SRTL-12: FINAL ANNOUNCEMENT (Updated)

Online: 21-26 January 2022

5 December 2021 (revised 11 January 2022)

Dear SRTL-12 friends,

It is with great pleasure that we welcome you as a participant in the Twelfth International Research Forum on Statistical Reasoning, Thinking and Literacy (SRTL-12) to be held online 21-26 January 2022. We are disappointed that we could not meet together but are optimistic that we can join together again somewhere in the world for SRTL-13 in 2023. We would like to express our deepest gratitude to Arthur, Lonneke and Marianne for the tireless commitment they put into preparing for our meeting in the Netherlands. We are utterly grateful to them.

Researchers in Statistics Education have been invited from around the world to share their work, discuss important issues, and initiate collaborations. The emphasis of this Forum, with the theme *Re-thinking learners' reasoning with non-traditional data*, builds on our work on informal statistical modelling and informal statistical inference yet reflects an increasing global turn towards using non-traditional data. We look forward to a stimulating week of discussions and presentations from a broad array of approaches related to the theme.

In keeping with tradition, the structure of the scientific program will be a mixture of small and whole group discussions around presentation themes, with input from wise discussants and an optional session to share projects, research tools or initiatives. Due to the online context and our wildly different time zones, the Forum will run 3 hours per day with a pause on Sunday 23 January (no meeting). Presentations will be significantly shorter, there is no keynote, and social program has been curtailed. Although the format has altered, we are maintaining the small size of the group to ensure discussions can continue from the last meeting and that new invited participants are gently enculturated into SRTL traditions. Over time we have learned how important this is to maintain our rich conversations and close sense of community.

Although there is no registration fee this year. In this unusual context, we realise that some participants may not be able to attend the entire Forum so have relaxed this requirement. However, we do ask that you attend as much as you are able to maximise focused attention on progressing the theme. Paper presenters are to submit their front-end paper by **15 December 2021**. In preparation for SRTL-12, it is very important that all participants *read the entire set of front-end papers* before arriving to allow the focus during presentations to be on discussing data, analysis and implications. These front-end papers will be made available by the end of December.

We look forward to welcoming you to a simulating week!

Warm regards,

Katie Makar & Dani-Ben-Zvi, SRTL co-chairs

IMPORTANT DATES

Wednesday 15 December 2021	Front-end papers are due (see details below)
End of December 2021	Front-end papers available
Friday 21 January 2022	SRTL-12 begins
Sunday 23 January 2022	Pause day (no meeting)
Wednesday 26 January 2022	SRTL-12 concludes

SRTL-12 SCIENTIFIC PROGRAM COMMITTEE

By reviewing the proposals, the members of the Scientific Program Committee have helped to shape the scientific program of SRTL-12.

- Andee Rubin – TERC, USA
- Arthur Bakker – Utrecht University, The Netherlands
- Dani Ben-Zvi – University of Haifa, Israel
- Janet Ainley – University of Leicester, UK
- Jennifer Noll – TERC, USA
- Katie Makar – The University of Queensland, Australia
- Maxine Pfannkuch – The University of Auckland, New Zealand
- Rob Gould – University of California – Los Angeles, USA
- Sibel Kazak – Pamukkale University, Turkey

INVITED PARTICIPANTS (Updated)

	Name	Country	Role
1	Andee Rubin	USA	Presenter
2	Andrew Zieffler	USA	Co-presenter
3	Anna Fergusson	New Zealand	Presenter
4	Arthur Bakker	The Netherlands	Co-organiser, co-presenter
5	Chelsey Legacy	USA	Presenter
6	Dani Ben-Zvi	Israel	Co-chair, co-presenter
7	Daniel Frischemeier	Germany	Co-presenter
8	Jan Mokros	USA	Co-presenter
9	Jennifer Noll	USA	Presenter
10	Jill Fielding	Australia	Presenter
11	Katie Makar	Australia	Co-chair, presenter
12	Kym Fry	Australia	Co-presenter
13	Lonneke Boels	The Netherlands	Co-organiser, presenter
14	Lucia Zapata-Cardona	Colombia	Presenter
15	Marianne van Dijke	The Netherlands	Co-organiser, special presenter
16	Michal Dvir	Israel	Presenter
17	Michelle Wilkerson	USA	Presenter
18	Nick Horton	USA	Presenter
19	Rob Gould	USA	Discussant
20	Robert delMas	USA	Co-presenter
21	Rolf Biehler	Germany	Discussant, Co-presenter
22	Ronit Gafny	Israel	Presenter
23	Sibel Kazak	Turkey	Presenter
24	Susanne Schnell	Germany	Presenter
25	Tim Erickson	USA	Discussant
26	Traci Higgins	USA	Co-presenter
27	Yannik Fleischer	Germany	Presenter

