

# UEFDSA newspaper



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UEFDSA is the University of Eastern Finland Doctoral Student Association



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May 1, 2022

Cover photo: paper air spinner, taken by Juha-Matti Huusko

## Contents of the General Series

<i>Juha-Matti Huusko – Greetings from editor-in-chief</i>	3
<i>Ari J. Tervashonka – Publication of dissertation</i>	8
<i>Ari J. Tervashonka – How many supervisors are enough for the dissertation?</i>	10
<i>Ari J. Tervashonka – Character building</i>	11
<i>Juha-Matti Huusko – Hide and show details – a Javascript solution</i>	13
<i>Szabolcs Felszeghy – The bridges of Sighs</i>	14
<i>UEFDSA newspaper</i>	15
<i>UEFDSA 2021</i>	16

## Contents of the Science Series

<i>I. Scientific essays: Ari J. Tervashonka – Creation of theory – Series part II Theory making strategies</i>	17
<i>III. Summaries of research: Mikko Malinen – Means Of Several Random Variables</i>	21
<i>IV. Abstract papers: Tanja Tarvainen – Evolution, Reproduction &amp; Sexual selection Group – Towards a more detailed understanding of molecular-level mechanisms of post-copulatory sexual selection and its role in human infertility</i>	24

## *Greetings from editor-in-chief*

*Juha-Matti Huusko*

*May 1, 2022*

Vappu, as the Finns call the First of May, is one more step towards summer. In Joensuu market square, the temperature at noon is a modest +8°. However, many people are celebrating.

On April 29<sup>th</sup>, some students have *baptised* their overalls in the cold water, and finally, the overalls can be officially worn.

On April 30<sup>th</sup>, the Vappu eve, students in different cities have parades and put a white hat to their favorite statue in the city. The students with technology background get a five-month permission to wear their white hat and to swing its tassel in the summer.

On May 1<sup>st</sup> it is Vappu and people celebrate on different ways. Finnish flags are on poles. International labour movement have their parade with their flags. People get out and enjoy. It is OK to look for a nice Vappu brunch – the most eager ones purchase 50 food items for 43 .

On Vappu, many students also publish their newspaper. Inspired by this, the first issue of UEFDSA newspaper was published on May 1<sup>st</sup> 2019.

I thank all the writers and photographers. In the current issue, we have also a couple of advertisements, which is also a happy thing.

UEFDSA newspaper has a couple of websites in beta phase.

- Titles of all texts will appear at <https://www.integraali.com/dsa/otsikot/titles2.php>.
- Issues can be read as images in a mobile friendly (?) site <https://www.integraali.com/dsa/read/read.php?issue=2021-2/page=1>.

The sites have still some mistakes. But I am happy to share them and that I have learned enough PHP, Javascript etc. to create the sites.

Juha-Matti Huusko

UEFDSA newspaper editor in chief

(ex treasurer of UEFDSA 2018-2020)

# Call For Papers

We call for all the scientific essays, unpublished abstract papers, philosophical writings, and summaries or research with the authors' name on it. If you are a member of DSA, staff member of the UEF or otherwise interested in themes of science and philosophy you can submit your paper in all these categories. We will start our science paper in the following UEFDSA Newspaper issues. Do you want to publish more general material? Do you wish to fatten your writer portfolios? Now there is a great chance to do that and also let other people actually know about your research.

One reason for this call of papers is to promote doctoral students and researchers alike for the wider audience and also promote the constant effort that we do during the doctoral studies. We also want to open this forum for methodological development and general scientific reference frame development that requires more philosophical reach than many of the peer-review papers would allow. This includes also themes that are still within the realm of speculation and try-out phases. Send papers to [aritervashonka@hotmail.com](mailto:aritervashonka@hotmail.com) for the edit.

Science categories will be

- I. Scientific essays
- II. Philosophical writings
- III. Summaries of research
- IV. Abstract papers
- V. Methodological essays
- VI. Book reviews
- VII. Research reports

Freedom for the scientific essays!

Ari J. Tervashonka – Science series editor in chief

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# Call for Papers

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The Journal of Methodology, *Metodologia*, is a peer-reviewed journal published by the Finnish Methodological Society, which seeks to further methodology and scientific philosophy in all fields of science. It aims to foster the spread of methodological articles that have been published nationally, to develop the methodological know-how in Finland, and to provide a platform for writers to advance themselves as producers of scientific works.

*Metodologia* publishes scientific contributions related to methodology, philosophy of science, and interdisciplinary methodological subjects. The range of publication formats comprises peer-reviewed articles (theoretical and empirical), essays (peer-reviewed or non-peer-reviewed), book reviews, scientific statements on science and policy, discussions, and doctoral thesis lectures. Essays differ from theory articles since they are primarily meant for speculative theorizing on methodological problems while theory articles address methodological theory or practical methodology. The publications are both in Finnish and English.

Our journal adheres to the principles of open science. Through our extensive peer-review process, we publish high-quality articles and essays. To find out more, please visit our homepage: [Peer Review Process](#)

In the spirit of open and free science, our journal does not adhere to strict themes or too limiting thematic constraints for publications. Proposal for publications can therefore be submitted electronically at any time. They can either take the form of a concise abstract of approximately 600 words or a transcript in its early or final stage. We do not set time limits for our writers for the initial transcript, as thorough and high-quality transcripts require time.

