

# Frans M.J. Willems



November 5, 2021 TUE, Eindhoven

# CONTENT



from MASTER



PhD



to PROFESSOR

1978: Frans wanted to do a master thesis in „the Brain and Information theory,” but

instead, Frans did something else....(it was too early)

*J.P.M. Schalkwijk*

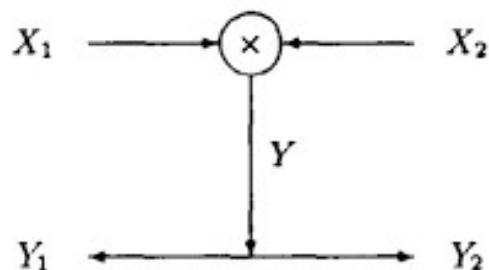


Fig. 6. Binary multiplying channel.

	0	1
0	0	0
1	0	1

HET CAPACITEITSGEBIED VAN  
EEN TWO-WAY CHANNEL.

F.M.J. Willems.

Verslag van het afstudeerwerk  
verricht in de groep  
Informatie- en Communicatietheorie.  
Mei 1979,  
Technische Hogeschool Eindhoven.  
Coach :  
Prof.Dr.Ir.J.P.M. Schalkwijk.



worden. In dit verslag wordt aangetoond dat voor een bepaalde klasse van TWC's, namelijk die TWC's met slechts één output, het capaciteitsgebied gelijk is aan het inner bound gebied. Uitgaande hiervan wordt er een nieuwe upper bound

A lot of discussion  
at ISIT in Grignano  
July, 1979



Frans went for a PhD to KU Leuven (1979 – 1983)

- where he worked on the **Multiple (2) Access Channel**

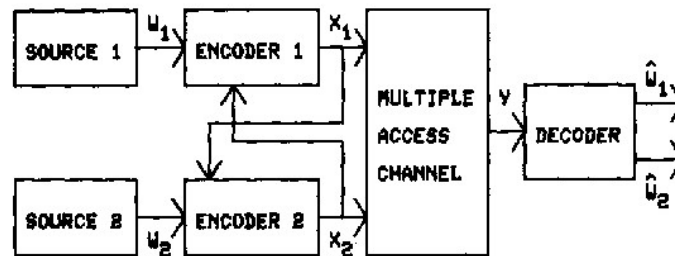
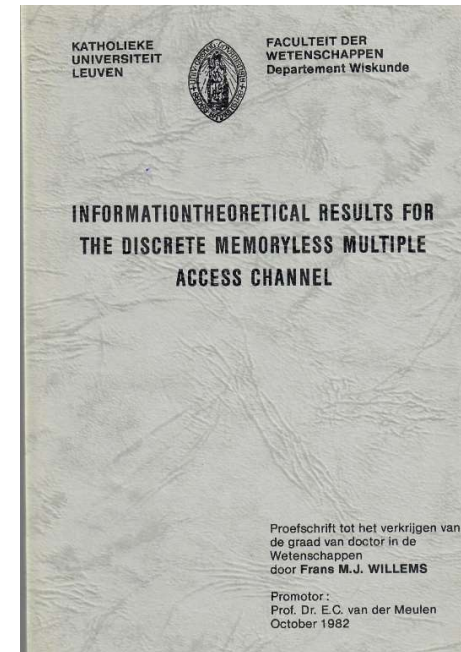


Fig. 4. Both encoders crib.

- and got his PhD from the „Katholieke Universiteit Leuven“, Belgium, 1982.
  - Supervisor: Edward van der Meulen





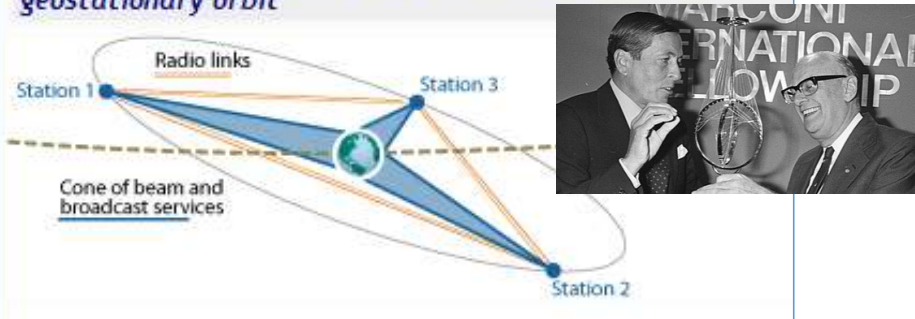
Followed by a great reward for his PhD work!

