# Kvantti Vihko

Fyysikkokilta 1/2022

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Kvantti 1/2022 "Vihko"
kvantti.ayy.fi
Bookcover oy
painos 150kpl
ISSN 2736-996X (painettu)
ISSN 2736-9978 (verkkojulkaisu)

Editorial

# The Language Barrier

Wait what, why is this in English? The simple answer is that I don't have enough time nor space for both a Finnish and an English version. I did think for a long time about what to write and ultimately decided to give you the long answer anyway - so here we go:

I love our guild. It's given me a place to grow as a person and connect with other like-minded people. It's no secret that we all have had more struggles these past few years than we signed up for, but it's been a lot less difficult to get through when you have such a wonderful community behind you. Studying physics can be hard work - we all know that - but it sure is easier when you have people to support you.

This is exactly why feeling like you belong is important. Of course everything the guild organises from sitsit to volleyball games are an integral part of being a student in general, but the most valuable thing the guild offers - is a community. At the start of our studies moving to a new city, and for some even a new country, can leave us feeling lonely and disconnected. In such times, knowing you have people you can count on on a rainy day is far more precious than gold.

"The most valuable thing the guild offers – is a community."

The problem is that all this is significantly harder to achieve for our English speaking students. Even though the flow of information happens in two languages and there is a large English-speaking community in Aalto - people might still feel like they don't belong. It doesn't help that there have certainly been less than ideal experiences in guild events. Even though I speak Finnish perfectly fine, watching my friends grow tired and disinterested during a sitsit held almost solely in Finnish left a bad taste in my mouth. Not because the songs were in finnish - but because everything else was too. If the "donkey-bridges" start to get boring as the night goes on anyway, imagine if on top of that you couldn't understand them at all.

"There's no point in paying 20e to try out something new if you're not sure you'll be able to understand any of it."

Don't get me wrong, the guild gets a lot of things right. Communication in both languages is efficient and accurate, and there's plenty of events organised in English. Despite all that, there is no guarantee that an event will be worth attending - especially if said event has an attendance fee. There's no point in paying 20e to try out something new if you're not sure you'll be able to understand any of it. On top of that, even if people are willing to speak in English, it doesn't mean that a lone English-speaker won't feel like they're an inconvenience to others.

How do we fix this? Doing everything in English isn't a good solution. Not everyone is comfortable speaking in English all the time - and they shouldn't have to either. On the other hand, doing everything in two languages may take up so much time and resources that it's practically impossible. Frankly, I don't know what the best solution is. In the lack of a better one, I've decided to do some things in English - like this article. The editorial of Kvantti may be a tiny drop in the vast amount of activities and content the guild has to offer - but it's still something.

But not to worry, there'll still be plenty of articles in Finnish. After all, this is just one article. But hopefully this year Kvantti - no, the whole guild - will be more accessible to everyone.

*Editor in Chief*

*Karoliina Oksanen*

# Puhispalsta

"Se, että kiltamme täyttää nyt 75 vuotta ei ole mikään itsestäänselvyys."

Oma suhtautumiseni syntymäpäiviin on ollut aina vähän vieroksuva. Erityisesti angstisina teinivuosinani ihmettelin, että mitäs juhlittavaa tässä nyt on? Nykyään hiukan vanhempana, ja jopa ehkä pikkiriikkisen viisaampana, on oma suhtautumiseni muuttunut, mutta en silti esimerkiksi omiani mitenkään erityisesti tapaa viettää. On olemassa kuitenkin poikkeuksia, ja tänä vuonna on erittäin merkittävä sellainen.

Kuten olette saattaneet jostain kuulla, Fyysikkokilta täyttää tänä vuonna 75 vuotta. On hätkähdyttävää, kuinka moneen ihmiseen kilta on ehtinyt vaikuttaa. Kiltamme läpi on kulkenut tuona 75 vuoden aikana tuhansia ihmisiä, joista kaikille kilta on ollut omanlainen yhteisönsä; joillekin siitä on tullut yksi elämän tärkeimmistä yhteisöistä, jotkut taas eivät ikinä lähteneet mukaan. Kummatkin vaihtoehdot ovat ihan yhtä ok, vaikka toki ainakin itse toivon, että jokainen löytäisi killasta jotain itselle sopivaa.

Se, että kiltamme täyttää nyt 75 vuotta ei ole mikään itsestäänselvyys. Uuden killan perustaminen aikoinaan ei ole varmasti ollut mitenkään helppo prosessi, eikä sen pyörittäminen tai kehittäminen nykyäänkään ole mitenkään mutkatonta. Ja silti aina on löytynyt väkeä jatkamaan killan toimintaa.

"Killan ydin ovat kiltalaiset; kaikki erilaiset ihmiset, jotka ovat jostain sattuman seikasta löytäneet tiensä tänne."

Tietyllä tavalla on hiukan hassua puhua killasta, viitaten siihen jonain yksilönä. Koska joo, onhan kilta teknisesti ja ihan käytännössäkin yhdistys, mutta jos nyt vähän metafysiikkaan ajaudutaan, niin ei se ehkä killan ydin ole kuitenkaan. Killan ydin ovat kiltalaiset; kaikki erilaiset ihmiset, jotka ovat jostain sattuman seikasta löytäneet tiensä tänne. Meitä on hyvin erilaisista lähtökohdista (sekä kirjaimellisesti että kuvainnollisesti), ja meidän kaikkien suhde kiltaan on omanlaisensa. Jotkut päätyvät kilta-aktiiveiksi, joiden toimarinakkien lista on pidempi kuin Täffän spagujono;

joillekin killasta löytyy täysin uusi kaveriporukka; joillekin kilta tarkoittaa paria tapahtumaa vuodessa; joillekin ei välttämättä sitäkään. Kaikki ovat kiltalaisia, ja kaikki ovat omalta osaltaan muovaamassa kiltaamme juuri sen näköiseksi kuin se on. Kilta muuttuu kun sen jäsenet muuttuvat, ja paljon on muuttunut 75 vuodessa. Paljon on myös pysynyt samana.

"Kiltaa ei ole ilman sen jäseniä, ja siksi jokainen kiltalainen on aivan yhtä tärkeä ja korvaamaton."

Viimeiset pari vuotta ovat olleet koko killan historiassa poikkeuksellisia, ja ne vaikuttavat varmasti siihen millaiseksi kilta kehittyy, niin kuin ovat kaikki muutkin vuodet vaikuttaneet. Näiden etävuosien aikana ei ole varmasti ollut helppoa lähteä killan tapahtumiin ja toimintaan mukaan, ja on varmasti ollut petollisen helppoa tippua niistä pois. Siksi toivonkin, että juuri Sinä, joka tätä luet - olet sitten kilta-aktiivi, toiminnasta pois tippunut, tai joku joka et ikinä ole päässyt osaksi kiltaan - haluat olla osa kiltaa, ja uskallat lähteä mukaan. Kiltaa ei ole ilman sen jäseniä, ja siksi jokainen kiltalainen on aivan yhtä tärkeä ja korvaamaton. Kiitos juuri Sinulle, että olet osa Fyysikkokiltaa.

Hyvää 75-vuotisjuhlaa koko killalle toivottaen

Antti Karjasilta

Puheenjohtaja

# Q + CTRL + ⌘

Kello lähentelee seitsemää, ja ulkona on jo toista tuntia pilkkopimeää. Saavuit kotiin, ja toteat iltasi olevan täysin vapaa kolmatta vuotta putkeen. Vaihtoehtonasi on joko katsoa Netflixiä loppuilta (luonnollinen jatkumo näyttöjen täyteisen päivän päätteeksi) tai lähteä ulos liikkumaan. Kumpi nappaa?

Ei ole salaisuus, että suomalaiset liikkuvat liian vähän. Liian vähän liikkuvien määrä kasvaa jatkuvasti, ja uskaltaisin väittää, että korona-aika on vain lisännyt tätä, vaikken puolen minuutin googlauksella sopivaa lähdeviittausta tähän väitteeseen löytänytkään. Jos kaikki tapahtuu etänä, arkiliikunta, tuo liikunnan helpoin ja hyödyllisin muoto, loistaa poissaolollaan. Opintomme ja mahdolliset työmme tulevaisuudessa tuskin myöskään haastavat lihaksistoamme ja hengitys- sekä verenkiertoelimistöämme. Jos Fyysikkokiltalainen työskentelee hikisenä ilman paitaa, kyseessä tuskin on fyysisen työn aiheuttamat lieveilmiöt, vaan todennäköisemmin ilmastonmuutoksen aiheuttama tuskallinen helle ja konttorin hajonnut ilmastointi.