THE SCIENTIFIC PROGRAMME

All participants will be able to access and download the front-end papers by the end of December 2021 from the shared Google Drive so that they can be read before attending the Forum.

Google Drive Folder for the January 2022 Forum: https://bit.ly/3EsffKc

We strongly encourage participants to review the material and discussions from our meeting in July 2021: https://bit.ly/3DpCsLJ

The structure of the scientific program is thematic, with presentations clustered into themes where possible. Each day will consist of 4-5 presentations (up to 90 mins total), a randomised small group discussion (30 min) and a whole group reflective discussion (30 min on following day). This structure allows each presenter to interactively share the insights from their research with the group, and then allows substantive discussion and processing time around the daily theme.

During the Forum, we shall use Google Drive to share materials (presentations, video, transcripts, meeting artefacts, photos, etc.). The scientific activities include:

- Daily overall (Mods) and small group (SMods) moderators
- Research presentations to the entire group. There will be long (30 min) and short (10 min) presentations, including brief questions and short video clip, if desired.
- Small group discussion around each cluster's thematic topic (30 min)
- Social time to share (20 min)
- Opening session each day for reflection on the presentations and discussions of the previous day (30 min)
- Optional interactive session in small groups devoted to additional projects, video, tools (30 min)
- Panel by discussants, with discussion on final day (60 min)
- Looking backward, looking forward session on final day (30 min)

PRESENTATIONS (Updated)

Long Presentations

1. Nick: *How learners produce data from text in classifying clickbait*
2. Chelsea, Andy & Bob: *Data to graphs and back: Secondary teachers' reasoning about the aesthetic mappings that link data and visualizations*
3. Yannik & Rolf: *Teaching and learning to understand and use machine learning methods in the context of predictive modelling with non-traditional data*
4. Lonneke: *Learning from gaze data in statistics education research: the case of drawing inferences from graphs*
5. Katie & Kym: *Using a data science perspective with primary children to address complex problems by creating digitised systems for non-standard data*
6. Sibel: *Engaging in statistical thinking with image-based data*
7. Andee, Jan & Traci: *Injuries on and off the field: How do middle-school youth investigate relationships among complex categorical variables?*
8. Michal & Dani: *Repurposing Data Sets for Authenticity*

Short Presentations

A. <u>Susanne & Daniel</u>: *Selecting and preparing data from social media - an exploratory study with prospective teachers*
B. <u>Ronit & Dani</u>: *Students' articulations of uncertainty about non-traditional big data in IMA learning environment*
C. <u>Anna</u>: *Exploring measures of central tendency using grayscale photos: Human vs computers!*
D. <u>Jen</u>: *DataFest!*
E. <u>Lucia</u>: *Students' reasoning with non-conventional data*
F. <u>Jill</u>: *Outcomes of young students' statistical inquiries using non-traditional photographic data*
G. <u>Michelle</u>: *How connections to personal/ social aspects of data may inspire students to adopt different "lenses" (per Konold)*

SCHEDULE (Updated)

Time Zones for 21-26 January 2022

CET	Israel & Turkey	Australia (Qld & NSW)	New Zealand	US West Coast (PST)	US Central (CST)	US East Coast EST & Colombia
7-10 pm	8-11pm 9pm-12am	4-7am & 5-8am (next day)	7-10am (next day)	10am-1pm	12-3 pm	1-4 pm