- in the Ridderzaal, the Hague



The Marconi award was for Arthur Clarke

*Figure 1 – In his paper of 1945, Clarke illustrated how the entire globe could be covered by three satellites in geostationary orbit*



## Marconi Young Scientist Award '82 voor Willems



Vrijdag 11 juni jl. heeft ir. Frans Willems in de Haagse Ridderzaal de Marconi Young Scientist Award 1982 uit handen van mevrouw Gioia Marconi Braga in ontvangst genomen. Ter herdenking van de 100ste geboortedag van de grote Italiaanse uitvinder Marconi werd in 1974 door zijn dochter Gioia Marconi Braga de Marconi International Fellowship ingesteld. Die prijs werd uitgereikt aan Arthur C. Clarke, terwijl de onderscheiding voor Jonge Onderzoekers dus gewonnen werd door THE-ingenieur Willems (zie ook TH-Berichten nr. 36). Sinds de instelling van de Marconi Prijs is de Fellowship Award jaarlijks toegekend en de Young Scientist Award is pas aan drie Jonge Onderzoekers uitgereikt. Frans Willems, die per 1 juli a.s. in dienst treedt van de THE, noemde in zijn dankwoord deze onderscheiding een stimulans om op de ingeslagen weg door te gaan.

After that, he worked at **TU/e** from 1983 – 2020 on several topics

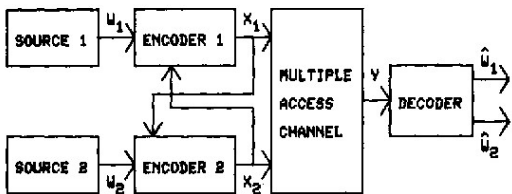


Fig. 4. Both encoders crib.

*J.P.M. Schalkwijk*

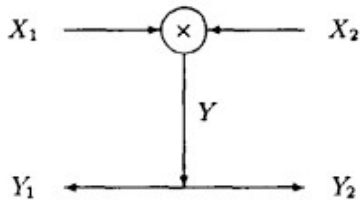
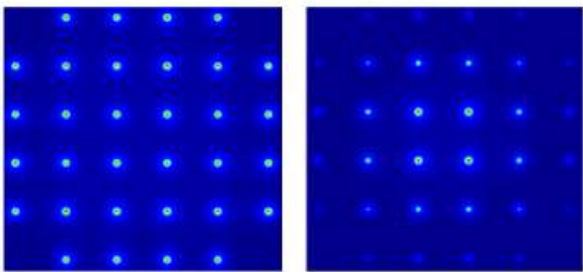
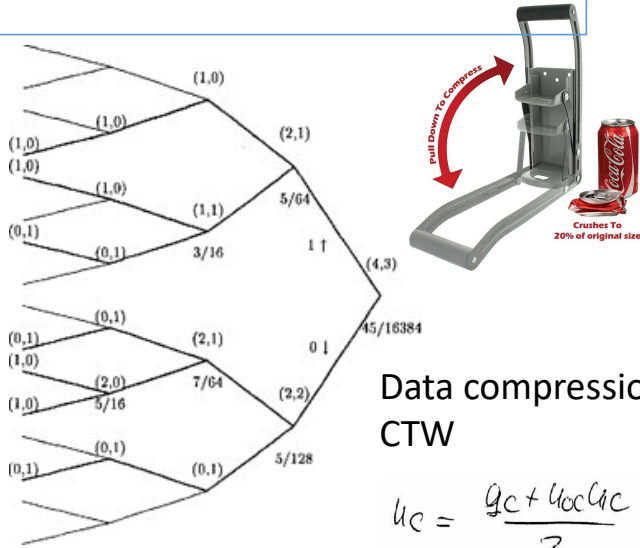


Fig. 6. Binary multiplying channel.

Two way and Two-access



shaping



Biometrics, PUF



1999- 2017  
 Advisor Royal Philips



# He started in the Schalkwijk (EI) group



Han Vinck presentation for Frans Willems - Nov 2021

1983 IEEE ISIT, St. Jovith,  
To New York via Niagara



1981 Norwich (Nato)  
Good speakers, long boat trip



1985 ISIT in Brighton, where  
Shannon was a participant



For his work he received two best paper awards

- IEEE IT society Best paper award (1996)
  - with Yuri Shtarkov and Tjalling Tjalkens

The Context Tree Weighting Method : Basic Properties

Frans M.J. Willems, Yuri M. Shtarkov\*and Tjalling J. Tjalkens

- IEEE Signal processing society Best paper award (2009)
  - with Tanja Ignatenko

" [Biometric Systems: Privacy and Secrecy Aspects](#) ," published in the *IEEE Transactions on Information Forensics and Security*, Volume 4, Number 4, December 2009.