Proposals can be sent to [journalofmethodology@gmail.com](mailto:journalofmethodology@gmail.com)

Additional information on our journal, submission and writing guidelines, or peer review process is available on our homepage <https://www.journalofmethodology.com> or by contacting [journalofmethodology@gmail.com](mailto:journalofmethodology@gmail.com).

We are looking forward to receiving your publication proposal!

The publishers of *Metodologia*

## *Fonetiikan päivät*

25.–26.8.2022, Joensuu campus, UEF. Fonetiikan päivät (literally ‘Days of Phonetics’) is a conference for the study of spoken language, articulation, acoustics, speech—language pathology and speech technology – and phonetics, of course. The conference welcomes researchers and experts globally. This is the 35th conference.

This year program includes presentations, posters and a technical workshop. The languages used are Finland and English.

Abstract submission: 1.5–31.5.2022.

For more information, see <https://sites.uef.fi/fonetiikanpaivat2022/>

## Advertisement prices

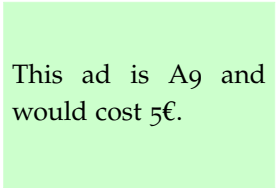
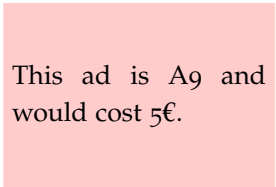
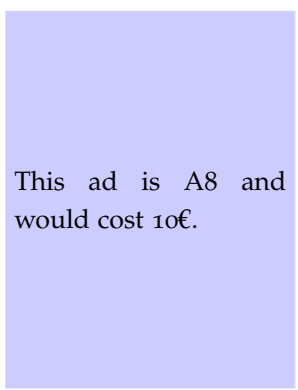
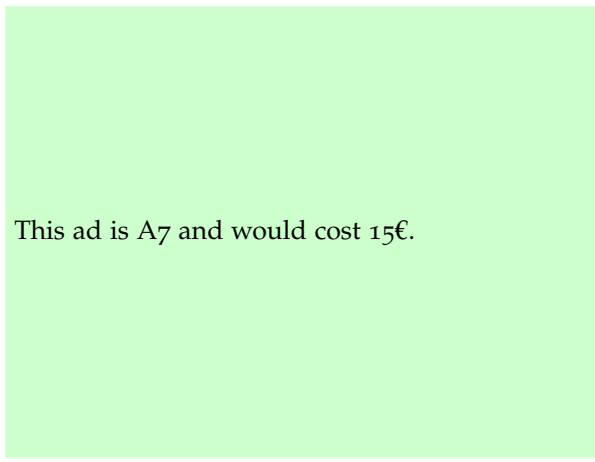
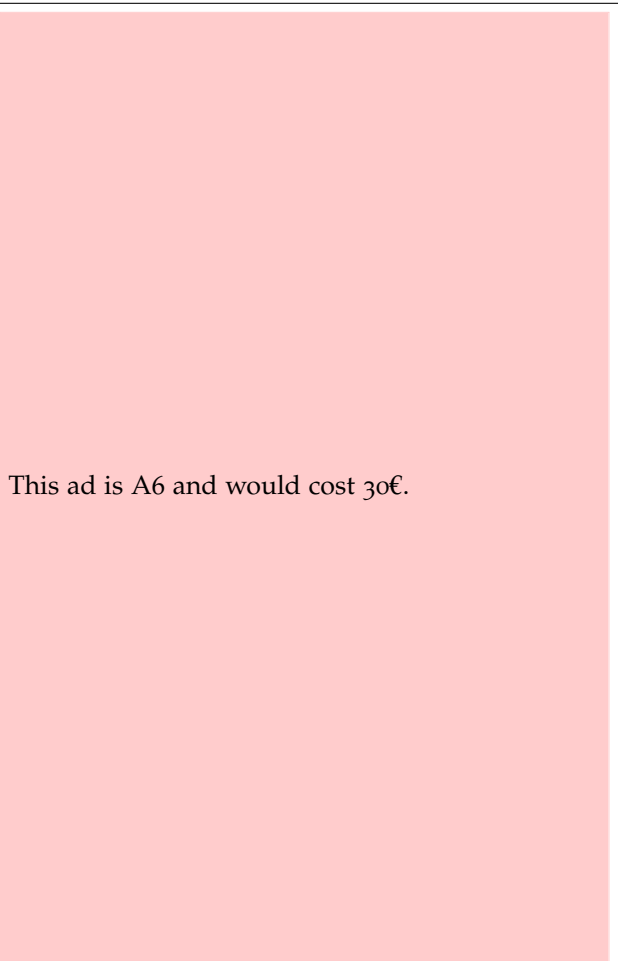
If you want to publish advertisements at a fair price contact us with your advertisement at [uefdsa@protonmail.com](mailto:uefdsa@protonmail.com)

For the next newspaper (regular price)	For the next 3 newspapers (ota 3, maksa 2)	Long term (at least 3 newspapers)
Size A5 70 €	Size A5 140 €	Size A5 46.60 € / newspaper
Size A6 30 €	Size A6 60 €	Size A6 20 € / newspaper
Size A7 15 €	Size A7 30 €	Size A7 10 € / newspaper
Size A8 10 €	Size A8 20 €	Size A8 6.60 € / newspaper
Size A9 5 €	Size A9 10 €	Size A9 3.30 € / newspaper

Full page size advertisements are negotiable.