Etenkin korona-aikana liikkuminen on tuonut vaihtelua helposti puuduttavaan arkeen. Pitkän päivän päätteeksi sykkeen nostattaminen yli 100 bpm:ään tekee hyvää kaikille terveyden osa-alueille. Tai vaikkapa karanteenissa ollessa, jos ei ole kipeä, pitkä kävely ulkona tarjoaa hyvän syyn poistua neljän seinän sisältä, ja ainakin allekirjoittaneella tämä helpotti huomattavasti ajankulua. Ulkona liikkuminen tarjoaa myös mahdollisuuden nähdä oikeita ihmisiä, ihan kasvotusten!

Haluan kuitenkin myös sanoa, että liikkumisesta ei pidä tulla (tirsk) stressin aihe. Liikkumisen on tarkoitus tuoda iloa ja terveyttä elämään, mikä ei varmasti toteudu, jos nokkela fyysikko keksii vain uuden ulottuvuuden, josta sytyttää kynttilä palamaan. Mitä hauskempaa ja luonnollisempaa liikkuminen on, sitä todennäköisemmin sitä tulee tehtyä.

Talviolympialaisten hengessä suosittelen kaikkia käymään itse toteamassa, että tänäkin vuonna pito oli paska ja huolto petti jälleen. Allekirjoittaneen ohjeet hyvään liikuntasuoritukseen ovat:

1. lämmittely on amatööreille
2. ”kyllähän minäkin tuohon pystyn”
3. lenkin jälkeinen pitsa + palautteleva juoma

Ei muuta kuin narut kireälle ja menoksi. Liikunnassa, etenkin terveysliikunnassa, kaikki on vain plussaa!

# Raati 2022

Oletko varma, että tunnet raatilaiset jo läpikotaisin? Tänä vuonna pääset testaamaan raadin tuntemustasi yhdistämällä raatilaiset kuvauksiinsa! Oikeat vastaukset lopussa

RAHIS
*Laura Rautiainen*

PUHIS
*Antti Karjasilta*

IE
*Emma Tonteri*

A: Tämän raatilaisen pizzaan kuuluu ainakin kahta juustoa: aurajuustoa ja mozzarellaa. Jäätelöannokseenkin kuuluu "3 kaverin kahvi" -maku. 5 vuoden päästä kyseinen henkilö ei toivo olevansa enää kandivaiheessa. Lapsuudessaan hän muistaa eksyneensä (Minne? Sitä Kvantti ei saanut selvitettyä) ja hänen lempi disney prinsessansa on Ruusunen.

B: Tämän raatilaisen pizzassa on prosciuttoa ja basilikaa. Jäätelömauista huonoin on yllättäen kuulemma vanilja. 5 vuoden päästä hän ei toivo löytävänsä itseään ainakaan JMT6 solusta. Raatilaista voisi kuvailla ihmissäästöpossuksi, sillä leikkikoulussa hän söi maasta löytäneensä 2 euron kolikon. Disney pahiksista paras on tämänkin raatilaisen mielestä Scar.

C: Tämän raatilaisen pizzaan tulee pepperonia ja jalapenoja. Herkullisesta pizzasta huolimatta hän ei 5 vuoden päästä näe matkustavansa italiaan myymään tomaatteja. Jäätelöistä parhainta on hänen mukaansa minttu. Lapsuudessaan tämä raatilainen joutui stalkkauksen uhriksi ulkomaisessa hoplop-leikkipaikassa. Disney prinsessoista paras on kuulemma lumikki.

YRITYSSUHDEVASTAAVA
*Petteri Koskiahde*

D: Tämänkin raatilaisen pizzaan kuuluu ainakin kahta juustoa: mozzarellaa ja aurajuustoa. Jäätelöannokseen puolestaan ei ainakaan kuuluu popkorni-jäätelöä. 5 vuoden päästä häntä ei tule löytämään konsulttilafkasta. Lapsuudesta mieleen on jäänyt aivotärähdys sulkapallossa ja raatilaisen lemppari disney pahis on Scar.

E: Tämänkin raatilaisen pizzassa on ananasta, mutta jäätelötötterössä ei ainakaan ole teollisuus-vaniljaa. 5 vuoden päästä raatilaista ei tule löytämään keskustanuorten puhenjohtajana. Raatilainen on ollut tyylitajuinen lapsuudesta saakka pukien marimekon paidan ylleen päiväkodissa - muut lapset eivät kuitenkaan silloin vielä osanneet tätä arvostaa. Disney prinsessoista paras on hänen mukaansa Robin Hood.

FUKSIKAPTEEIN
*Tuomas Mäkelä*

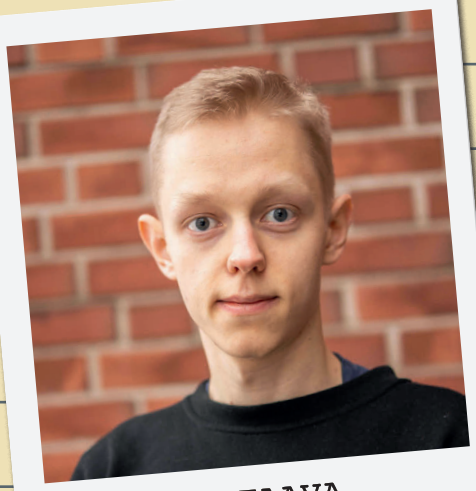
KV-VASTAAVA
*Laura Utriainen*

F: Ananas ja aurajuusto kuuluvat pizzaan tämän raatilaisen mukaan. Jäätelökippoon taas kuuluu jäätelön sijasta sitruunasorbettia. 5 vuoden päästä tämä raatilainen ei kuulemma näe itseään enää Otaniemessä. Lapsena hän muistaa lämmöllä purjehtimista perheen kanssa. Ehkäpä purjehtimisen tavoitteena on spotata hänen lempi disney prinsessansa, Ariel.

VARAPUHIS
*Laura Heikkilä*

G: Tämä raatilainen arvostaa pizzassaan herkkusieniä ja vegaanista juustoa ja hänen lemppari jäätelömakunsa on minttusuklaa. 5 vuoden päästä hän ei näe olevansa ainakaan töissä. Lapsuudesta hän muistaa kiipeilypuun ja hänen lempi Disney-prinsessansa on Mulan.

H: Tämä raatilainen tilaa pizzansa vuohenjuustolla ja munakoisolla ja jälkkäriksi "3 kaverin vadelmalaku" -jäätelöä. 5 vuoden päästä hän ei näe itseänsä rutiini toimistohommissa. Lapsuudesta on jäänyt mieleen mökkeilykesät perheen kanssa. Disney pahiksista parhain on kuulemma Haades.



OPINTOVASTAAVA
*Into Pääkkönen*

VIESTINTÄVASTAAVA
*Jaakko Johansson*

I: Ananas kuuluu pizzaan tämänkin raatilaisen mukaan. Jäätelökippoon hän haluaa puolestaan pistaasi-jäätelöä. 5 vuoden päästä hän uskoo lopettaneensa opiskelemisen. Lapsuudesta mieleen on jäänyt jalkapalloturnauksen pronssiottelun maali vikoissa rankkareissa. Tilanteessa on täytynyt varmasti pitää pää kylmänä, ja varmaankin siksi lempi disney prinsessa on Elsa.

IE
Julia Virtanen

J: Tämän raatilaisen pizzaan tulee pepperonia ja jalapenoja. Herkullisesta pizzasta huolimatta hän ei 5 vuoden päästä näe matkustavansa italiaan myymään tomaatteja. Jäätelöistä parhainta on hänen mukaansa minttu. Lapsuudessaan tämä raatilainen joutui stalkkauksen uhriksi ulkomaisessa hoplop-leikkipaikassa. Disney prinsessoista paras on kuulemma lumikki.

K: Tämä raatilainen toivoo pizzaansa klassiset täytteet: tomaattia ja mozzarellaa. Jäätelöistä hirveintä on hänen mielestään rommirusina. 5 vuoden päästä tämäkään raatilainen ei näe olevansa töissä. Lapsena tämä raatilainen luuli osaavansa lentää (tarina ei valitettavasti kerro miten raatilaiselle selvisi ettei näin ole). Disney pahiksista lempparein on paha kuningatar Lumikista.

HUPIMESTARI
Petteri Lehti

FUKSIKAPTEENI
Lotta Mäkinen

L: Jos pizzatilauksessa on aurajuustoa ja kebabia, on kyseessä tämä raatilainen, etenkin jos jälkkäritilaus on korvapuusti-jäätelöä. 5 vuoden päästä hän ei näe itseään Balilla. Hän muistaa kerran melkein ajaneensa mopolla ojaa, mutta onneksi hypänneensä kyydistä viime hetkellä. Hänen lemppari disney prinsessansa on tietenkin Leia.