The Information Theory Society Paper Award, received by him encourage contributions to the discipline.



Frans Willems



Yuri Shtarkov



Tjalling Tjalkens

**Reflections on the Prize Paper:**  
**"The Context-Tree Weighting Method: Basic Properties"**

Frans Willems<sup>1</sup>, Yuri Shtarkov<sup>2</sup>, Tjalling Tjalkens<sup>3</sup>





More:  
Invited plenary speaker at ISIT Istanbul 2013



Frans M.J. Willems: Lossless Source Coding Algorithms

Speaker at the Shannon 100yr celebration 2016, in Paderborn



4 IEEE IT presidents from "Germany"



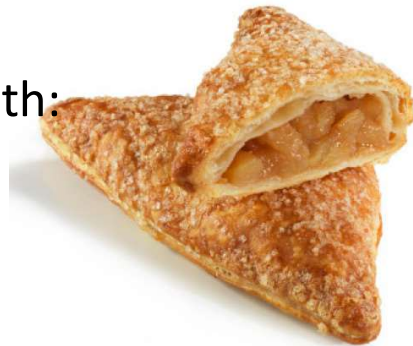
Han Vinck presentation for Frans Willems - Nov 2021

Publication pressure? => our private joke!

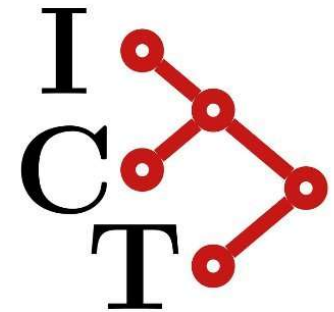
Every IEEE paper was  
another mark on ...



And was celebrated with:



# Frans found a new inspiring environment!



A new basis in the  
Signal Processing Group  
(head: Jan Bergmans)



## international research recognition: IEEE Fellow 2006



For contributions to multi-user information theory  
and activities for the scientific community



- **0,1 % of the IEEE community/year**
  - ( $\approx 3/\text{yr}$  for Information Theory)



### Some of the activities:

- Associate Editor for Shannon Theory for the IEEE Tr. on Information Theory from 1988 to 1990
- Associate Editor for Information Th. for the European Tr. on Telecomms. from 2002 to 2006.
- Board of Governors of the IEEE Information Theory Society, 1998 to 2000
- Counselor of the IEEE Student Branch Eindhoven, 2007-2014 (IEEE outstanding Branch Counselor award!)
- Chairman of the IEEE Benelux Chapter on Information Theory from 2007 to 2017.

Frans organized scientific meetings at TUE for the IEEE chapter on IT and the WIC



Not only scientific, but also jury for the IEEE Women baking contest, 2013



Han Vinck presentation for Frans Willems - Nov 2021

# We changed a bit, or may be more?

- Niagara **1983**, after St. Jovith, Cnd.



- **2018**, TU München (at Gerhard Kramer's group)

<https://www.ei.tum.de/events-2018> ▼ [Vertaal deze pagina](#)

**2018 Munich Doctoral Seminar on Communications (MSC)**

Han Vinck (Univ. Duisburg-Essen) Prof. **Frans M.J. Willems** (TU Eindhoven). TUM





## Frans: “Information is driving our society”

- I want to understand how information should be
  - gathered,
  - protected,
  - communicated,
  - stored,
  - processed,
  - and used in the best possible way.



Prost Frans ! THANKS

- for **contributions** to Information Theory
- for being a fine colleague
- for your **friendship**
- for a great **carreer!**



and for the future?



Many happy years with Monique!



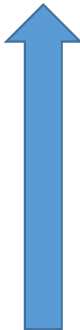
Han Vinck presentation for Frans Willems - Nov 2021



Slides skipped because of time limits ( 10 min.)




PROFESSOR





PhD

MASTER



**Professor**  
Technische Universiteit Eindhoven  
1982 - Present · 38 years  
1982 - 1991 assistant professor, 1991 - 2016 associate professor. **2016 – 2020 Full professor**

**Advisor**  
Royal Philips  
1999 - 2017 · 18 years  
Area Information Theory. From 1999 - 2016 Philips Research. Since 2016 Philips Lighting.

