



ICTMT 15 – third announcement

Making and strengthening “Connections and Connectivity” (C & C) for teaching mathematics with technology

ICTMT 15 - at a glance

Website	conferences.au.dk/ictmt15
Dates	13 to 16 September 2021
Place	Danish School of Education (DPU), Aarhus University (campus Emdrup)
Address	Tuborgvej 164, 2400 Copenhagen, Denmark
Plenary lecturers by	Chronis Kynigos Anna Baccaglioni-Frank Shai Olsher Dan Meyer



Photos: Jørgen Weber, Søren Kjeldgaard / AU-foto, Poul Ib Henriksen

Contents

Contents.....	2
Presentation.....	3
Themes	4
Plenary lectures.....	5
Scientific activities.....	6
Social activities	7
Schedule: summary	8
Day 1: Monday 13 September.....	9
Day 2: Tuesday 14 September	11
Day 3: Wednesday 15 September	14
Day 4: Thursday 16 September	16
Practical information.....	18

Presentation



Photo: Søren Kjeldgaard / AU-foto

The 15th International Conference on Technology in Mathematics Teaching (ICTMT 15) takes place in **Copenhagen** in **September 2021**. The conference is organised by the Danish School of Education (DPU), Aarhus University, and its venue is on campus Emdrup, located in **Tuborgvej 164, 2400 Copenhagen, Denmark**.

ICTMT series

The ICTMT conference series is unique in bringing together **lecturers, teachers, educators, curriculum designers, mathematics education researchers, learning technologists, and educational software designers** who share an interest in improving the quality of teaching and learning. Through its character, the conference provides a forum for researchers and practitioners in this field to discuss and share best practices, research approaches and results, theoretical know-how, innovation and perspectives on educational technologies and their impact on the teaching and learning of mathematics.

This biennial conference began in Birmingham, UK, in 1993, under the influential enterprise of Bert Waits from Ohio State University. The [previous instance](#) was held in Essen, Germany, in 2019.

Conference programme

The ICTMT 15 programme starts on **Monday 13th September 2021** at noon and ends on **Thursday 16 September 2021**.

The programme includes scientific activities (plenary lectures, paper presentations, poster sessions and workshops) and social arrangements (excursions and conference dinner).

Format

All activities are planned to take place in person. Participants can find all relevant information and guidelines regarding travelling to Denmark on [covidtravelrules.dk](https://www.covidtravelrules.dk).

Themes

The ICTMT 15 overarching theme is making and strengthening
“Connections and Connectivity” (C & C)

for teaching mathematics with technology. This general frame is split into four main themes:

Designing technology

for mathematical learning and its assessment – a focus on theoretical or actual ‘designs’ with contributions from researchers, industry and teachers.

Making sense of “classroom” practice

with and through technology – a focus on the work of teachers and lecturers, where the classroom might be geographically located or mobile. Again, contributions could be both theoretical and practical.

Fostering mathematical collaborations

with and through technology – a focus on the communications’ aspect of technology, including assessment strategies.

Innovating with technologies

for mathematical learning – a focus on highly innovative approaches in the early stages of development for constructive critique by the community.



Photo: Jesper Rais/AU Kommunikation

Plenary lectures



Theme 1: Designing technology

Embedding mathematics in Socio-scientific games: The case of the mathematical in grappling with Wicked Problems

Chronis Kynigos

National and Kapodistrian University of Athens, Greece
Linnaeus University, Sweden



Theme 2: Making sense of “classroom” practice

Shifts from teaching mathematics with technology to teaching mathematics through technology: a focus on mathematical discussion

Anna Baccaglioni-Frank

University of Pisa, Italy



Theme 3: Fostering mathematical collaborations

Te(a)ching to collaborate: Automatic assessment based grouping recommendations and implications for teaching