A: Emma Tonteri, B: Laura Rautiainen, C: Petteri Lehti, D: Antti Karjasilta, E: Petteri Koskiahde, F: Laura Utriainen, G: Julia Virtanen, H: Lotta Mäkinen, I: Into Pääkkonen, J: Petteri Lehti, K: Laura Heikkilä, L: Jaakko Johansson

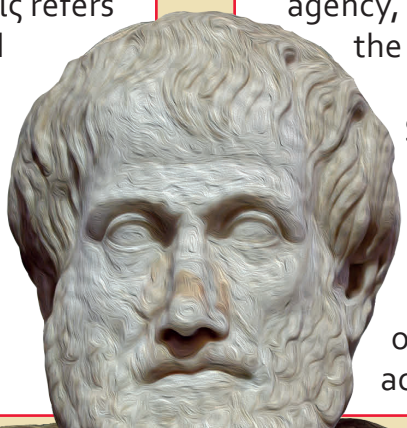
# A quantum realist wondering
## between philosophy and praxis

by Stergios Tsiormpatzis

*When I applied for my new studies in the program of Quantum Technology at Aalto university, it wasn't the only program I applied for. But it was my first choice. If I couldn't make it, I would choose to attend the Sciences program at the university of Helsinki. As I had it, I could explore the microcosm at the quantum level through both roads. But, at the end, my choice was defined by one criterion: praxis (πρᾶξις).*

Even if I'm not a philosopher, having been born and grew up in Greece, I can't avoid devoting some lines of this article to ancient Greek philosophy. For Aristotle (350 B.C.E. a, b), there are three types of knowledge: θεωρία, ποίησις, and πρᾶξις. Physics is a form of theoretical knowledge (θεωρία), it is neither productive knowledge (ποίησις) nor practical knowledge (πρᾶξις). That is due to its object: natural things/beings independent of human intention, that have in themselves their principle of motion, not needing an external human agent. In contrast, ποίησις refers to objects creatively produced by human beings and πρᾶξις refers to objects/actions done based to the rational choice of human beings.

Θεωρία aims for the truth (as in basic sciences), knowledge per se, independent of any benefit it might bring. Ποίησις aims for a result (as in arts), whoever possesses ποίησις don't necessarily reflect what is really happening, but what could happen according to a possible and necessary interconnection of facts. Πρᾶξις aims for the action and the practical success (as in technology and engineering). Ποίησις and πρᾶξις both refer to objects that are subject to change due to human agency. Those who master them can alter the object they know. In contrast the object that is known by θεωρία cannot be altered by human agency, but by itself it can change the knower.



So, praxis... That was my criterion on choosing technology and engineering instead of sciences. Technology as "the set of methods of systematic influence/action on a certain object,

aimed at obtaining predetermined properties of the object, and the organisation of technical activity that is developing during the material and intellectual production [of society]" (Patelis, D. S., 2019, p.52).

As a kid I used to "travel" with all kind of technologies imagined by Jules Verne. Later I used to read popular science books, and as a result I was aware of different "paradoxes" of quantum physics and their various interpretations. When I began studying scientific publications and following the research literature, my realist underpinnings got stronger. The popular interpretation of quantum physics was not the result of current research and technology, the criterion of praxis was putting the paradoxical view of quantum aside. Technology, I was thinking, was a guarantee that a no-nonsense study of quantum physics will be the basis of the study program I was going to follow. But is it necessarily?

Let's examine a simple question: What does the quantum state represent? Can you give an answer? What is going on here? As I said earlier, I'm not a philosopher, but it is philosophy that is going on... If I try to give three possible answers in philosophical terms, it is something like Agnosticism (nobody knows) vs. Solipsism (subjective knowledge) vs. Realism (objective property). Very broadly, since analysing those concepts – especially in the context of quantum physics – requires writing a whole book. Now, my question is, as future engineers of quantum technology, can we accept agnosticism (or even worst solipsism) in the interpretation of the quantum? But then, you will tell me, "We are engineers, we work with science, not philosophy". Science and philosophy, this old love and hate relationship (de Haro, S., 2020)...

During my previous studies in health sciences, I attended a methodological lecture in which the lecturer put it bluntly: "any methodological choice has behind philosophical presuppositions". And I believe that this is true for all domains of science and technology. That was the case when science was a domain of "natural philosophy" in ancient Greece, that is the case when a smartphone uses some logic exploited by computer science advancements. Ah, yes, looking at the library, the philosophical titles that are available are a lot. Many of the books consider philosophical implications of the quantum and take a realist ontological position. The problem is that with an overwhelming number of formulas and processes that we should master to become efficient engineers or scientists, there is never time to devote to philosophy. What we deal with during our studies is still the "shut up and calculate" mantra (Baggott, J., 2021) that Smolin described about his experience of studying physics in the 70's (ok, we have progressed since then, at least

nobody is going to tell you that with that words nowadays).

Smolin, L., 2007, p.312

When I learned physics in the 1970's, it was almost as if we were being taught to look down on people who thought about foundational problems. When we asked about the foundational issues in quantum theory, we were told that no one fully understood them but that concern with them was no longer part of science.

Yet is it possible for such an approach to be dominant in engineering and concurrently to not consider engineering under a realist ontology? As a realist, I don't only have a realist ontological position (reality is ontologically independent of the human mind) but a corresponding epistemological position too, claiming that reality is knowledgeable by the human mind. The theories that humans develop to express reality, dialectically reflect the real world in a creative way (limited by historical circumstances), with successful technology and engineering being the result of the most accurate reflections of reality in the human mind (considering the historical limitations), the criterion of praxis.
Put it another way, how can we claim that nobody knows what a quantum state represents, when we successfully manipulate the quantum state of qubits using gates that produce statistically deterministic results? How can

The job was to take quantum mechanics as given and apply it to new problems. The spirit was pragmatic; "Shut up and calculate" was the mantra. People who couldn't let go of their misgivings over the meaning of quantum theory were regarded as losers who couldn't do the work.

we doubt the reality of a quantum state, when, for example, our colleagues in the University of Chicago just published about their success of managing to keep a quantum state intact for over five seconds (Anderson, Glen, Zeledon et.al, 2022)? How can we ignore the realistic Quantum Field Theory that is concerned with a level of reality that encloses the quantum? On the other hand, how can we really understand the quantum, if we have no understanding of basic philosophical categories? How can we interpret what the quantum state represents if we can't separate the category of potential from that of the real (Bitsakis, E. I., 1988)?

I will close those questions with an optimistic citation by Saridakis, from the recently published collection of papers that occurred by the work of the European Cooperation in Science and Technology "Cosmology and Astrophysics Network for Theoretical Advances and Training Actions" (CANTATA) action:

***"The investigation of Nature as a whole, and not only of specific parts of it, in order to reveal the truth, namely the physical laws that govern objective reality, is a hard and arduous procedure. A procedure that is not a solitary or instant play but it demands the collective work of scientific community in many generations. Nature is out there, it is knowable, and the physical laws, the first principles and the highest causes, are waiting to be discovered. It is up to us to accept the challenge".***

*(Saridakis, E. N., 2021, p.623)*

**References**


Anderson, C. P., Glen, E. O., Zeledon, C., Bourassa, A., Jin, Y., Zhu, Y., Vorwerk, C., Crook, A. L., Abe, H., Ul-Hassan, J., Ohshima, T., Son, N. T., Galli, G., & Awschalom, D. D. (2022). Five-second coherence of a single spin with single-shot readout in silicon carbide. Science Advances, 8(5). https://doi.org/10.1126/sciadv.abm5912

Aristotle. (350 B.C.E. a). Nicomachean Ethics (W. D. Ross, Ed.). The Internet Classics Archive. http://classics.mit.edu/Aristotle/nicomachaen.html

Aristotle. (350 B.C.E. b). Physics (R. P. Hardie & R. K. Gaye, Eds.). The Internet Classics Archive. http://classics.mit.edu/Aristotle/physics.html

Baggott, J. (2021, December 6). 'Shut up and calculate' does a disservice to quantum mechanics. Aeon Essays. https://aeon.co/essays/shut-up-and-calculate-does-a-disservice-to-quantum-mechanics

Bitsakis, E. I. (1988). Potential and real states in quantum mechanics. In A. van der Merwe, G. Tarozzi, & F. Selleri (Eds.), Microphysical Reality and Quantum Formalism: Proceedings of the Conference, Urbino, Italy, September 25th – October 3rd, 1985 (Vol. 1, pp. 47–63). Kluwer Academic Publishers. https://tinyurl.com/dyk5a3cy

de Haro, S. (2020). Science and Philosophy: A Love–Hate Relationship. Foundations of Science, 25(2), 297–314. https://doi.org/10.1007/s10699-019-09619-2

Patelis, D. S. (2019). Research, technology and the prospect of unifying humanity: research and technological activity in the dialectic of humanity's interaction with nature [Ερευνα, τεχνολογία και προοπτική ενοποίησης της ανθρωπότητας: η ερευνητική και τεχνολογική δραστηριότητα στη διαλεκτική της αλληλεπίδρασης της ανθρωπότητας με τη φύση]. ΚΨΜ. https://static.eudoxus.gr/books/91/toc-86194191.pdf

Saridakis, E. N. (2021). The End of the Beginning. In Modified Gravity and Cosmology (pp. 617–625). Springer International Publishing. https://doi.org/10.1007/978-3-030-83715-0_38

Smolin, L. (2007). The trouble with physics: The rise of string theory, the fall of a science, and what comes next. Mariner Books. https://tinyurl.com/3dp4rdta

# Kvantin toimittajat / Editors of Kvantti '22

Minkälainen on keskiverto Kvantin toimittaja? Kysyimme Kvantin toimitukselta nämä harkiten valitut kysymykset saadaksemme tähän vastauksen. Itse keskiarvon laskemisen jätämme kuitenkin teille, arvon lukijat.