**Ph.D. student**  
Katholieke Universiteit Leuven  
Jul 1979 - Jun 1982 · 3 years  
Ph.D. student at the Department of Mathematics. Supervisor: Prof. Edward C. van der Meulen.  
Research Area: Multi-User Information Theory.

Education

**Eindhoven University of Technology**  
Ingenieur · Electrical Engineering  
1972 - 1979  
Master-thesis supervisor was Prof.dr.ir. J. Pieter M. Schalkwijk, subject: Information Theory.



# Some colleagues in 1978



Frans



Jack Aarts



Stan Baggen



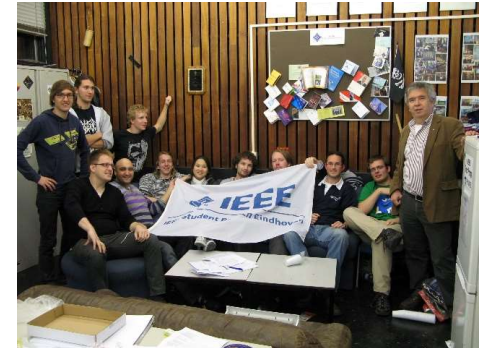
Loe Feijs



Jean Kleijnen



## Frans active with the students in Eindhoven



Han Vinck presentation for Frans Willems - Nov 2021

## Best chapter of the year award (Barcelona, 2016)



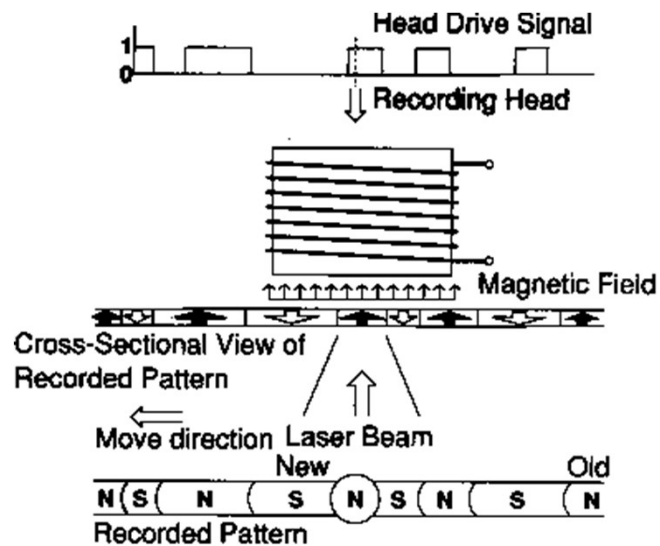
Han Vinck presentation for Frans Willems - Nov 2021



Jasper Goseling  
Frans Willems ( Counselor)  
Jos Weber

## Joint work

- Write Unidirectional Memory
  - ( the Walhalla - Baggen code)

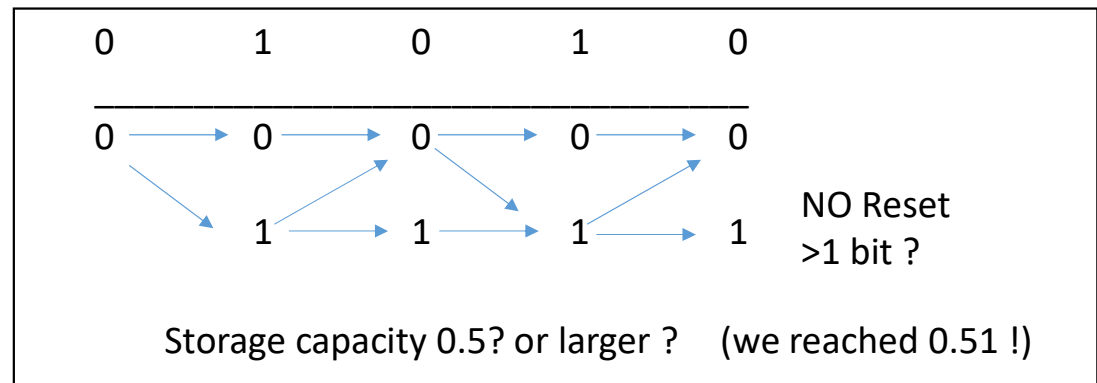
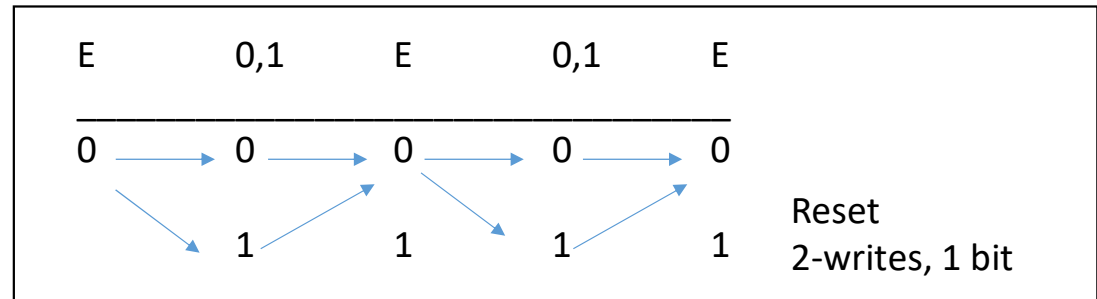


