seminar on Yiddish at Lund University, organized by Jan Schwarz.

6.3. Limmud

I participated on 2015 November 14 in a conference on Jewish culture, *Limmud*, at Norra real, Stockholm. Jan Schwarz lectured twice there.

7. Visitors

7.1. Shigeaki and Junko Nagamachi in Uppsala

Shigeaki Nagamachi from Tokushima University (Japan) and his wife Junko Nagamachi visited me in Uppsala, June 19–23.

8. Visits

8.1. Visit to Pouylebon (France)

I visited Lawrence Gruman, professor at Université Paul Sabatier in Toulouse, and his wife Evelyne with grandchildren, July 20–25.

8.2. Visit to Fontainebleau (France)

A visit to Jean Serra and his family 2015 August 01–03. Discussions on mathematical morphology with one of the founders of this science. Meeting with Rahul Gaurav.

9. Eight current research projects

9.1. Complex convexity

Project abstract: A bounded open set with boundary of class C^1 which is locally weakly lineally convex is weakly lineally convex, but, as shown by Yuriï Zelinskiï, this is not true for unbounded domains. We construct explicit examples, Hartogs domains, showing this. Their boundary can have regularity $C^{1,1}$ or C^∞ .

Obstructions to constructing smoothly bounded domains with certain homogeneity properties are presented.

Period: 1967-10-01 — 2016-12-31.

Financed by: Université de Nice (1967-10-01—1968-09-30); Uppsala University (1968-10-01—2006-04-30); Kingdom of Sweden (2006-05-01 —). Amount 400,000 SEK.

There are several publications in this project. The latest manuscript was accepted on 2015 May 03.

A current activity is a study of one-sided regularity of subsets of \mathbf{R}^n or \mathbf{C}^n , presented on September 16 (see Subsection 2.4).

9.2. Language choice in theses in mathematics at Uppsala University and in a Nordic journal

A study of language choice in doctoral thesis, showing the changes from Latin over Swedish to French, German and English.

Period: 1998–2016.

9.3. Convexity of marginal functions in the discrete case

We define, using difference operators, classes of functions defined on the set of points with integer coordinates which are preserved under the formation of marginal functions. The duality between classes of functions with certain convexity properties and families of second-order difference operators plays an important role and is explained using notions from mathematical morphology.

Period: 2010-01-11 — 2016-12-31.

Partner: Shiva Samieinia, formerly at the Royal Institute of Technology (KTH); now at Stockholm University.

Financed by: The Royal Institute of Technology, Stockholm University; Kingdom of Sweden. Amount 110,000 SEK.

A manuscript, joint with Shiva, was accepted on 2015 April 11. Several generalizations are now being studied.

9.4. Digital hyperplanes

Project manager: Christer Kiselman.

Project abstract: Digital planes in all dimensions are studied.

Period: 2010-01-11 — 2016-12-12.

Partner: Adama Koné, Université des Sciences, des Techniques et des Technologies de Bamako, USTTB, Bamako I (Mali).

Financed by: International Science Programme (ISP); Kingdom of Sweden. Amount 240,000 SEK.

The general goal is to generalize to any dimension the results of Kiselman's 2011 paper in *Mathematika*.

An important part of the study was finished with Adama's thesis, presented on 2016 January 16. There are, however, several possible generalizations to be investigated.

9.5. Combination of word elements in Esperanto

Project manager: Christer Kiselman.

Project abstract: This is a rather theoretical study of word formation in Esperanto, with an historical survey and questions for the future.

Period: 2011-01-11 — 2016-12-31.

Financed by: Kingdom of Sweden. Amount 46,000 SEK.

An important part of the project was finished with the article 15-a (see Subsection 1.1).

9.6. Discrete convolution equations

Project manager: Christer Kiselman.

Project abstract: We study solvability of convolution equations for functions with discrete support in \mathbf{R}^n , a special case being functions with support in the integer points. The more general case is of interest for several grids in Euclidean space, like the body-centred and face-centered tessellations of three-space, as well as for the non-periodic grids that appear in the study of quasicrystals. The theorem of existence of fundamental solutions by de Boor, Höllig & Riemenschneider is generalized to general discrete supports, using only elementary methods. We also study the asymptotic growth of sequences and arrays using the Fenchel transformation. Estimates using the Fourier transformation are studied. Now duality of convolution will be investigated.

Period: 2012-01-11 — 2016-12-12.

Financed by: Kingdom of Sweden. Amount: 150,000 SEK.

A paper was published on 2015 May 07 in *Mathematika*. A second paper was submitted on 2015 December 31.

9.7. Werner Fenchel, a pioneer in convexity theory and a migrant scientist

Werner Fenchel (1905–1988) was a pioneer in convexity theory and in particular the use of duality there. When asked about his views on the many terms used to express this duality he described in a private letter (1977) the whole development from Legendre and onwards, as well as his preferences concerning the choice of terms. The background for his leaving Germany and moving to Denmark and later to Sweden is sketched.

Period: 2013–2016.

9.8. Zamenhof's Yiddish grammar

Zamenhof wrote a Yiddish grammar (in Russian) around 1880. It was published in full only in 1982. A study of this grammar is now being undertaken. In particular, a comparison with his language project *Lingvo universala* from about the same time is of interest.

Period: 2015-08-01 — 2016-12-31.

Financed by: Kingdom of Sweden. Amount: 100,000 SEK.

A presentation in Nitra (Slovakia) is planned for July 2016.

10. Two finished research projects

10.1. Euclid's straight lines

This project was both linguistic and mathematical.

Period: 2007-01-22 — 2015-03-15.

Financed by: Kingdom of Sweden. Amount 100,000 SEK.

Finished with the publication 15-1.

10.2. Mathematical spaces / Mathematical rooms

Project title: *Matematiska rum*, which could mean 'Mathematical spaces' or 'Mathematical rooms'.

Project manager: Christer Kiselman

Project abstract: A survey of mathematical spaces, mathematical terminology, Euclidean and digital geometry, discretization of space and time, tropical mathematics, mathematical morphology, research policy, evaluation of research.

Period: 2013-10-22 — 2015-03-15.

Partner: Dr. Hania Uscka-Wehlou, Flintstensvägen 10, 752 67 Uppsala.

Financed by: Kingdom of Sweden. Amount 45,000 SEK.

Finished with the publication 15-ii.

11. Referee reports (not reported to Squirrel)

11.1. 2015:1, 2. ISMM 2015, Rejkjavik

Referee reports on two manuscripts submitted to *International Symposium on Mathematical Morphology, ISMM 2015*, were sent on 2015 February 20.

11.2. 2015:3, 4. Comptes Rendus

Three reports on a manuscript submitted to *Comptes Rendus de l'Académie des Sciences de Paris* were sent on 2015 May 11, 2015 June 15, and 2015 June 26, respectively.

A report on a manuscript submitted to *Comptes Rendus de l'Académie des Sciences de Paris* was sent on 2015 August 15.

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