- Mitä opiskelet ja minkä vuoden opiskelija olet?
- Mitkä kolme asiaa ottaisit mukaan autiolle saarelle?
- Lempi matemaattinen/fysiikan kaava?
- Jos voisit syödä vain yhtä ruokaa koko loppuelämäsi, mitä se olisi?
- Lisättävää?

What is an average Kvantti reporter like? We asked these carefully chosen questions to find out. However, we leave the actual calculation of the average to you, dear readers.

- What are you studying and what year student are you?
- Which 3 things would you take with you to a desert(ed) island?
- Favourite mathematical/physics formula?
- If you could only eat one food for the rest of your life, what would it be?
- Anything to add?

**Name:** Stergios Tsiormpatzis

**Studies:** QT, 1st year

**Island:**

- Insulin,
- knife,
- the not yet invented machine that transfer a friends of yours in your place for a day

**Formula:** Boltzmann-Planck equation

**Food:** rice of depression

**Extra:**

**Name:** Pinja Helasuo

**Studies:** Fysiikkaa, 4. Vuosi

**Island:** makuupussin, koiran ja lakua. päivät pulikoitais sen koiran kanssa ja sit illalla käperryttäis rannalle, minä makuupussiin lakupussin kanssa ja koira siihen viekkuun lempikeppinsä kera. mietittäis maailmaa ja seikkailtais taas seuraavana päivänä yhdessä!

**Formula:** pi = 3

**Food:** oon suuri ruoanlaiton ystävä, mut ikinä ei oo päivää kun ei pinskiletut (pinaattiletut) ja pepemake maittais <3

**Extra:** Oon kvantin saksan kirjeenvaihtaja hehe! (oon täällä siis vaihdossa elokuuhun asti)

**Picture:**

**Name:** Iris Kause

**Studies:** Toisen vuoden fyysikko / 2nd year physicist

**Island:**
- Lierihatun,
- aurinkolasit ja
- hyvän kirjan /
- A sun hat,
- sunglasses and
- a good book

**Picture:**

**Formula:** Pizzateoreema / The pizza theorem

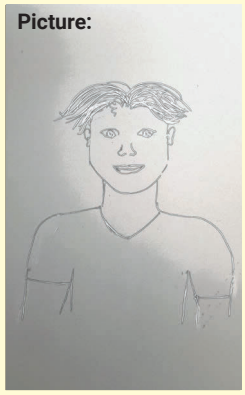
**Food:** Tuoretta leipää / Freshly baked bread

**Name:** Leevi Kaukonen

**Studies:** Matikka, 3.

**Island:**
- Dekkari,
- aurinkorasva,
- frisbee

**Picture:**



**Formula:** Identiteetti

**Food:** Täffän lohi

**Name:** Emma Tonteri

**Studies:** pääaineena systis, tänä vuonna tupsu!

**Island:**
- Saunan,
- kassillisen kirjoja ja
- jääkaapin josta löytyy aina sitä mitä haluun

**Picture:**

**Formula:** Tää ei oo kaava mut Markovin ketjut on ihan huippuja

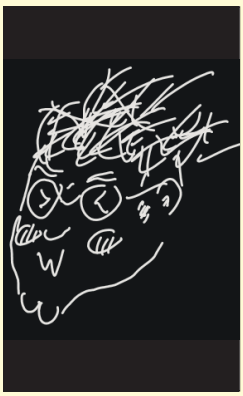
**Food:** Hanko sushin lohi poke bowl bängää ihan huolella xd

**Extra:**

**Name:** Kasper Väistö

**Studies:** Matikkatupsu

**Island:** Ketkä tahansa kolme kiltismouhoa



**Formula:** Residylause / Residue Theorem

**Food:** Kanachopelti

**Name:** Iina Manninen

**Studies:** Matematiikka ja systeemitieteet, 2. vuosi

**Island:** Kolme ystävää

**Formula:** Pythagoraan lause

**Food:** Juusto-suklaa

**Extra:**

**Name:** Amina Chahla

**Studies:** Second year quantum technology

**Island:**
- A fully operating ship filled with food and water if need be to leave
- kindle to be powered by said ship
- my unicorn slippers

**Picture:**

**Formula:** Shrödinger equation

**Food:** Pasta

**Extra:**

**Name:** Olli Winberg

**Studies:** Olen kolmannen vuoden matematiikan ja fysiikan lukija.

**Island:**

- Kastelukannun,
- tulentekovälineet ja
- aurinkolasit.

**Formula:** $P_A = A(A^TA)^{+}A^T$

**Food:** Peruna

**Extra:**

**Picture:**

**Name:** Marc Aguado

**Studies:** Quantum Technology (2nd year)

**Island:**

- Water,
- a sand castle mold,
- University Physics with Modern Physics by Young and Freedman (14th Edition)

**Formula:** Schrödinger equation :)

**Food:** Spanish Omelette

**Extra:**

**Picture:**

**Name:** Reetta Saine

**Studies:** Fysiikka, fukso

**Island:**

- Pehmolelu,
- puukko,
- makuupussi

**Formula:** E = hf

**Food:** Kasvissosekeitto

**Extra:**

**Picture:**

**Name:** Niko Savola

**Studies:** Fysiikka, 4. vuosi

**Island:**

- Sunscreen,
- computer, and
- rice cooker

**Formula:** Jaynes-Cummings model: $\hat{H}_{\mathrm{JC}} = \hbar\omega_c\hat{a}^\dagger\hat{a} + \hbar\omega_a\frac{\hat{\sigma}_z}{2} + \frac{\hbar\Omega}{2}\left(\hat{a}\hat{\sigma}_+ + \hat{a}^\dagger\hat{\sigma}_-\right)$

**Food:** Chicken curry

**Extra:**

**Picture:**

**Name:** Leevi Rönty

**Studies:** Systistä, neljäs vuosi

**Island:**

- Vene,
- paljon ruokaa ja
- joku laite millä voisin navigoida itseni takaisin ihmisten ilmoille.

**Formula:** Tällä hetkellä varmaan Euler-Lagrange -yhtälö t. Dynaaminen optimointi

**Food:** Pitsa olisi varmaan oma lemppari, mutta loppuelämästä saattaisi tulla aika lyhyt

**Extra:**

**Picture:**

**Name:** Aapo Pajala

**Studies:** Matematiikka, 4. vuosi

**Island:**

- Kitara,
- kirjoitusvälineet (1 kpl),
- aurinkorasvaa (mä palan tosi helposti))

**Formula:** Bezout'n lemma on varmaan tarpeeks kaava

**Food:** Nuudeliwokki

**Extra:**

**Picture:**

**Name:** Meri Aho

**Studies:** Matikkaa, 4vsk

**Island:**
- sänky,
- peitto ja
- tyyny

**Formula:** 1+1=2

**Food:** pizzaa

**Extra:**

**Picture:**

**Name:** Lotta Mäkinen

**Studies:** Systis, 2.

**Island:**
- Lämpimän takin (oon vilukissa!),
- ensiapulaukun ja
- hyvän kirjan

**Formula:** Poisson formula for a ball

**Food:** Kaurapuuro kaikilla eri lisukkeilla!

**Extra:**

**Picture:**

**Name:** Teemu Mäki

**Studies:** Matematiikka, N. vuosi

**Island:**
- Puukko,
- Tulukset,
- Kvantin numero 1/2022

**Formula:** 1+1=2

**Food:** Kaurapuuro

**Extra:** "Sellasta se elämä on"

**Picture:**

**Name:** Akseli Anttonen

**Studies:** Matematiikka n

**Island:**
Kynän ja
paljon
paperia

**Formula:** Noetherin teoreema

**Food:** Pinaattiletut

**Extra:**

**Picture:**

**Name:** Atso Ikäheimo

**Studies:** 4. vuoden fysiikan opiskelija

**Island:**
- Linkkuveitsi,
- trumpetti ja
- Iijoki-sarja

**Formula:** Tsiolkovskin laki

**Food:** Kasvistagine

**Extra:**

**Picture:**

**Name:** Karoliina Oksanen

**Studies:** Quantum Technology, 2nd year

**Island:**
- Chocolate,
- a quitar and
- a machine capable of accessing all past, present and future issues of Kvantti (aka a computer but with time-travel)