Sony minidisk



## References

- [1] S. Baggen (Philips Research Laboratories, Eindhoven, The Netherlands), private communication (December 1985).
- [2] F.M.J. Willems & A.J. Vinck, "Repeated recording for an optical disc," *Proc. 7th Symp. on Information Theory in the Benelux*, Noordwijkerhout, The Netherlands, May 22-23, 1986. Ed. by D.E. Boeke, Delft University Press, 1986, p. 49-53.





# Where is Frans? (7 – 9)





Frans his first important international conference: ISIT 1979, Grignano (Italy) - meeting Günther Dück – Rudi Ahlswede

- G. Dueck, The capacity region of the two-way channel can exceed the inner bound, Inform. and Control **40** (1979), no. 3, 258--266; MR 81i:94009



It “was” a difficult problem!

But, Frans found a way out: from two-way to multiple access in Leuven

## Work at TUE from 1983 - 2021: Vakgroep EI (Piet Schalkwijk)

- 1981 Norwich (Nato)
  - Good speakers, long boat trip
- 1983 IEEE ISIT in St. Jovith
  - New York, Niagara
  - Trip from St. Jovith to NY
- 1985 ISIT in Brighton
  - Shannon was a participant



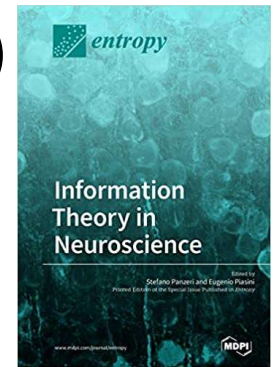
1978: Frans wanted to do a master thesis in „the Brain and Information theory,“ but....(it was too early)

- 2020 Neuroscience is a hot topic (with a lot of financial support)

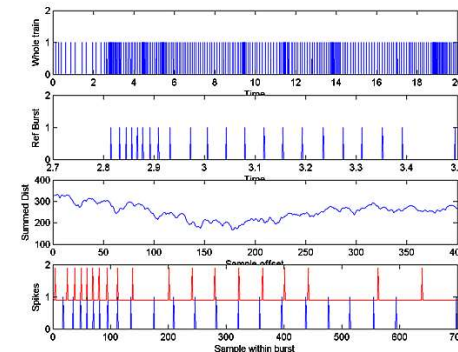
## A Tutorial for Information Theory in Neuroscience

Nicholas M. Timme and Christopher Lapish

eNeuro 29 June 2018, 5 (3) ENEURO.0052-18.2018; DOI: <https://doi.org/10.1523/ENEURO.0052-18.2018>



- Example: Estimating entropy from empirical samples of finite size is of central importance for information theory as well complex statistical systems.



# 2021 van der Meulen Seminar in Honor of Prof. Frans Willems

Save the date for the 2021 van der Meulen Seminar in honor of Prof. Frans Willems, Friday, November 5, 2021 at Eindhoven University of Technology.

Save the date for the 2021 van der Meulen Seminar in honor of Prof. Frans Willems.

Title: "Van der Meulen Seminar in honor of Frans Willems".

Venue: Corona Hall, TU/e, Eindhoven.

Date: Friday, November 5, 2021.

The preliminary program includes the following speakers:

- Dr. Pim Tuyls, CEO Intrinsic ID
- Prof. Gerhard Kramer, Technical University of Munich
- Prof. Jean-Paul Linnartz, Signify (Philips Lighting)
- Prof. Liesbet Van der Perre, KU Leuven
- Prof. Ioannis Kontoyiannis, University of Cambridge
- Prof. Frans Willems, Eindhoven University of Technology

## More Information

Event Date

 Nov 5, 2021

[Add to Calendar](#)

Event Location

 Eindhoven University of Technology

Contact Name

 Alex Alvarado

Event URL