Shai Olsher

University of Haifa, Israel



Theme 4: Innovating with technologies

Pixels are Pedagogy

Dan Meyer

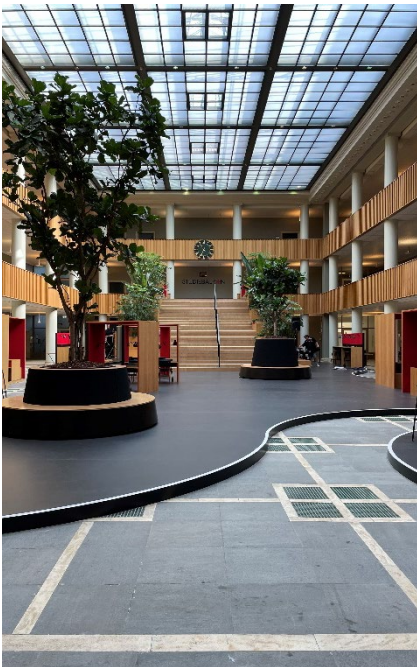
Desmos, Oakland, CA, USA

Abstracts

All abstracts for plenary lectures are available on the conference [website](#).

Scientific activities

Aside from plenary lectures, the scientific programme includes paper presentations, a poster session and workshops. Full papers, and posters and workshop proposals are available in the [Book of Accepted Contributions](#) on the conference website.



Aulaen - Photo: Cecilie Carlsen Bach

Paper sessions

Authors have the chance to present and discuss their submitted papers with participants. On each 90-minute session, there will be three paper presentations led by one **chair**, who will make sure to introduce the authors and the papers and guide the discussion. Authors should aim for a **15 to 20-minute presentation** followed by a 10 to 15-minute discussion.

Poster session

The poster session will take place on **Monday 13 September, 17:00-18:30**. Authors are welcome to set up their posters (recommended size: **A0**) in the Festsalen (A220) upon arrival. Posters can stay throughout the rest of the conference. The poster session will be coupled with a **wine reception** sponsored by [Maplesoft](#). Therefore, participants will have the chance to socialise their research in a friendly setting.

Workshops

There will be two workshop sessions: **Tuesday 14 September at 14:30-16:00** and **Wednesday 15 September at 13:30-15:00**. They aim to engage participants in research-based hands-on activities. Participants can sign up for workshops during the poster session on Monday 13 September. Authors will receive the list of participants at the end of that day.

Social activities

Walk and talk

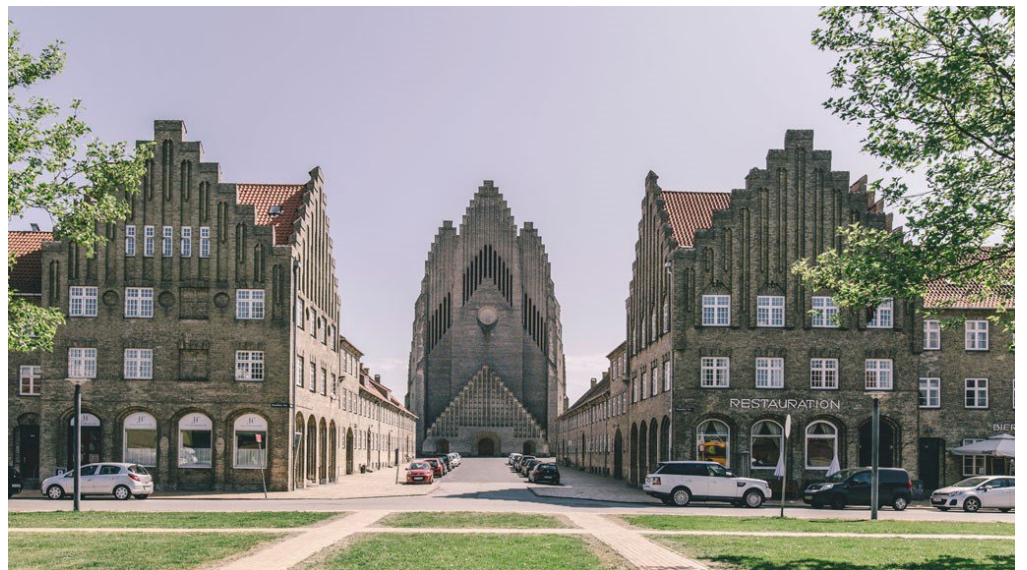
After lunch, on **Tuesday 14 September**, participants will split into groups and go for a walk-and-talk near campus. The suggested route is Bispebjerg Parkallé, leading to a visit to **Grundtvig's Church**. The groups and conversation themes will be announced in Festsalen (A220), from where we will depart.