**Formula:** F = ma

**Food:** Biryani

**Extra:**

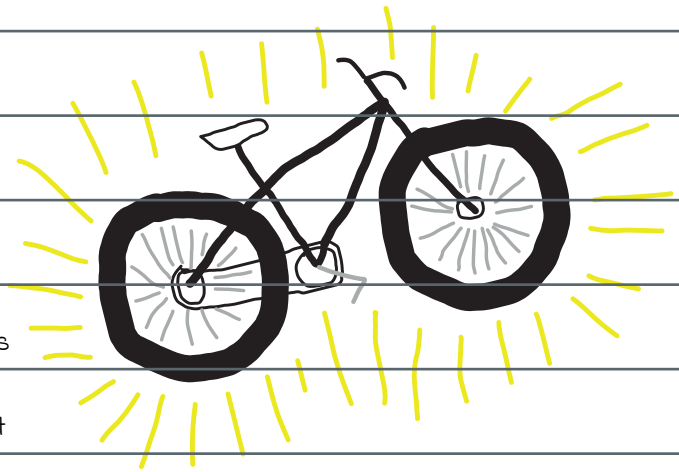
**Picture:**

# How to ride a bike(in the winter)

There are many good reasons to learn to ride a bike in the winter. Maybe you need to go places and you don't have access to other means of transportation. Or maybe walking doesn't sound so fun. Or maybe you are doing it for fun. Let's assume your winter consists of snow and ice. Otherwise there wouldn't be much left to discuss here. When riding in the winter, you need to consider two things:

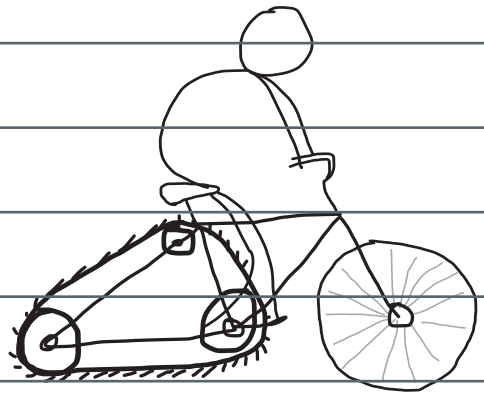
* Snow
* Ice

Let's start with the first point.



## Get a fatbike

The easiest way to solve the snow problem is to buy a fatbike. The were designed for exactly this purpose and that's why they solve the problem almost completely. If for some reason you don't want to invest in a fatbike, keep reading.

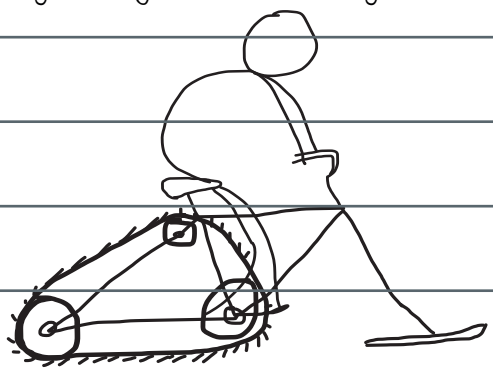


## Add treads

You can replace the rear wheel with a tread to improve traction on snow. This is what snowmobiles commonly use. The reason for increased friction isn't larger surface area, it is the fact that a tread can grip the snow more effectively. It lowers the pressure your vehicle applies to the snow below and it can even let you go on the snow rather than through it like you would have to go with a bicycle.

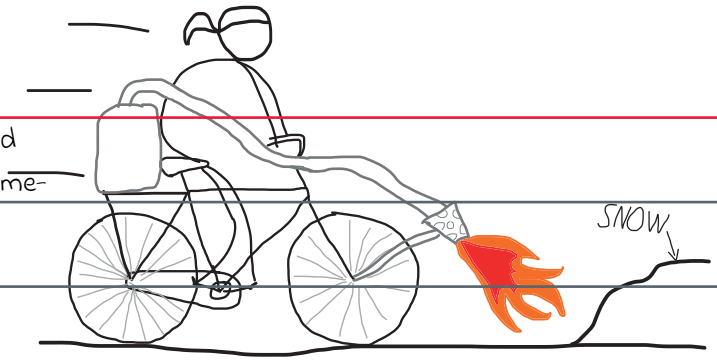
## Add a ski

Extending the previous idea, you can replace the front wheel with a ski. It will make your bike easier to manuever. At this point you have essentially reinvented the snowmobile -- except this time with an oatmeal powered engine.



According to Wikipedia a bicycle is a "-pedal-driven -- vehicle, having two wheels attached to a frame, one behind the other", hence the name bicycle. By this definition the above contraption is no longer a bicycle. This also means this idea cannot be taken further by saying that why not take advantage of the small traction and turn it into a sled.

# Fire




Let us consider melting the snow ahead on the road. To do this you need a flame-thrower attached to the front of your bike and you need to carry around a large tank of fuel of your choice.

Acetylene, butane, gasoline and methane are widely available and are used in all sorts of burners. The also share a similar energy content, around 50 MJ/kg. Here is an equation that tells how much power is needed to melt the snow ahead of us when we're riding at a constant speed.

power = speed * width of track * thickness of snow * density * heat needed to melt snow

The formula assumes that all energy goes towards melting the snow. In reality this is not the case. We can except efficiency of lower than 0.5. Now suppose there was a 10 cm thick crust of snow on the ground at a temperature of -10°C and you wanted to melt a 10cm wide track in it(you can still ride in a 10 cm wide track comfortably). You ride the bike at a pretty low 18 km/h speed, that is 5 m/s. This is how much power you will need:

power = 5 m/s * 0.10m * 0.10m * 550 kg/m^3 * (2.09 kJ/kgK * 10K + 333 kJ/kg)

power = 9732.25 kJ/s ≈ 10 MW

That is quite a lot of power. You would need to burn 200 grams of fuel per second to make your way through the snow. From a mathematical perspective, is there anything we can do? Well we can make the power requirements lower by assuming better conditions. Let us assume there is only a 2 cm layer of ice ahead of you and that the ice is at temperature 0°C. Now you need to produce the following power:

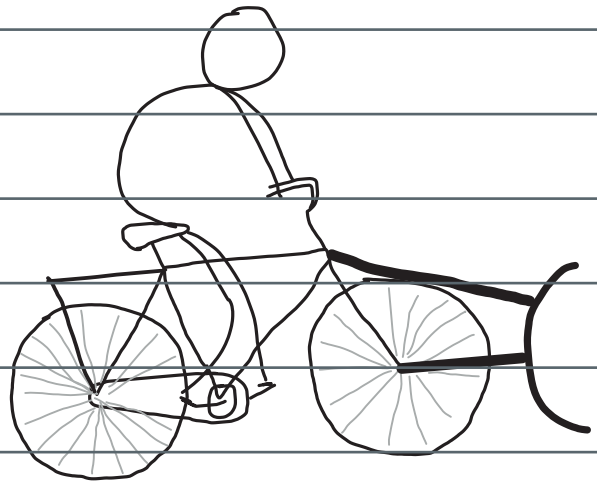
power = 5 m/s * 0.02m * 0.10m * 917 kg/m^3 * 333 kJ/kg = 3053.61 kW ~ 3 MW

Consider the previous result an average. This is the best case scenario. That is still a lot of power even though we are riding in ideal conditions. Well I guess in the ideal conditions there would be no snow...

You'll need about 12 kilograms of fuel for each kilometer you travel in the ideal world, where all the aforementioned assumptions hold. That is 12 kilograms of pure fuel, without containers, which are pretty heavy on their own. That number could easily be an order of magnitude higher in the real world. I'd imagine even the strongest of us would start to struggle a bit even on a 3 kilometer journey if they

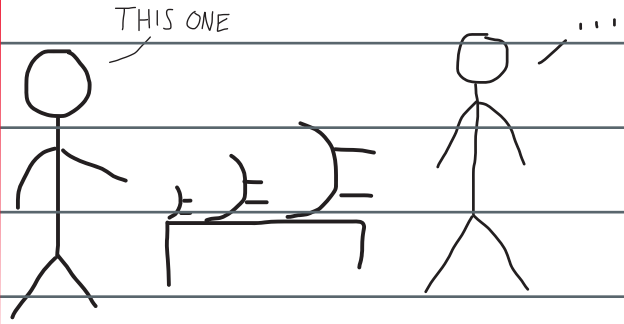
had to carry way over 36 kilograms of extra weight with them. There would also be the propulsion force from the flame which we didn't consider at all. It probably would be pretty small in this scenario and wouldn't change much and the change wouldn't for the better either. So this approach is not very practical. It would be super cool though.