- UEFDSA newspaper supports itself. It is not done with membership fees.
- Of the advertisement money, 70 % goes to expenses of writers and magazine.

This ad is A5 and would cost 70€.



## Publication of dissertation

Ari. J. Tervashonka

Different faculties have sometimes differing rules and procedures for publishing dissertations and sometimes differences between universities in the same field of study might be vast. Still, a lot of requirements have been standardized and in addition to these general publication standards, there are regulations and rules of science series who are the major publishers for dissertations. Sometimes these rules are not very well thought out. Either layout design leaves things to be desired, sometimes even font is mandated by the science series. In some cases, there are so many different things to consider that it is easier to make the layout yourself. If you don't want to abide by the procedural formalism or let someone else dictate how your dissertation looks there is also a choice of publishing it yourself with some publishing company.

But what are the pros and cons of publishing in science series or privately?

	Science series		Private publishers	
	Pros	Cons	Pros	Cons
Publication practices and procedures	Easy and simple rules			Have to put time into finding the right publisher
Layout options		1 option	Writer decides	
Font		1 option	Writer decides	
Cover options		1 option	Writer decides	
Print paper quality options		1 option	Writer decides	
Page size		1 option	Writer decides	
Customer service	Typically decent		Can be good	Can be bad
Free library permission (for any other library)		Doesn't typically have this option	Typically used	
Amount of the total work	Minimal			Considerably more
Cost	One of the lowest cost		Can be lower	Can cost more
Publication time	Standard (easy to plan timetables)	Sometimes slower	Can be faster depending on the contract	

As a choice, the choice between science series and private publishers depends on what a writer wants or needs. If a writer wants just to publish with minimum difficulties dissertation science



series is better for that purpose. If a writer wants exactly to dictate more options on how the dissertation looks it is more advisable to use private publishers. Essentially private option needs more work on checking all the details, but it gives maximum freedom for a writer in terms of options to choose from. The basic cost is very similar but if you are willing to use more money you can get your bone tone print paper, font of your choice, hardcover and even pressure letters on the cover. Only sky and budget are the limit on how publication can look like (albeit faculties pay only for a certain amount of books with certain price limits, a writer has to pay the rest of the publication expenses and services). It's important to also note that dissertations are not typically considered as magnum opuses but as a first attempts to do science. Usually, these books will be semi-forgotten on shelves and mostly underneath tons of other book boxes. Then again if you are travelling a lot at the beginning of your scientific career it is nice to be able to show decent looking work for potential employers, research groups, and other researchers. In some cases, your dissertation is the first thing that experts will browse through for years in your career. You can also think about what would be your target audience for your dissertation and what they would prefer.

## *How many supervisors are enough for the dissertation?*

*Ari J. Tervashonka*

*May 1, 2022*

Typically, there are always two supervisors with subject-related focuses. But when anything else is needed are two supervisors enough? Let us imagine any larger dissertation with maybe new multidisciplinary views that require multiple factors of effort in comparison to dissertations that are conducted in a more sensible manner. Then there is the possibility of new perspectives in methodology, specific method, a specific mixture of methods, and maybe even a new method within the study in addition to all manner of secondary source mixtures to create new perspectives in science. All of these and more alternative ways to conduct research can create quite unique situations where a real upper limit does not exist for the need for academic mentoring in the broadest sense.

The difficulty is to cultivate an academic frame of reference in an individualistic meaningful way to ensure the unique growth of talent. This same theme can be seen in a bachelor thesis, master thesis and dissertation. Ultimately for any subject, there is a great need for more views, mentors and experts. Sometimes it is equally important to get advices from starting academics, emeritus or emerita to ensure that no viewpoints and tacit understanding have not been wasted for the development of your topic and yourself.

In some cases, there might be jealous landlord kind of supervisors who despise the idea of anyone else meddling in their keep it as simple as a possible mentoring process. However, any decent academic knows the importance of social connectivity and the free flow of ideas and scientific ideals. Philosophy doesn't follow the borders of countries and all good ideas are not found in the same university. This vast world hides secrets, mentors, problems and solutions. The scientific community is the possibility and limitation of your intellectual growth, the cradle for evolving academic minds.

In the best case, you will find open-minded people who are willing to help you in your struggles to increasingly develop your scientific frame of reference, skills, and opening your talents with the right combination. Seek always these people and never overlook anyone. In the long term, proper cultivation of mind and scientific frame of reference will determine your place in the academic world.

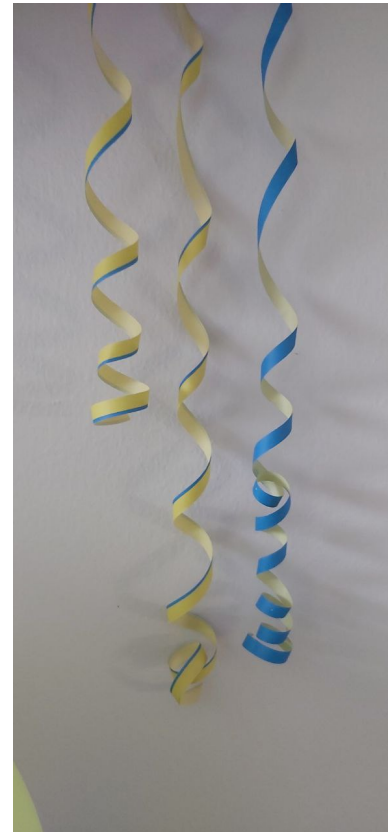


Figure 1: Comparing April 2021 and April 2022, sales of serpentine streamer have more than doubled – it has increased 127 %. <https://www.iltalehti.fi/kotimaa/a/fcf94167-4fda-4973-aba7-d22b06152b38>

## *Character building*

*Ari J. Tervashonka*

*May 1, 2022*

Let's play a game of life. What constitutes the character building of a person? Not a public image, not views or imaginaries but a real functional personality with a good amount of progressive attributes on the side. Our character is not only what we learn in life or what we experience. Everyone who wishes to be able to represent themselves better in life and important situations needs not only to help with presenting skills but decent character building.