Excursion

The conference excursion will be a ferry tour throughout the canals in Copenhagen on **Wednesday 15 September**. A bus will depart from campus Emdrup at 15:00 and take the participants to the starting point. The last stop of the trip will be **Christianshavn**, within walking distance of the conference dinner venue.

Conference dinner

The conference dinner will take place on the evening of **Wednesday 15 September** starting at **18:45**. The venue is the restaurant **Spiseloppen**, located in the free town **Christiania**. The street address is Bådmandsstræde 43, 1407 Copenhagen.



Grundtvig's Church - Photo: Martin Heiberg / © Wonderful Copenhagen

Schedule: summary

	Monday 13 September	Tuesday 14 September	Wednesday 15 September	Thursday 16 September
9:00 - 9:30		Plenary: Anna Baccaglini-Frank <i>(9:00 - 10:00)</i>	Plenary: Shai Olsher <i>(9:00 - 10:00)</i>	Paper session 5 <i>(9:00 - 10:30)</i>
9:30 - 10:00		Coffee break	Coffee break	
10:00 - 10:30				Coffee break
10:30 - 11:00		Paper session 2 <i>(10:30 - 12:00)</i>	Paper session 4 <i>(10:30 - 12:00)</i>	Paper session 6 <i>(11:00 - 12:30)</i>
11:00 - 11:30				
11:30 - 12:00				
12:00 - 12:30	Registration and lunch <i>(12:00 - 13:30)</i>	Lunch <i>(12:00 - 13:00)</i>	Lunch <i>(12:00 - 13:30)</i>	Lunch <i>(12:30 - 13:30)</i>
12:30 - 13:00				
13:00 - 13:30	Opening ceremony	Walk and talk <i>(13:00 - 14:30)</i>	Workshops 2 <i>(13:30 - 15:00)</i>	Plenary: Chronis Kynigos <i>(13:30 - 14:30)</i>
13:30 - 14:00				
14:15 - 14:30	Paper session 1 <i>(14:15 - 15:45)</i>	Workshops 1 <i>(14:30 - 16:00)</i>	Excursion: Canal trip <i>(15:00 - 18:00)</i>	
14:30 - 15:00	Coffee break			
15:00 - 15:45	Plenary: Dan Meyer <i>(16:00 - 17:00)</i>	Coffee break		
15:45 - 16:00				
16:00 - 16:30	Poster session and wine reception <i>(17:00 - 18:00)</i>	Paper session 3 <i>(16:30 - 18:00)</i>		
16:30 - 17:00				
17:00 - 17:30				
17:30 - 18:00				
18:00 - 18:30				
18:30 - 19:00			Conference dinner <i>(Starting 18:45)</i>	
19:00 - later				

Day 1: Monday 13 September

12:00-13:30 – Registration and lunch

Aulaen (A141)

Time for checking in; receive credentials and materials, and having lunch

13:30-14:00 – Opening ceremony

Festsalen (A220)

Uffe Thomas Jankvist, IPC chair – Danish School of Education, Aarhus University, Denmark

14:15-15:45 – Paper session 1

Festsalen (A220)

- Rogier Bos and Winand Renkema: *Metaphor-based algebra animation*
- Philipp Larmann, Simon Barlovits and Matthias Ludwig: *MCM@home: Analysing a learning platform for synchronous distance education*
- Lena Frenken and Gilbert Greefrath: *Successful modelling processes in a computer-based learning environment*

Chair: Morten Blomhøj

Auditorium (D174)

- Francesca Ferrara, Giulia Ferrari and Ketty Savioli: *Children in movement towards STEAM: Coding and shapes at kindergarten*
- Melanie Platz: *“... Then it looks beautiful” - Preformal proving in primary school*
- Susanne Podworny and Yannik Fleischer: *An approach to teaching data science in middle school*

Chair: Julie Vangsøe Færch

15:45-16:00 – Coffee break

Aulaen (A141)

16:00-17:00 – Plenary lecture

Festsalen (A220)

Dan Meyer – Desmos, Oakland, CA, USA

Theme 4: Innovating with technologies

Pixels are pedagogy

Chair: Alison Clark-Wilson

17:00-18:30 – Poster session and wine reception

Festsalen (A220)