## Make your own snowplow



Moving snow takes much less work than melting it. You can try to solve the problem the same way some cars, trains and other vehicles do it: by installing a snowplow to the front of your bicycle.

You want to get the smallest plow possible such that its width matches the width of the track you want to make. This optimizes the work you have to do. The height of the plow isn't that important but it should be at least the same as the depth of the snow.



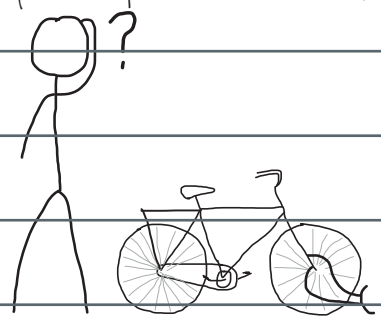

Let the width of our snowplow be 20cm and the height 10 cm. Snowplows are typically about 3 times as wide as they are tall. This one is a bit smaller. If you have more than 10cm of snow you must use a larger plow. The cross sectional area of our snowplow is 0.02m<sup>2</sup>. The drag coefficient for our snow plow is about 1.2. We are riding at a pretty normal speed of 18 km/h, that is 5 m/s. We can use the drag equation to solve for the amount of power needed to plow the snow at a constant speed.

power = 0.5 * speed^3 * density of snow * area * drag coefficient

power = 0.5 * (5m/s)^3 * 550 kg/m^3 * 0.02m^2 * 1.2

power = 832.5 W

According to Wikipedia, an average adult biker can produce about 50 or 150 watts of power while an elite biker can produce up to 400 watts. We can see that we can't ride the bike at that speed with a snow plow attached to it. We need to go slower. At a speed of 10.8 km/h the power requirement becomes 178.2 watts and at 7.2 km/h it's 52.8 watts. At those speeds it is certainly possible to use your own snow plow to clear the path.




Your snowplow would be much smaller then depicted in the previous figure. Here's a more accurate description:

These were some ways you can deal with snow. How do you deal with ice? Here are a few tips and ideas:

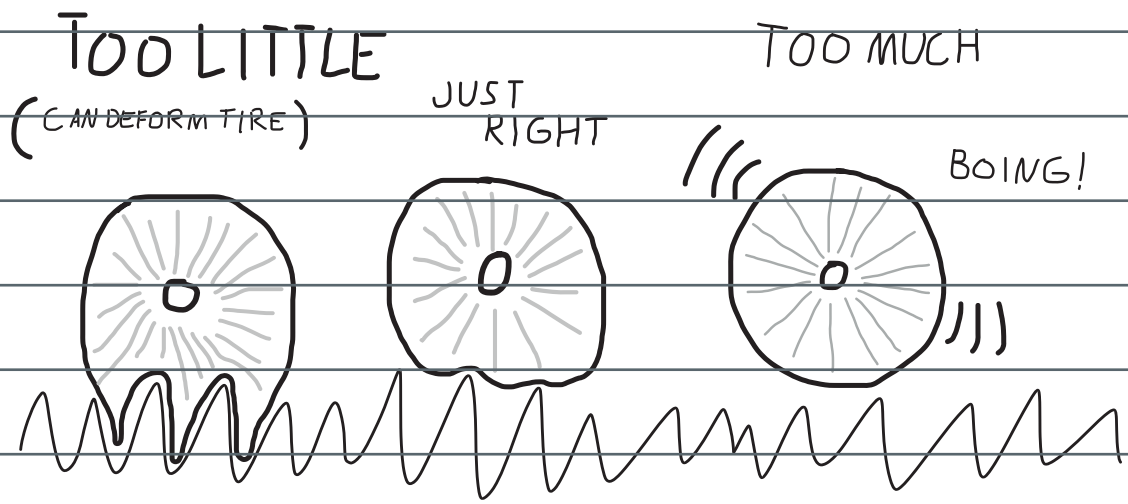
## Lower tire pressure

Lowering tire pressure causes the tire to flatten a bit. The flattening allows slightly larger surface area to be in contact with the ice. Although in theory larger surface area does not equal larger friction, this isn't what happens here.

This equation is just here to show how to calculate friction, in case you need it.

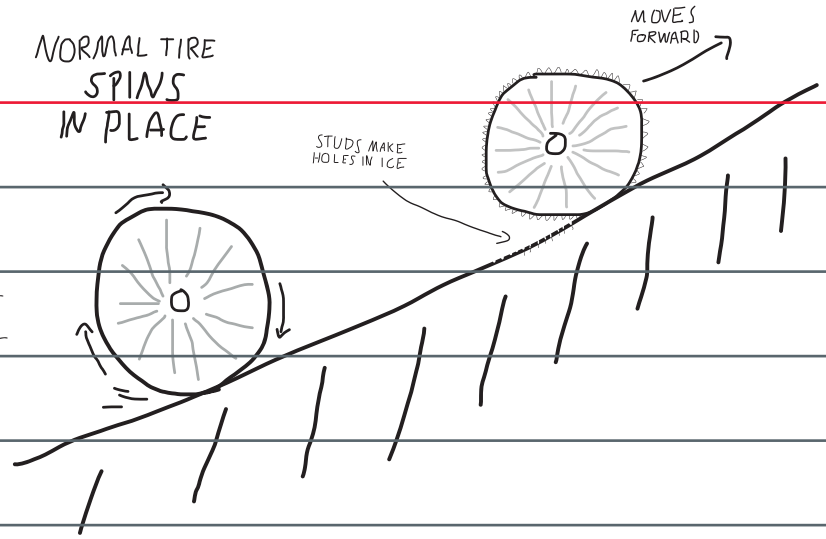
friction force = friction coefficient * normal force

The profile of the road is constantly changing. Having a larger contact area increases the propability of having a "good" friction coefficcient. This is due to more points of the tire being in contact with the ice. This phenomenon is more apparent in the winter and needs to be addressed. During other seasons when it's not slippery the friction coefficient is always large enough to keep you going. The road is more forgiving on your choice of tire pressure. In winter it is not. This was surprisingly difficult to explain. There are a lot of complex physics going on behind this simple trick.



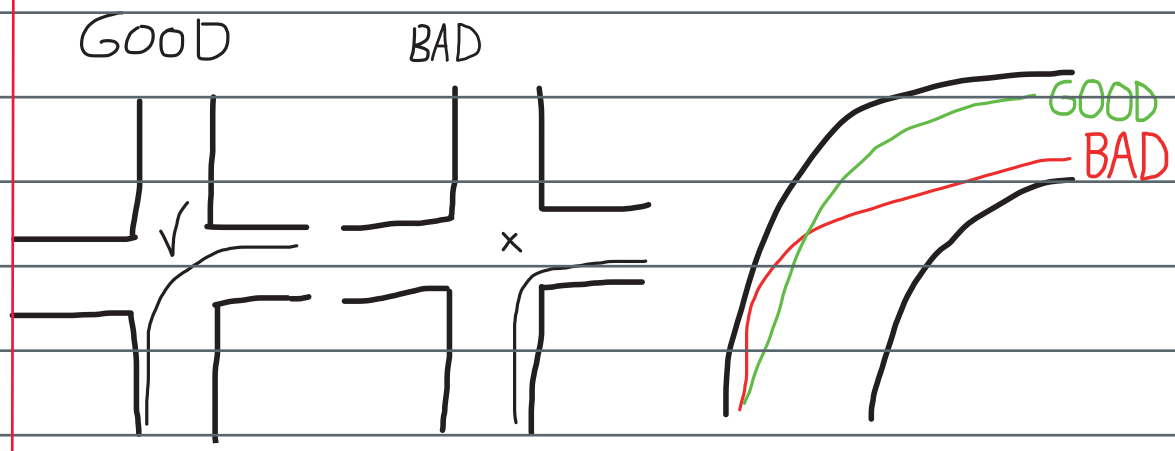
## Studs

Using studs will signifficantly increase your grip as the they bite into the ice. The friction coefficient for a rubber-ice interface is typically between 0.1 and 0.15. With a studded tire this is typically around 0.4, which is signifficantly better. For comparison, the coefficient for rubber and asphalt is usually between 0.5 and 0.7 depending on the wetness of the surfaces.