But how to start? By being honest to yourself and being brutally honest with all the self-estimation, reflection, and introspections. The latter is one of the most important tools. Introspection and self-reflection are something that can help everyday basis. It doesn't mean neurotic practices of fixing everything that you are thinking or doing. It is a way to reflect on your actions and relation of those actions to the world in a meaningful way. But self-reflection very rarely can succeed without any clear goals or direction where you want to go. Many people don't work like INTJ<sup>1</sup>s who sometimes overanalyse perceptions, plans and goals without getting taxed mentally because of it. It is more of the development mindset, "I want to be better" and "I want to do better".

It is not realistic to overhaul changes or demand that whole personality has to change. It just doesn't work like that. Almost all of the personal changes will occur incrementally and thus any large development will require more time and dedication.

Taking or making goals for life doesn't need to be always arduous long term commitment that gets forgotten in the next month of your life. We need these too but not only. It is also good to have short term and midterm goals like okay today I wash dishes or read this book. Or during week okay this week I will write this and that ready. Long term commitments are commitments that you have to believe fully and you cannot lie about yourself against these goals. Otherwise, those goals don't work. Sometimes being lazy can be a very good thing for your body and mind but it cannot be a constant situation in life. Very rarely does anything develop without effort. But this effort can be divided into parts so that you can feel that you are actually progressing to something where you want to be as a person. In addition to that long term commitments and the personal cultivation that comes with it can be very satisfying and even lifesavers during harder times. Life and living get harder if

your self-reflection is in constant negative dive caused by the feeling of lack of progress, belonging and agency. To avoid these outcomes it is better to dedicate some effort to think, discuss and understand how you work and how you are developing. Remember all the tools, tests, advices, views and reviews of you as a person are subjective or otherwise nonlinear to the truth of things. As your understanding of personality grows so grows the control and countenance of your mind.

<sup>1</sup> Check Briggs and Myers [personality test types](#) but remember that these are numeric estimates.



Figure 2: Comparing April 2021 and April 2022, sales of balls have increased by 66 %.  
<https://www.iltalehti.fi/kotimaa/a/fcf94167-4fda-4973-aba7-d22b06152b38>

## Hide and show details – a Javascript solution

Juha-Matti Huusko

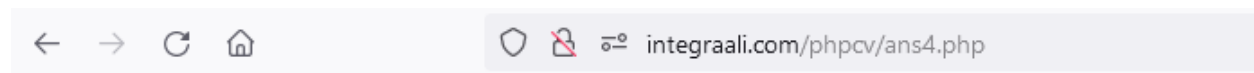
May 1, 2022

A time to make another job application. And when was the grant deadline?

Where is my latest CV file? Did I make it in Finnish or English last time?

Should I delete some long paragraphs? Will I ever use them again?

One (complicated?) solution is as follows...



## Ansioluettelo

Juha-Matti Huusko  
21.10.2021

### Työkokemus

01.09.2012 **Kooste: opetustehtävät, Itä-Suomen yliopisto**

-31.05.2022  Olen opettanut Joensuun Fysiikan ja matematiikan laitoksella vuosien 2015-2021 aikana laajaa valikoimaa erilaisia matematiikan kursseja (Johdatus topologiaan, Algebra a, Euklidinen geometria, Mitta- ja integroimisteoria a, Fourier-analyysin peruskurssi, Usean muuttujan differentiaalilaskenta). Tätä ennen olen pitänyt laskuharjoituksia edellä mainituista kursseista sekä kursseista Analyysi III, Numeerinen analyysi, Topologia, Kompleksianalyysi a, Johdatus matematiikkaan ja Alkeisanalyysi. Luennoimieni kurssien laajuudet ovat yhteensä 33op ja laskuharjoituksia olen pitänyt kursseista, joiden laajuudet ovat yhteensä 33op+36op.

01.06.2021 **yliopisto-opettaja, Itä-Suomen yliopisto**

-31.05.2022  ~~(Monitieteellinen korkeakoulutasoinen lineaarisen analyysin teemakokonaisuus -valtionavustus (Opetus- ja kulttuuriministeriö), 2021-2022) Tässä monitieteellisessä hankkeessa valmistelen matematiikan alan kurssien Lineaarialgebra a ja b uudistusta sekä fysiikan alan kurssien Numeerisen laskennan alkeet sekä Luonnontieteilijän data- ja virheanalyysi (kaksikielinen fin/eng) verkkototeutuksia.~~

01.09.2020 **tuntiopettaja**

-31.05.2021  Laskuharjoitukset: Johdatus matematiikkaan 4op, Alkeisanalyysi 4op  
Luennot ja laskuharjoitukset: Fourier-analyysin peruskurssi 9op, Usean muuttujan differentiaalilaskenta 9op

The solution can be found at  
<http://integraali.com/phpcv/ans4.php>

Figure 3: ...well, let me just untick the unnecessary details from my online CV. When the document is printed, the unticked parts will not appear in the document.