- Domenico Brunetto: *StreetMath: Supporting young migrants empowerment*
- Ben Davies, Eirini Geraniou, Cosette Crisan and Manolis Mavrikis: *Undergraduates' experiences with automated assessment in STACK* (cancelled)
- Morten Elkjær: *Equation Lab: Teaching equation solving in Virtual Reality using a modified dynamic balance model* (cancelled)
- Francesca Ferrara, Giulia Ferrari, Elvira Fernández-Ahumada and Natividad Adamuz-Povedano: *Gamifying CLIL within the mathematical context of fraction learning*
- Julie Vangsøe Færch: *Development and evaluation of primary school students' mathematical competencies via dynamic online learning environments*
- Inge Olav Hauge and Johan Lie: *Contributions of computational thinking and computer programming for development of critical democratic competence: Empowerment and agency*
- Ayse Kilic, Zeger-Jan Kock and Birgit Pepin: *Connectivity related issues in a modularised course involving mathematics*
- Evelyn Schirmer, Alexander K. Schüler-Meyer and Birgit E.U. Pepin: *Challenges of procedure-oriented cognitive conflict strategies for undergraduate students*
- Kinga Szücs: *Finding theorems and their proofs by using a calculator with CAS in university-level mathematics*
- Laura Wirth and Gilbert Greefrath: *Examining heuristic worked example videos in a collaborative setting: The conception of the project MoVie*
- Filip Moons, Ellen Vandervieren and Jozef Copaert: *Atomic, reusable feedback: A technology-mediated solution for assessing handwritten math tasks?*

Day 2: Tuesday 14 September

09:00-10:00 – Plenary lecture

Festsalen (A220)

Anna Baccaglioni-Frank – University of Pisa, Italy

Theme 2: Making sense of ‘classroom’ practice

Shifts from teaching mathematics with technology to teaching mathematics through technology: A focus on mathematical discussion

Chair: Hans-Georg Weigand

10:00-10:30 – Coffee break

Aulaen (A141)

10:30-12:00 – Paper session 2

Room A401

- Rikke Maagaard Gregersen: *How about that algebra view in GeoGebra? A review on how task design may support algebraic reasoning in lower secondary school*
- Cecilie Carlsen Bach and Angelika Bikner-Ahsbahs: *When a digital tool guides mathematical communication*
- Annalisa Cusi, Agnese Ilaria Telloni and Katia Visconti: *Design of digital resources to scaffold metacognitive activities: Focus on students’ reflections* (cancelled)

Chair: Anna Baccaglioni-Frank

Room A405

- Katrin Klingbeil, Fabian Rösken, Daniel Thurm, Bärbel Barzel, Florian Schacht, Ulrich Kortenkamp, Kaye Stacey and Vicki Steinle: *SMART_A – Online diagnostic to reveal students algebraic thinking and enhance teachers diagnostic competencies*
- Reinhard Oldenburg: *Relational thinking supported by an algebraic modeling tool on the web*
- Simeon Schwob and Paul Gudladt: *Successful communication as a part of teaching and learning mathematics in remote settings* (cancelled)

Chair: Stine Gerster Johansen

12:00-13:00 – Lunch

Aulaen (A141)

13:00-14:30 – Walk and talk

Festsalen (A220)

Walk tour in groups with a visit to Grundtvig's Church.

14:30-16:00 – Workshop session 1

Room A100a

- Chaim Ballin, Anatoli Kouropatov and Ofir Shafirovitz: *Workshop: Interactive digital environment for teaching and learning deductive geometry (FullProof): Design principles, functionality, pedagogy and results of implementation (Part I)*

Room A104

- Theo van den Bogaart and Rogier Bos: *Heuristic trees hackathon: Designing and implementing support for mathematical problem solving (Part I)*

Room A201

- Kendal Bahadirgil and Knud Nissen: *Maple Mathematics Suite - essential tools for STEM education*

Room A203

- Lena Frenken: *Discovering the Possibilities of a Computer-Based Learning Environment on Mathematical Modelling*

Room A408

- Mats Brunström, Maria Fahlgren, Mirela Vinerean and Yosief Wondmagegne: *Workshop on the design of tasks and feedback utilizing a combination of a dynamic mathematics software and a computer-aided assessment system*

Room A412

- Yannik Fleischer and Susanne Podworny: *Teaching machine learning with decision trees in middle school using CODAP*

Room A416

- Allan Tarp: *Develop children's innate mastery of many by bridging outside existence to inside essence in full sentences*