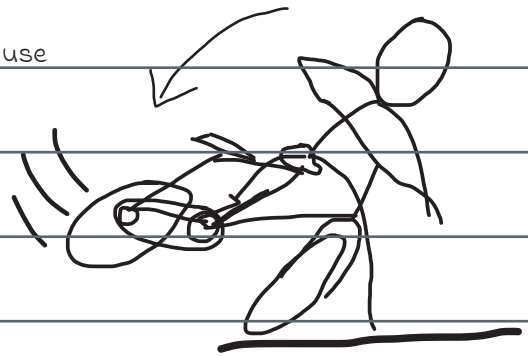



## Avoid sharp turns and sudden movements

From a physics point of view you can't fall if the net force and torque affecting you is zero. In most cases the excessive torque is caused by the centripetal force, which is present when turning. It causes torque on the bike. Normally you counteract this by leaning. Your leaning will create an opposing torque on the bike resulting in no net rotation. When friction and the torque caused by it disappear or become too small, the bike will spin in the direction you're leaning towards i. e. you'll fall. Riding on ice, there isn't always enough friction to provide centripetal force to keep you on a circular track, so you must either go slower or turn more widely than normally to oppose this.

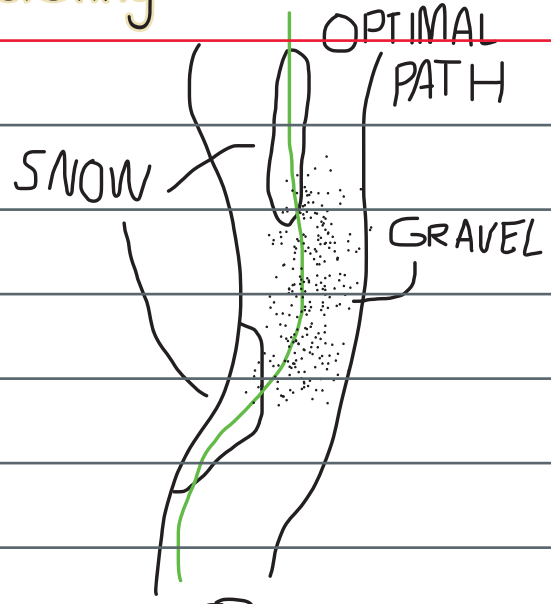



You can even let your bike oversteer while turning. You can use your legs to help pull this off.



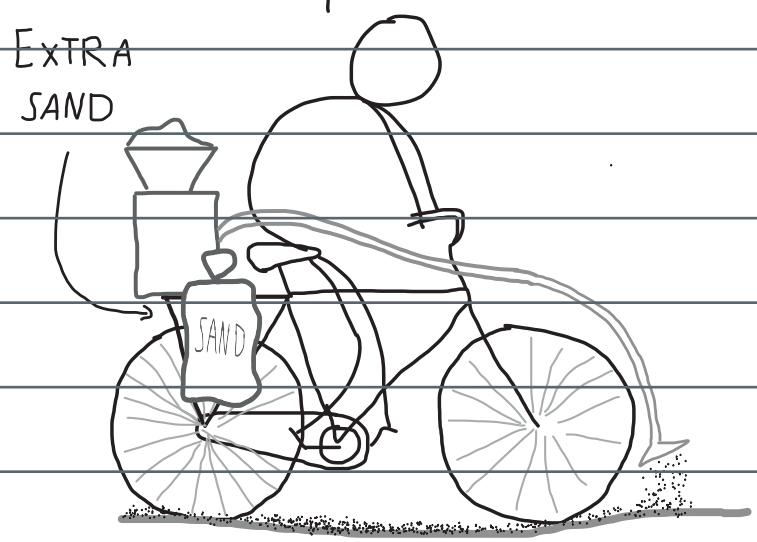
# Accelerating and decelerating

Ice is slippery and changing your velocity on it can be difficult. Packed snow, however, is not nearly as slippery. That's why you should try to do all adjustments to your speed on packed snow, gravel or exposed patches of land.




## Sand

Many areas in a neighbourhood are sanded every winter to avoid accidents. It should be no problem to ride your bike in a well sanded area. However when you encounter a road that has not been sanded, you have a problem. You can carry around sand to, well, sand the road ahead of you. Sanding will multiply your chances of success as it will significantly increase traction between your bike and the road. The main problem with this method is the weight of the sand. It was surprisingly difficult to find data on this subject so we will have to approximate.



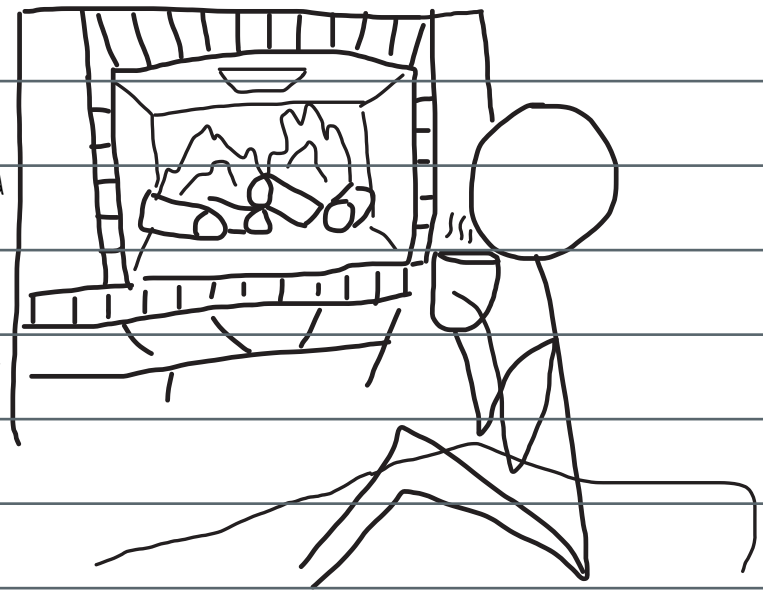

Let's assume that sand covers about a quarter of the surface of the road. A 20 kg bag of sand may have a volume of 0.011424 cubic meters. The grains of sand are 3-6 mm in diameter so let's assume that we have a uniform 3mm layer of sand. If you can be so precise as to sprinkle the sand in a 10 cm strip(on which you can definetely still ride your bike on), you can cover a whopping 152 meters with one bag.

That is not very good. You'd need around 130kg of material per kilometer traveled. It could come close to the gas bottles from earlier. That was just 12 kilograms of gas per kilometer in an ideal world. That would easily turn to over 100 kilograms of extra weight in the real world. If we wanted to cover a kilometer with one bag, we would have to lower the density to less than four percent and after that the sand likely won't do much good. The same propulsion problem we saw earlier in the paragraph about fire persists, but again, it wouldn't change much here.

# Final words of wisdom

The best way to ride a bike in the winter is to just do it. You'll get better as you go, and you would have figured most of these tips out through trial and error anyway. Hopefully these tips still prove themselves more or less useful. You can go outside now and do it. Ride your bike and enjoy the winter.

...or you can stay indoors, warm up, drink coffee and wait for summer.



Thank you for taking the time to read this! This was inspired by the How to-book by Randall Munroe and my recent experiences with cycling in the most difficult winter conditions I have ever encountered.

## Sources:


MAOL, 6. edition<br>
https://en.wikipedia.org/wiki/Liquid_hydrogen, read 9.3.2021
https://en.wikipedia.org/wiki/Methane, read 9.3.2021
https://en.wikipedia.org/wiki/Gasoline, read 9.3.2021
https://en.wikipedia.org/wiki/Acetylene, read 9.3.2021
https://en.wikipedia.org/wiki/Butane, read 9.3.2021
www.linde-gas.fi , read 9.3.2021
https://physics.stackexchange.com/questions/500562/why-does-low-tire-pressure-increase-friction, read 9.3.2021
http://ffden-2.phys.uaf.edu/211_fall2013.web.dir/connor_mattson/physics.html, read 9.3.2021
https://www.theproscloset.com/blogs/news/a-beginners-guide-to-bike-tire-pressure, read 9.3.2021
https://core.ac.uk/download/pdf/80716643.pdf, read 10.3.2021
https://en.wikipedia.org/wiki/Drag_(physics), read 10.3.2021
https://en.wikipedia.org/wiki/Drag_coefficient, read 10.3.2021
https://en.wikipedia.org/wiki/Snow, read 10.3.2021
https://en.wikipedia.org/wiki/Human_power, read 10.3.2021
https://www.k-rauta.fi/tuote/hiekoitussepeli-weber-murskattu-3-6mm-20kg/6415910032982, read 10.3.2021

# Does Finland Exist?

By Marc Aguado

After over one year of very in-depth investigation, I am finally ready to write this article where I will be exposing my arguments using FACTS and LOGIC to answer the most important question of our lifetime: Does Finland Actually Exist?