# The bridges of Sighs

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Venice of the North  
**KUOPIO**

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Itä-Suomen yliopiston jatko-opiskelijoiden yhdistys - UEF DSA ry**Established** May 1<sup>st</sup> 2019**Owned by** Juha-Matti Huusko and Ari J. Tervashonka**Funding:** This newspaper supports itself. No membership fees are used to produce it.**Appears** once in two months as pdf  
at <http://www.uef.fi/web/dsa/newspaper>**UEFDSA newspaper editor in chief:** Juha-Matti Huusko,  
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Here “≥” means at least.

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*UEFDSA 2021*

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contacts, see:	<a href="https://sites.uef.fi/dsa/contacts/">https://sites.uef.fi/dsa/contacts/</a>	<p>UEF PHD STUDENTS LIVING IN UUSI-MAA – NETWORKING VIRTUAL COFFEE</p> <ul style="list-style-type: none"> <li>• <b>Time:</b> every other Wednesday at 14-15</li> <li>• <b>Venue:</b> in Microsoft Teams</li> <li>• <b>Contact:</b> ?</li> <li>• <b>Next meeting:</b> ?</li> </ul> <p>EVENT CALENDAR <a href="https://sites.uef.fi/dsa/">https://sites.uef.fi/dsa/</a></p>

*Membership*

**Full membership** is restricted to UEF doctoral students.

**Associate membership** is open to anybody. Especially, we welcome all master students interested about PhD related matters. (Plan your doctoral studies better by joining as an associate member before you start doctoral studies.)

**Supporting membership** is open to anybody.

*Benefits*

- All members have priority in UEF DSA Newspaper as a writers and photographers.
- For associate member, much knowledge on doctoral studies, meetings and relevant programs every year.
- Members can join the UEFDSA board.
- Members can join activities of the association without cost.
- Support members are added in public list (if a person wants their name published on it).

*Membership fee*

**Joining fee** is paid only once, in total 10 euros. The fee is the same for members and associate members. (Fee is only paid 1 time, in case you are upgraded from associate member to full member the upgrade is free.)

**For a support member** the one time fee is 50 euros. This fee is intended to support activities of the association.

**More information at:** <https://sites.uef.fi/dsa/membership/>

*Check out*

**Website:** <https://sites.uef.fi/dsa/>



# I. Scientific Essays

Creation of theory – Series part II

Theory making strategies

Ari J. Tervashonka

Theory is an answer, typically to a more complicated problems in form of arrangement of how and by what logic information is structured. Theory can be mathematical physics to explain physical phenomena, eventually supported by physical evidence or interpretation theory that examines the social human interaction of language and meaning supported by its explanatory power and form of use. If we think of all the fields of study, there are a countless number of directions that theory could take and based on its functionality its merit as a theory has to be proofed or logically confirmed by its connectivity of reality and other counterparts within that field of study. In this part, we are investigating different notions of how theory is formed. The rules for theory creation depend hugely on the field of study, but the end goal is the same, to expand and explain with increased accuracy phenomena of any kind for the benefit of humanity.

But is there a reasonable guideline on how to form theories? In a way yes and no. Views, scientific heritages, and different philosophies of science form with the difficulties differing venues for theory making strategies. The creation of theory can take many forms in terms of strategies. The plurality of choices is so vast that it is not fruitful to dedicate much attention to singular cases but to understand that different elements work in combinations, modularly or as a composition. As I have studied how theories are made, the plurality of the perspective of theory creation strategies has been hugely beneficial. In addition, there is a large question of how far different theoretical approaches can go without discussing with other fields of study or even other theoreticians.

When Ludwig Bertalanffy formalized the general system theory (GST) (1968) he attempted to bridge different systemization projects in science together by providing a rough idea of building different systems science results from different areas of science together in so far that same processes, limitations and trial and error would not be needed to be made. Bertalanffy's approach was therefore synthesis based on large proof of connectivity between different systems approaches and he claimed that if similar logic can be used in most of them the issue is not, therefore, building only systems logic or applications but to accept best practices from other projects and go further with the systems development. Theoretically, Bertalanffy, therefore, wanted to cut all the wasted effort away from explaining the same thing in multiple areas of science and by encouraging co-operation and showing that it could be feasible to even combine different systems ideas in theoretical form. Now, after decades have passed the ever-increasing specialization has taken another kind of role and it has on many occasions ripped open all tectonic plates of the science as a whole and by this action, specialization has nurtured oceans in between different specializations. But even still there

are great chances of solving complex theory problems by loaning some of the ideas from different methodological heuristics.

I have named earlier systems approach; it is an effort of creation of systems theories where one larger phenomenon or even field of study is attempted to be systemized. Systems theories take decades or even longer to be formed, these theories are typically life-long commitments. Here are a few major perspectives on what foundations and arguments building of theory can be conducted.