16:00-16:30 – Coffee break

Aulaen (A141)

16:30-18:00 – Paper session 3

Auditorium (D174)

- Raimundo Elicer and Andreas Lindenskov Tamborg: *Nature of the relations between programming and computational thinking and mathematics in Danish teaching resources*
- Liv Nøhr, Morten Misfeldt and Andreas Lindenskov Tamborg: *Teacher development in computational thinking and student performance in mathematics: A proxy-based TIMSS study*
- Eleonora Faggiano and Federica Mennuni: *Grasping sense and building meanings in mathematical distance contexts: The role of the teacher*

Chair: Mathilde Kjær Pedersen

Room D170 (cancelled)

- Scott Courtney: *Exploring teachers' attempts to differentiate instruction in remote learning environments: The case of Claudia* (cancelled)
- Eirini Geraniou and Cosette Crisan: *Adapting classroom based practices to online teaching: A mathematics teacher's reflections* (cancelled)
- Melih Turgut, Iveta Kohanová, Jørn Ove Asklund, Øistein Gjøvik, Marit Buset Langfeldt and Hermund André Torkildsen: *Fourth graders explore a computational thinking task using Robot Emil: A multimodal analysis of pupils' thinking* (cancelled)

Day 3: Wednesday 15 September

09:00-10:00 – Plenary lecture

Festsalen (A220)

Shai Olsher – University of Haifa, Israel

Theme 3: Fostering mathematical collaborations

Te(a)ching to collaborate: Automatic assessment based grouping recommendations and implications for teaching

Chair: Alison Clark-Wilson

10:00-10:30 – Coffee break

Aulaen (A141)

10:30-12:00 – Paper session 4

Festsalen (A220)

- Frederik Dilling and Julian Sommer: *Virtual Reality in Mathematics Education – Design of an Application for Multiview Projections*
- Alice Barana: *Understanding linear functions in an interactive digital learning environment*
- Cintia Scafa Urbaez Vilchez and Alice Lemmo: *A videogame as a tool to orchestrate productive mathematical discussions*

Chair: Eleonora Faggiano

Auditorium (D174)

- Manuela Subtil, António Domingos and Maria Alessandra Mariotti: *Graphing calculator in the connection between geometry and functions with the contribution of semiotic mediation*
- David Reid, Angelika Bikner-Ahsbabs, Thomas Janßen and Estela Vallejo-Vargas: *Forms of epistemic feedback*
- Zelha Tuñç-Pekkan, Eylem Sayar and Isil Ozturk: *Affordances of university based online laboratory school: Types of feedback*

Chair: Marianne Thomsen

12:00-13:30 – Lunch

Aulaen (A141)

13:30-15:00 – Workshop session 2

Room A100a

- Chaim Ballin, Anatoli Kouropatov and Ofir Shafirovitz: *Workshop: Interactive digital environment for teaching and learning deductive geometry (FullProof): Design principles, functionality, pedagogy and results of implementation (Part II)*

Room A104

- Theo van den Bogaart and Rogier Bos: *Heuristic trees hackathon: Designing and implementing support for mathematical problem solving (Part II)*

Room A203

- Filip Moons and Ellen Vandervieren: *Workshop - Writing atomic, reusable feedback to semi-automatedly assess handwritten math tasks*

Room A405

- Philipp Larmann, Simon Barlovits and Matthias Ludwig: *MCM@home: An approach for synchronous distance learning with mobile devices*

Room A414

- Frederik Dilling and Julian Sommer: *Mixed reality in mathematics education*

Room A416

- Francesca Ferrara, Giulia Ferrari and Keyy Savioli: *Spatial and computational thinking at kindergarten through the aid of an educational robot*

Room D166

- Douglas Butler: *Comparing the user interfaces of dynamic software*

(cancelled)

15:00-18:00 – Excursion

Parking lot between buildings A and C

Ferry tour to the Copenhagen canals.

A bus will be expecting us on the campus parking lot.

The last stop of the tour will be **Christianshavn**, at a walking distance to the conference dinner.