Day 1: Friday, 21 January - Theme 1: What adults do with non-traditional data

Mod of the day: Sibel

Time (duration)	Activity	Format
From 30 min before start	Arrive and say hello!	Whole group
0:00 (30 min)	Welcome and introduction	Whole group
0:30 (60 min)	Long presentations 1 Nick; 2 Chelsea	Whole group
1:30 (10 min)	Break	
1:40 (20 min)	Short presentations: A Susanne; B Ronit	Whole group
2:00 (30 min)	Discussion	Small groups
2:30 (30 min)	Social & Close	Whole group
3:00	End – room to remain open	

Day 2: Saturday 22 January – Theme 2: Machine-learning & computational methods

Mod of the day: Jill

Time and duration	Activity	Format
From 30 min before start	Arrive and say hello!	Whole group
0:00 (30 min)	Reflection	Whole group
0:30 (60 min)	Long presentations: 3 Yannik; 4 Lonneke	Whole group
1:30 (10 min)	Break	
1:40 (30 min)	Short presentations: C Anna; D Jen	Whole group
2:10 (30 min)	Discussion	Small groups
2:40 (20 min)	Social & Close	Whole group
3:00	End – room to remain open	

Day 3: PAUSE – no meeting on Sunday 23 January

Day 4: Monday 24 January – Theme 3: Is it bias?

Mod of the day: Andee

Time and duration	Activity	Format
From 30 min before start	Arrive and say hello!	Whole group
0:00 (30 min)	Reflection	Whole group
0:30 (60 min)	Long presentations: 6 Katie; 7 Sibel	Whole group
1:30 (10 min)	Break	
1:40 (30 min)	Short presentations: D Lucia; E Jill; F Michelle	Whole group
2:10 (30 min)	Discussion	Small groups
2:40 (20 min)	Quick Mid-week reflection; Close	Whole group
3:00	End – room to remain open	

Day 5: Tuesday 25 January – Theme 4: Authentic problems

Mod of the day: Lucia

Time and duration	Activity	Format
From 30 min before start	Arrive and say hello!	Whole group
0:00 (30 min)	Reflection	Whole group
0:30 (60 min)	Long presentations: 8 Andee; 9 Michal	Whole group
1:30 (10 min)	Break	
1:40 (30 min)	Discussion	Small groups
2:10 (30 min)	Optional presentations/discussions	Small groups
2:40 (20 min)	Social & Close	Whole group
3:00	End – room to remain open	

Day 6: Wednesday 26 January – Wrap up day

Mod of the day: Andy

Time and duration	Activity	Format
From 30 min before start	Arrive and say hello!	Whole group
0:00 (30 min)	Reflection	Whole group
0:30 (60 min)	Discussant panel: Rob, Rolf, Tim	Whole group
1:30 (10 min)	Break	
1:40 (30 min)	Looking ahead	Small groups
2:10 (30 min)	Looking ahead together	Whole group
2:40 (20 min)	Farewell	Whole group
3:00	End – room to remain open	

INSTRUCTIONS FOR PARTICIPANTS

Please upload the following to Google Drive by the deadline listed:

- Front-end papers: Presenters must upload their Front-end papers to the Google Drive by **15 December. Name the file by the first author's last name (.pdf or .docx)**. Guidelines for preparing papers are given below.
- Presentation: Presenters will need to insert their presentation into the Google slide deck folder in Google Drive at least 24 hours ahead. See below how to convert a PowerPoint to Google Slides.
- Discussants: Discussants will actively participate in all sessions; they will share their reflections in a panel on the final day that provoke ideas as we transition into the final *Looking Forward* session. They have a designated Folder in the Google Drive.

Presentations

Because all participants will have read the front-end of your paper, do not repeat this material in your presentation beyond one reference slide.

The working language of the Forum is English. Keep in mind that for many participants, English is not their first language. Please speak slowly and clearly, and plan your presentation for this audience.

Long presentations will be **30 minutes long, including at least 10 minutes of interactive discussion**. Presenters of long presentations are encouraged to present a short excerpt of video. Upload (to the Presenters' materials folder) ahead of time a transcript handout for participants; video is best uploaded as a link into your presentation.