Evolutionary perspective of science

Efficiency driven perspective

Theory as a process

Theory as explanation

Control theory

Living systems theory

Theory as information form

Systematic theory

Systems theory

Systemics theory

Normative theory

Experiment based theory

Theory of human interaction

Interdisciplinary theory

Modularly combined theory

The choice of a valid perspective or mixture of perspectives tends to be subjective, even in physics and some parts of mathematics. These choices are sometimes governed by fashions of a specific areas of science and sometimes therefore some notions seem or are more valid currently than other choices. Still, there is considerably more breathing room for any new theory or modification theory of older theories. This does not always show in peer-reviews if the reviewer is a defender of the faith of certain scientific views or fashions, instead of conducting a review as a scientifically argumentative adversary. No matter the case theory creation is always merited by its result, novelty, scope, clearness and effectiveness of the information use. History is full of examples of theoretical views that have been formed by someone, developed by someone else and after all this work it has been generalized in functional form by someone else. In the most difficult cases, this might take centuries. The

reason for this large spread is the higher specialization in sciences and it is exceedingly rare to see one person conducting theory fully from their standpoint. Typically, theories are in some way or another form of co-operation either between humans, theory materials and information.

In terms of research strategy, the choice of using one or more views for making the foundation for theory is led by the used problems and gathered previous data on the said problems. While building theory it is vital to understand in what philosophical environment earlier data has been made and what has influenced older theories, why do we have these theories and views, why not opposites? Despite building a new theory it does not mean that everything older can be disregarded without learning them. This might work in a very specific corners of certain theories, but more general theory attempts to be, more detailed legwork must be conducted in terms of understanding the fundamentals of the topic.

After having a holistic enough view of the fundamentals of the theory subject begins the choice of theory approach and views. These are sometimes changed in the middle of the theory building. Sometimes something better is found or by accident, data works better with different tools and approaches. The researcher cannot ever, therefore, expect always get to the best results or even approach with the theory. Same as in science in general researchers must be able to modify, update, and ultimately discard the theory that doesn't have relevancy or is discarded by development. However, sometimes older theories and in between development theories might have some interesting views and functions that can be either reused or used as an idea for other settings. Therefore, it is in the researcher's interest not to overlook any theory, not even the outdated ones. Sometimes theory itself is wrong but the conduct how it is built, or its logic can be used elsewhere. Sometimes even dead theories can stem from new beginnings in science.

So far, we have discussed the views or alternative approaches and how to start using them but without rationale and philosophies of science, the questioning part is not conducted with needed vigour. But after the choice of views, philosophies of science and different explanatory theories and example theories we still face the problem of categories. Categorization is ultimately always done in some form or another when we create a new theory on anything. We can loan some parts from older data but the whole logic of how the theory will work is not always loanable from past experiences. Sometimes new functions, meanings and environments must be explored and their place within theory explained. The biggest difficulty is that while creating something new we cannot have an only definite view of what can work since we are trying to solve some complex problem that needs not only explanation but also a theory to explain the heuristics of the problem and functions of it. Therefore, the creation of theory cannot be pre-destined by some views or whatever tools might be used. This challenge also makes it impossible to formulate more than general views of what strategy could work better when creating a theory. Every problem can have cousins and even the philosophies of sciences and perspectives can be somewhat related to another, but new theory barely sometimes has an immediate relation to what has been achieved so far.

If we are cheated by categorical thinking to formulate the problem in form of categories and then we are solving the problem by using the exact same heuristics of said categories, we are forming a mind prison around ourselves and thus neglecting the creative processes of theory building.

To avoid these problems all assumptions, have to be measured, all the key argumentation has to be weighted multiple times and differing views have to play out countless wars in the mind of scientists before the dust will settle and the foundation ideas of theory can be recovered. Openness to admit what is known and what needs further discovery is the key element for the creation of fundamentals for theory. And even then, when things start to work out and everything seems to work within theory the creator of the theory must avoid rushing the procedure. If any corner of reasoning is neglected and if no proper evaluation of each part is not made the end result might not carry as wished. In the worst case falsely finding the “needed” categories can blind us from a chance of discovering the real solution one corner away. We are sometimes masters of fooling ourselves that the found answer is final and entire. Only repetition and differing arguments can secure us from this error.

To achieve the needed multiple viewpoint checking of argumentation within the theory it has to be expressed to others who are willing to go through the arduous gathering of reasoning in terms of theory. You must listen to countless views to form solid a theory. Very rarely theory can be crafted alone without any outside help. In many cases, this help is indirect as best because sometimes theory making process or theory as a not ready-made entity or even finished theory does not open to everyone. But if you can explain your problems at a basic level to any decently helpful person you can gather a lot of indirect notions that will help you to continue with the needed multiple viewpoints checking each key argument within the theory. Openness to differing views is equally important as personal autonomy on behalf of critical argumentation. Both of these form vital tools and views for theory creation. Openness is needed to that we can maximize our understanding of the topic. Different people are working in different ways even within the same problems. It is easy to point fingers and argue but it is much harder to understand differing backgrounds and views not to even talk about different methods and data.

As we need a humane environment for our progressing ideas and the open use of intuition there is also the danger of forming too narrow social circles around the theory. Your only helping circle of people cannot just be similarly minded folks who just tap on the back of each other in conferring each other’s excellence. That is not how science or any decent theory can be built. Theoreticians must always look for an intellectual struggle to be able to keep their mind’s eye clear and not step on the trap of complacency and therefore lack of critical argumentation. Science and definitely theory creation is not only a fun incrementally satisfying development task. It is also repeated defence and attack on the core notions and applicability of the theory sometimes even at the same time.