18:45 – Conference dinner

Restaurant *Spiseloppen*

Address: Bådmandsstræde 43, 1407 Copenhagen (Christiania)

Day 4: Thursday 16 September

09:00-10:30 – Paper session 5

Festsalen (A220)

- Dimitris Diamantidis and Chronis Kynigos: *Digital media as tools fostering teacher creativity on designing tasks around an area of mathematical concepts*
- Bjarnheiður Kristinsdóttir, Freyja Hreinsdóttir and Zsolt Lavicza: *Developing silent video tasks' instructional sequence in collaboration with teachers*
- Tim Lutz: *Machine learning model for automated text classification of mathematical tasks*

Chair: Rikke Maagaard Gregersen

Room A203

- Marianne Thomsen and Uffe Thomas Jankvist: *Mathematical thinking in the interplay between historical original sources and GeoGebra*
- Maria Fahlgren, Mats Brunström, Mirela Vinerean and Yosief Wondmagegne: *Designing tasks and feedback utilizing a combination of a dynamic mathematics software and a computer-aided assessment system*
- Mathilde Kjær Pedersen: *The use of digital technologies for mathematical thinking competency*

Chair: Andreas Lindenskov Tamborg

10:30-11:00 – Coffee break

Aulaen (A141)

11:00-12:30 – Paper session 6

Festsalen (A220)

- Zelha Tunç-Pekkan, Rukiye Didem Taylan, Bengi Birgilil and İbrahim Burak Olmez: *An examination of pre-service mathematics teachers' experiences at an online school*
- Andreas Lindenskov Tamborg, Uffe Thomas Jankvist and Morten Misfeldt: *Comparing programming and computational thinking with mathematical digital competencies from an implementation perspective*
- Simone Jablonski, Eugenia Taranto, Matthias Ludwig and Maria Flavia Mammana: *Go online to go outdoors – a MOOC on MathCityMap*

Chair: Cecilie Carlsen Bach

Room A203

- Maxim Brnic and Gilbert Greefrath: *Does the gender matter? The use of a digital textbook compared to printed materials*
- Alexander Schüler-Meyer: *The purpose of handwriting with tablet-computers and smartpens in mathematical group work over distance*
- Stine Gerster Johansen: *A Review on Allgemeinbildung and Digital Technologies in Mathematics Education*

Chair: Raimundo Elicer

12:30-13:30 – Lunch

Aulaen (A141)

13:30-14:30 – Plenary lecture

Festsalen (A220)

Chronis Kynigos – National and Kapodistrian University of Athens, Greece;
and Linnaeus University, Sweden

Theme 1: Designing technology

Embedding mathematics in socio-scientific games: The case of the mathematical in grappling with Wicked Problems

Chair: Hans-Georg Weigand

14:30-15:00 – Closing ceremony

Festsalen (A220)

Uffe Thomas Jankvist, IPC chair – Danish School of Education, Aarhus University, Denmark

Practical information

Directions to the conference venue

Campus Emdrup is located by **Emdrup Station** of the S-train circuit in Copenhagen. A complete map of the S-train circuit can be found [here](#). Alternatively, bus lines 18 and 21 also stop by the venue. You can plan your trip from the airport or otherwise visiting [rejseplanen.dk](#).

Denmark has an integrated public transportation system, with trains, metro, S-train and buses. Find ticket options on the public transportation [website](#). For total flexibility, we recommend buying a City Pass upon arrival.

Campus map

Conference activities will take place in buildings A and D.





ICTMT 15 – organization

International Programme Committee (IPC)

Uffe Thomas Jankvist	Denmark	IPC chair
Alison Clark-Wilson	UK	IPC co-chair
Hans-Georg Weigand	Germany	IPC co-chair
Gilles Aldon	France	
Ivan Kalas	Slovakia	
Eleonora Faggiano	Italy	
Susana Carreira	Portugal	
Florian Schacht	Germany	
Ingi Heinesen Højsted	Faroe Islands	
Sonia Palha	The Netherlands	

Local Organising Committee (LOC)

Uffe Thomas Jankvist	LOC chair
Marianne Thomsen	LOC co-chair
Raimundo José Elicer Coopman	LOC co-chair

Morten Blomhøj, Tina Hudlebusch, Ditte Wolff-Jacobsen, Rikke Maagaard Gregersen, Cecilie Carlsen Bach, Mathilde Kjær Pedersen, Stine Gerster Johansen, Morten Elkjær, Julie Vangsøe Færch, Lisser Rye Ejersbo

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