Short presentations will be **10 minutes long, including 2-3 minutes of interactive discussion**. Given the short time, it is advisable to focus on one example with a key point that will best contribute to the ongoing Forum discussions. There is unlikely time for a video.

How to convert a PowerPoint to Google Slides
1. Open Google Drive… .
2. Select "New" in the upper left-hand corner of the screen.
3. Select "Upload File… ".
4. Select the desired PowerPoint presentation.
5. After uploading, right click and select "Open with," then select "Google Slides… ".
6. Select "File".
7. Select "Save as Google Slides."

Instructions for submitting front-end paper

As with previous SRTLs, all presenting authors will submit a front-end paper that includes the front-end of a normal paper (see below). To facilitate discussion in the Forum, please ensure that you clearly address in the front-end paper the link between your perspective of non-traditional data and the study you are presenting, as well as an explicit discussion of how your study contributes to the field's understanding about non-traditional data and the SRTL-12 theme.

The front-end paper will both inform the group of the necessary details that led up to the data analysis (to avoid repeating this in the presentation) and allow for more rigorous discussion at the Forum. Instructions are given below for the format of the front-end paper.

Please follow the common guidelines for formatting papers including:

- Title and author details (names, institute, emails)
- Abstract (200 words) and 4-5 Keywords

- Introduction addressing the theme, problem, relevance and aim of the research
- Brief review of related literature and theoretical framework leading to specific research questions. Make sure to including your perspective on non-traditional data and the aspect you are addressing.
- Method, depending on the author's theoretical approach, this may include an overview of the context/setting, participants, details and justification of any tasks, data collection and analysis
- Very brief overview of what you plan to present, annotated list of video (if relevant, or this may be handed out with transcripts at the Forum)
- Potential implications for research and practice
- References
- Appendices (e.g., tasks, stimulus material)

We assume this format will fit most papers. Be reminded that the focus of your paper should be a *particular aspect* of the Forum theme: *Re-thinking learners' reasoning with non-traditional data.* Please ensure that you limit the focus to this topic so we can have a productive discussion. When writing the paper, please give special consideration to the following points, based on lessons learned from past SRTL Forums:

- **Format Guidelines** Papers are typically about **8 pages in length** single spaced with APA7 formatting, A4 size paper, margins (1" or 2.54 cm), font (Times New Roman, size 12). Keep table and figures inside the text as a service to the reader.
- The opening sections (Introduction, Review of literature/theoretical framework) should focus on issues and literature specifically relevant to the SRTL-12 theme. Make sure your text is explicit about the purposes/goals of the study, as well as about the motivation or justification for raising your specific research questions, e.g., why is it useful to study this particular aspect? How would answering these questions contribute to existing knowledge on re-thinking learners' reasoning with non-traditional data? Consider adding an image or concept map to visualise your understanding of the web of relations between relevant concepts.
- Ensure that your research questions are clarified and that when citing previous research, you describe what was found and how that feeds into or is the basis for raising the question(s) you pose. Avoid stating research questions that are vague or too broad. Clearly show how the questions are grounded in and emerge from gaps in the literature.
- The Method section needs to be structured. Try to organize it according to standard subtopics, for example: a) Participants, b) Instruments and/or Tasks, c) Procedure, d) Data collection and e) Data analysis. That said, in certain qualitative or complex studies, you might need to elaborate further on the Approach, Context and/or Setting (to describe considerations that led to a specific task or study design, the design of the learning environment within which the study takes place, etc.).
- The overview of results section should include a *brief* description of the data you intend to present at SRTL-12.
- Potential/intended implications regarding: *research* (e.g., needed changes to models, theories, research methodologies, or future studies, etc.), *and practice* (teaching methods, technologies and materials, teacher professional development, task and learning trajectory design, etc.).

BACKGROUND

SRTL

The International Collaboration for Research on Statistical Reasoning, Thinking, and Literacy (SRTL) was established in 1998 to cultivate a community of researchers and statistics educators who share the passion of studying the nature and development of students' statistical literacy, reasoning and thinking, and exploring the challenges posed to educators and researchers at all levels in supporting learners to achieve these goals. Today, SRTL offers scientific gatherings for statistics education researchers every two years.