# III. Summaries of research

## Means Of Several Random Variables

Mikko I. Malinen

20th November, 2021

### Abstract

We consider a line segment of length 1, where we put several points at random locations. We examine what are the mean positions of the points starting from the leftmost point and proceeding to the middle points and to the rightmost point. This setting gives also the mean values of several identically distributed random variables starting from random variable with the lowest value and proceeding to higher value random variables.

## 1 Two Points On a Line Segment

Let's consider first two randomly located points on a line segment of length 1, see Figure 1. We will derive the mean locations of the points. Probability that the second point is on the left side of the first point  $p_1 = x$ . The mean location for the second point, if it is on the left side of the first point  $x_1 = x/2$ . Probability that the second point if it is on the right side of the first point is  $p_2 = 1 - x$ . The mean location for the second point, if it is on the right side of the first point is  $x_2 = x + (1 - x)/2$ . Now, the mean position from the left of

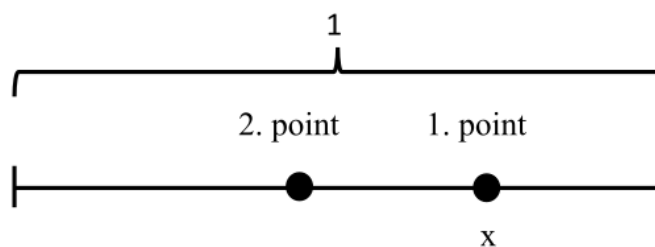


Figure 1: Two random points on a line segment of length 1.

the leftmost point is

$$x_{1,mean} = p_1 \cdot x_1 + p_2 \cdot x_2 \quad (1)$$

$$= x \cdot \frac{x}{2} + (1-x) \cdot x \quad (2)$$

$$= \frac{x^2}{2} + x - x^2 \quad (3)$$

$$= -\frac{x^2}{2} + x. \quad (4)$$

We now introduce the following lemma:

Lemma 1. The mean  $\bar{f}(s)$  of a function  $f(s)$  on an interval is

$$\bar{f}(s) = \frac{1}{b-a} \int_a^b f(s) ds,$$

where  $a$  is the starting point of the interval and  $b$  is the endpoint of the interval.

We now use the Lemma 1 in calculating the mean position of the leftmost point by calculating the mean when  $x$  goes from 0 to 1:

$$\bar{f}(x) = \frac{1}{1-0} \int_0^1 -\frac{x^2}{2} + x dx \quad (5)$$

$$= \int_0^1 -\frac{1}{6}x^3 + \frac{1}{2}x^2 \quad (6)$$

$$= -\frac{1}{6} + \frac{1}{2} \quad (7)$$

$$= \frac{1}{3}. \quad (8)$$

This is our result. The mean of the leftmost point is  $1/3$ . By symmetry, the mean of the rightmost point is  $2/3$ .

## 2 Three Points On a Line Segment

In the case of three points, the mean of the middle point is 0.5 because the points have to be symmetrically on the line segment. Moreover, because of symmetry, there has to be one point on the left side of the middle and one point on the right side of the middle. The mean of the leftmost point is in the middle of the left end and 0.5, that is, at 0.25. The rightmost point respectively at point 0.75. To summarize, the means of the points are in 0.25, 0.5, and 0.75.

## 3 $n$ Points On a Line Segment

If all other points are kept fixed and one point can be moved, the mean of it is at the mean of neighboring points or, if there is no neighbor on one side, at

the mean of end and neighboring point. When all points are moved like this one point at a time, and this process is repeated several times, they will settle uniformly on the line segment. Thus the mean locations of  $n$  points will be

$$\frac{1}{n+1}, \frac{2}{n+1}, \dots, \frac{n}{n+1}. \quad (9)$$

## 4 Analogy to Random Variables

There is a correspondence between the points, which we have been talking so far, and uniformly and identically distributed random variables. Let there be as many random variables as there are points. Then the random variable having the minimum value corresponds to the leftmost point and the random variable having the second smallest value corresponds to the second point from the left. The means of the values of the random variables have equal spacing as have the points. But what if the distribution of the random variables is something different from uniform distribution? Then the mean values of the random variables are such that there is equal amount of probability mass between two neighboring random variables. To get those values, proceed similarly as in sampling from arbitrary distribution. Take  $n$  values from an uniform distribution, with equal spacing, and transform those to the values from the arbitrary distribution as you would do when sampling from that distribution.

## 5 Summary

When placing  $n$  random point on a line segment, the means of the point locations will be set uniformly, with equal spacing, to the line segment.

When sampling values for uniformly and identically distributed random variables, the spacing between two variables neighboring by value is equal in every such pair.

When sampling values for arbitrarily and identically distributed random variables, the spacing by probability mass between two variables neighboring by value is equal in every such pair.

## IV. Abstract papers

### **Evolution, Reproduction & Sexual selection Group – Towards a more detailed understanding of molecular-level mechanisms of post-copulatory sexual selection and its role in human infertility**

Infertility is diagnosed as a failure to conceive after 12 months of unprotected and regular sexual intercourse (World Health Organization). Approximately 15 percent of couples suffer from infertility in developed countries <sup>1</sup>. Traditionally infertility is considered as a male- or female-derived pathological condition. However, diagnosing infertility is extremely challenging <sup>2,3</sup>, and in up to 40 percent of couples, the reason for infertility remains unexplained <sup>4</sup>. Our recent observations show that in addition to pathological conditions, fertilization failure may result from gamete-level compatibility differences. The idea originates from evolutionary theory and post-mating sexual selection mechanisms that may affect reproductive success. By using an experimental approach we aim at widening the definition of infertility. Evolutionary aspects should be included as described in an opinion paper titled “Genetic incompatibility of the reproductive partners: an evolutionary perspective on infertility”, which was published in December 2021 <sup>5</sup>.

Previous studies of other species have indicated that fertilization is a non-random event, i.e., the fastest sperm may not be the one that eventually fertilizes an egg <sup>6</sup>. Accordingly, it has been demonstrated that females can bias fertilization towards the sperm of certain male(s) over the other(s) by various cryptic female choice mechanisms (CFC, reviewed by <sup>7</sup>). Furthermore, Kekäläinen and Evans (2018) proposed that CFC would be manifested via a gamete-level chemical signaling process (termed gamete-mediated mate choice, GMMC), which frequently favors selective fusion between genetically compatible gametes <sup>8</sup>. In summer 2020, our group published almost simultaneously with another group the first results showing that GMMCs occurs also in humans <sup>9–11</sup>. These results demonstrated that follicular fluid (bioactive fluid surrounding the egg) and cervical mucus induce male-female combination-specific physiological changes in sperm. Additionally, the similarity of HLA genes (human leucocyte antigen), which are genes related to the immune system, of the males and females, negatively correlated with sperm motility. In other words, follicular fluid may selectively increase the fertilization success of the sperm of HLA dissimilar males over genetically more similar individuals.

The molecular and immunological basis of GMMC are currently weakly understood in general but especially in humans. Our results recently revealed one potential mechanism for GMMC <sup>12</sup>. In this study, we investigated whether females’ follicular fluid could selectively affect the post-translational



modifications status of sperm proteins of different males, serving as a novel mechanism for GMMC. Post-translational modification generally refers to adding an amino acid chain to a protein after its biosynthesis to regulate its function. We observed that the changes in protein SUMOylation status are female-induced and that the higher SUMOylation status of sperm proteins associates with lower sperm motility. Thus, females may be able to selectively modify sperm motility and viability by controlling the function of sperm proteins.

Our research provides important information that may help in developing more realistic functional tests for sperm fertilization capability and reproductive compatibility of couples who struggle with conceiving. However, given that collection of female reproductive fluids, such as follicular fluid, is harmful and requires hormonal treatment, there is no easy access to follicular fluid for such diagnostic tests. In our latest study, we showed that follicular fluid and serum affect similarly sperm motility and viability. Noteworthy, our results indicate that in 70% of the males, sperm response to serum predict male-female compatibility that was observed in the follicular fluid of each female <sup>13</sup>. These results encourage further studies of the use of serum as a predictive biomarker that could enable more accurate infertility diagnostics and targeting the treatment based on the cause of infertility.

Voluntary donors of semen and female reproductive tract samples are crucial for our research. We gratefully thank every volunteer who has participated our study! Thank you also those who have encouraged their friends and family members to take part in our study. The Finnish-speaking audience of this journal, please, follow our research call. Unfortunately, due to the ethical permit, we are allowed to accept only participants with knowledge of Finnish.

Our research group locates in Joensuu, but our research involves multidisciplinary knowledge and techniques; thus, we regularly travel also to Kuopio campus. Our group consists of two post-docs **Aleksandra Łukasiewicz** (Poland) and **Mandar Bandekar** (India), and three PhD students **Annalaura Jokiniemi**, **Tanja Turunen**, and **Enni Linnavirta**. The group is led by associate professor **Jukka Kekäläinen** and funded by the Academy of Finland. We collaborate at UEF with professor **Merja Heinäniemi**, research director **Sami Heikkinen**, associate professor **Marjut Roponen**, and senior researcher **Marjo Malinen**. More information: <https://gamcomgroup.wordpress.com/>



# Haluaisitko luovuttaa spermaa tutkimuskäyttöön?

Hei, sinä perusterve alle 45-vuotias mies!



Tarvitsemme spermanäytteitä Suomen akatemian rahoittamaan tutkimukseen. Saat näytteen luovuttamisesta 10€ suuruisen korvauksen (ns. haittakorvaus). Näytteen voi antaa kotona ja toimittaa ennakkoon sovitus Itä-Suomen yliopistolle (Natura-rakennus, Yliopistokatu 7, Joensuu).

Tutkimuksemme tavoitteena on selkiyttää sukusolujen kemiallisen kommunikaation mekanismeja, mikä voi avata uusia näkökulmia hedelmöitymistapahtuman ja hedelmättömyyden syiden ymmärtämiselle.

Tutkimuksemme toteuttaminen edellyttää tasaisin väliajoin uusia näytteitä ja näytteenantajia. Tutkimuksemme soveltuvilta henkilöiltä voimmekin pyytää myös lisänäytteitä.

Lisätietoja: Itä-Suomen yliopisto,  
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Meidät löydät myös:

[www.gamcomgroup.wordpress.com](http://www.gamcomgroup.wordpress.com)



Facebook: Sperm sampling

Tarkemmat ohjeet löydät:





Members of the research group from left to right. Aleksandra Łukasiewicz, Tanja Turunen, Annalaura Jokiniemi, Jukka Kekäläinen, and Mandar Bandekar. Enni Linnivirta is missing from the picture.

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