The SRTL research forums have unique features, such as a small size (around 25 participants), that allow time for in-depth presentation and discussion of research. There is extensive use of videos to present how learners solve problems and reason about statistical information in classrooms or during interviews. Forums include a statistician-in-residence in addition to the educational researchers in order to provide the perspective of the discipline and to give feedback on the research presented. Participants present, discuss and argue about research related to these topics in a format that facilitates becoming acquainted with key researchers and viewing their work in progress in a stimulating, positive and enriching environment. The SRTL research forums have led to many frontier publications that present new research, synthesise and build on previous research, and form connections among related work in other disciplines (Garfield & Ben-Zvi, 2015; Ben-Zvi, Makar, & Garfield, 2018).

Non-traditional forms of data

Data come in many forms, although traditional statistics education has focused on data from random samples. Where statistics education has capitalised on knowledge about a sample to understand an unknown population, many ubiquitous forms of data do not clearly fit the sample-population assumptions that underpin statistical reasoning. For example, data collected in real time (GPS, live traffic, tweets), image-based (photographs, drawings, facial recognition), semi-structured (scraped from social media posts), repurposed (school testing data to estimate housing prices) and big data (open access internet data, civic databases) are all examples of non-traditional data.

While non-traditional forms of data have been with us for some time (Donoho, 2017; Frick, 1998), the digital age has led to a pervasive culture of data in all aspects of life, including those of our students. Widespread availability and access to myriad non-conventional, repurposed, massive or messy data sets necessitate broadening educational knowledge to better understand how learners make sense of, model, analyse and make predictions from these data.

New research directions have emerged, focusing on methods for making predictions from open, semi-related and ubiquitous data, often relying heavily on computational methods and predictive modelling. Concerns have been expressed about the relative lack of attention to how and why data were collected, whether inferences being made are trustworthy and how statistics education might respond (e.g., Wild, Utts, & Horton, 2018). We are united in our goal to develop learners' deep understanding and reasoning with data and models. Therefore, awareness of implications of non-traditional data - including complexities resulting from the contexts in which data are generated - have resulted in multiple discussions about how the field of statistics education may proceed (e.g., Biehler et al., 2018; Finzer, 2013; Gould, 2011; 2017; Hicks & Irizarry, 2018), but many questions remain open.

SRTL-12

The Twelfth International Forum for Research on Statistical Reasoning, Thinking and Literacy (SRTL-12) will build on work in previous Forums (particularly around statistical modelling and informal statistical inference) to re-think and discuss how statistics education research can assist learners to make sense of and reason with data in its many forms and contexts.

Maintaining SRTL's focus on video-rich qualitative research that aims to understand learners' reasoning and thinking with data, we will consider questions such as:

Theory

- What does it mean to reason statistically if data do not fit a conventional sample-population relationship?
- What new uncertainties arise in handling non-traditional forms of data?
- What possibilities, constraints or uncertainties emerge in broadening how statistical or data literacy is approached/nurtured in the school, university or community?

Students' reasoning

- How do learners' reason with non-conventional, repurposed, massive or messy data?
- How do coding, algorithmic or computational methods support or detract from learners' reasoning with data at different levels of schooling?
- What do learners attend to when collecting or using secondary data in messy contexts? How do they decide which data are relevant, trustworthy, or clean enough to make sense of them?
- What ideas and *data moves* (Erickson, Wilkerson, Finzer, & Reichsman, 2019) can students build on or adapt from their current statistical reasoning, thinking and tools as they learn to make sense of non-traditional data?

Pedagogy, design, tools

- How can we support students to flexibly record/store, represent or model non-conventional, repurposed, massive or messy data?
- What new "worry questions" are useful for learners to adopt when approaching non-traditional data or engaging in predictive modeling based on computational methods?
- What are new considerations for designing learning environments that support students' reasoning of non-traditional data?
- How can simulations or other statistical technological tools assist learners to make sense of chance and variability when using non-traditional data?
- What and how do we assess students' reasoning with non-traditional data?

References

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