The first place we have to look at to answer the question is statistics, more specifically government censuses and margins of error. There are approximately 7.9 billion humans on Earth, and according to the census of the alleged country of Finland, there are about 5.5 million Finns. That's roughly 0.00069% of the world's population, or to put it in another way, over 99% of the planet is inhabited by non-Finnish people. On average, government censuses have a margin of error of at least 1% and Finnish people make up 0.00069% of the planet, plus or minus 1%, so that means that there is a 50/50 chance that Finland doesn't exist.

After formulating and calculating these incredible statistics that have no fault in their LOGIC whatsoever, I decided to email them to some of the Aalto math professors. None of them ever replied. "Those that keep silence can only be accomplices" I said to myself, so I then proceeded to send the statistics to every Finnish person I knew of, including my girlfriend, to see if any of them would crack their silence and admit the truth!

Once again none of them replied, except for my girlfriend, who told me that she couldn't deal with my craziness anymore and that she would leave me if I didn't stop with my investigation. "So, the conspiracy runs that deep huh?" I told her. "You're one of them!" I shouted at her, multiple times. She left me the following day.

Thankfully, my sadness didn't last long, because at 2am during Juhannus I met a Finnish gal who goes by the name of Minttu Rakastaja. She admitted the truth about the (in) existence of Finland, and then proceeded to vomit all the alcohol she had in her body, or guilt as I like to call it.

If that didn't convince you, let's take a look at the second argument: my experience in this alleged country. Ever since I got here, I have been treated with kindness, respect, and friendliness. I have felt welcome from day one by the citizens of this alleged beautiful nation. I have been very happy and made lots of Finnish friends (or accomplices, depending on how you look at it) whom have helped me adapt and have made my life easier, even though they weren't required to. There's a saying that goes like this: "If it's too good to be true, it probably is", so take that as you wish.

And if that didn't convince you I have the ULTIMATE witness, the one that will put an end to the big question, and here's his statement:

Unfortunately Marc has been missing for the past two weeks and we know nothing about him. If anybody knows where he is please let us know ASAP

-Editor-in-Chief

Sources:
-Facebook
-TikTok
-Reddit
-Astrology
-Trust me bro

# Join Women of Aalto!

What?
Women of Aalto is a network of students which unites the future talents of tech, business and art from Aalto University. We are here to offer a chance for you to get support and encouragement from like minded people and to grow both as a person and as a professional. We promote equality in everything we do and want to help our members surpass their limits. To achieve our vision, we organise inspiring professional events, eg. panel discussions, as well as casual mingling, such as relaxing sauna evenings and the women's sits.

For Whom?
Everyone is welcome, regardless of gender! Our membership is free of charge and doesn't oblige you to anything. As a member you'll be amongst the first ones to know about what's happening in the community and you'll get notified of upcoming events, eg. the museum tour...

How?
Fill out our membership form and join our telegram group easily with the QR-codes below!

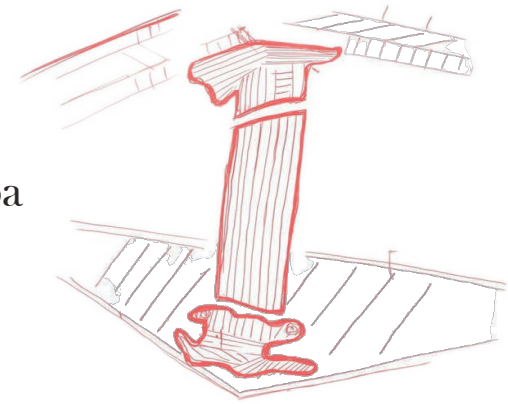
# Materializing ideologization of the instincts

The scholar floated in front of the bloated clock.
The human rhythm of time
flowed through his bluish body.
“And where is the lust?” he thundered at a moment...
He touched the freshly bloomed clover and sighed encouraged.
Soon, the voluptuously pulsating beauty of the woods
of the oceanic plateau, distorted the time sequence.
The denial of the temporal continuum created in him
the sense of the freely determined
rebellious comradeship
of the submerged human temple of the future.
“So will all the priesthoods burn!” he shone,
keep floating on the edge of his timeless micro-universe.

extract translated from the Greek original
written (2003) and translated (2022) by Stergios Tsiormpatzis

# Luonnostelija

Silmäkulmat rypistyvät hymystä, joka kiristää suupieliä. En ole varma hymyileekö hän kireästi vai onko hänen hymynsä kasvoja puristava aidoimmillaankin. Jotakin hän kai tokaisee seuralaiselleen. Olen taitamaton huuliltalukija. Ihmiset vaikuttavat älykkäämmiltä silloin, kun heidän sanojansa ei kuule. Niissä on potentiaalia olla elegantteja, mutta kun ne on määritelty, onnistuvat ne vain harvoin säväyttämään. Puhuminen on rujo tapa ilmaista ajatuksiaan.



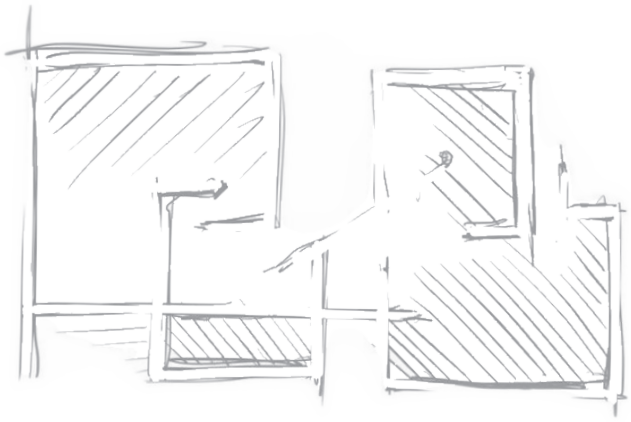
Ei mikään klassinen kaunotar, ajattelen. En ole varma, mikä hänen persoonallisessa ulkonäössään kiinnittää huomioni niin tiiviisti. Ehkä olen tuntenut jonkun häntä muistuttavan. Tuttuus ja symmetrisyys viehättävät ihmistä. Luonnoton otsakiehkura kehystää kasvoja, joita hallitsee päättäväisyys. Avaan luonnostelu-vihon ja vedän muutaman viirun pehmeällä lyijykynällä. Paperi näyttää sotkuiselta. En ole piirtäjä, mutta ajatuksen tavoittaminen jälkikäteen on helpompaa kuvista kuin sanoista.

Minulla on ollut jo pidempään haasteita sen jälkeen, kun naapurin iäkäs herra kuoli pois. Oli ollut tapanani tutkailla hänen liikkeitään niin ovisilmästä kuin sisäpihalle avautuvista ikkunoistani. En ikinä tee inspiraation lähteisiini tarkempaa tuttavuutta, mutta jokin minussa tuntuu pysähtyvän aina silloin,

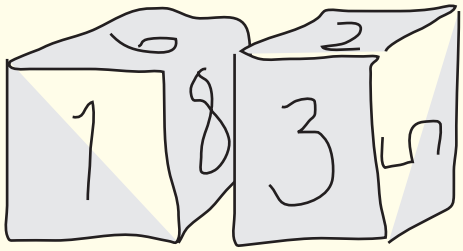
kun joudun luopumaan innoittajastani. Konkretiaa ja käytännönläheisyyttä arvostava ystäväni sanoisi, että en voinut muodostaa ihmissuhdetta toisen osapuolen tietämättä asiasta. Hänen mielestään tuntemattomista inspiroitumiseni on pelkkää oman mielikuvituksen liitoa, jossa yritän väkisin löytää kohdetta tunteilleni. Vähän niin kuin sähkövaraus etsii reittiä maahan. Olen yrittänyt selittää hänelle, että kyse on jollakin tasolla samasta, kuin tuhansien ihmisten kokiessa internetin kuuluisuuden ystäväkseen. Minua vain kiinnostavat ne ihmiset, jotka eivät jaa elämäänsä tarkoituksellisesti ventovieraille. He haastavat minua.

Ensimmäistä kertaa suruni jälkimainingeissa, kekseliäisyyteni kuopassa tunnen mahdollisuuden aavistuksen. Lähikonditorian kulmapöydästä apatian tilalle hiipii vienoa innostusta. Ei kuitenkaan pidä rakentaa liikaa mielikuvia. On odotettava rauhassa ja tultava tänne useammin. Jos osun oikeaan, hän saapuu tänne toistekin. Ja minun työni voi imeä tarkoitustaan tuosta mitään aavistamattomasta tavallisesta ihmisestä.

Iina Manninen



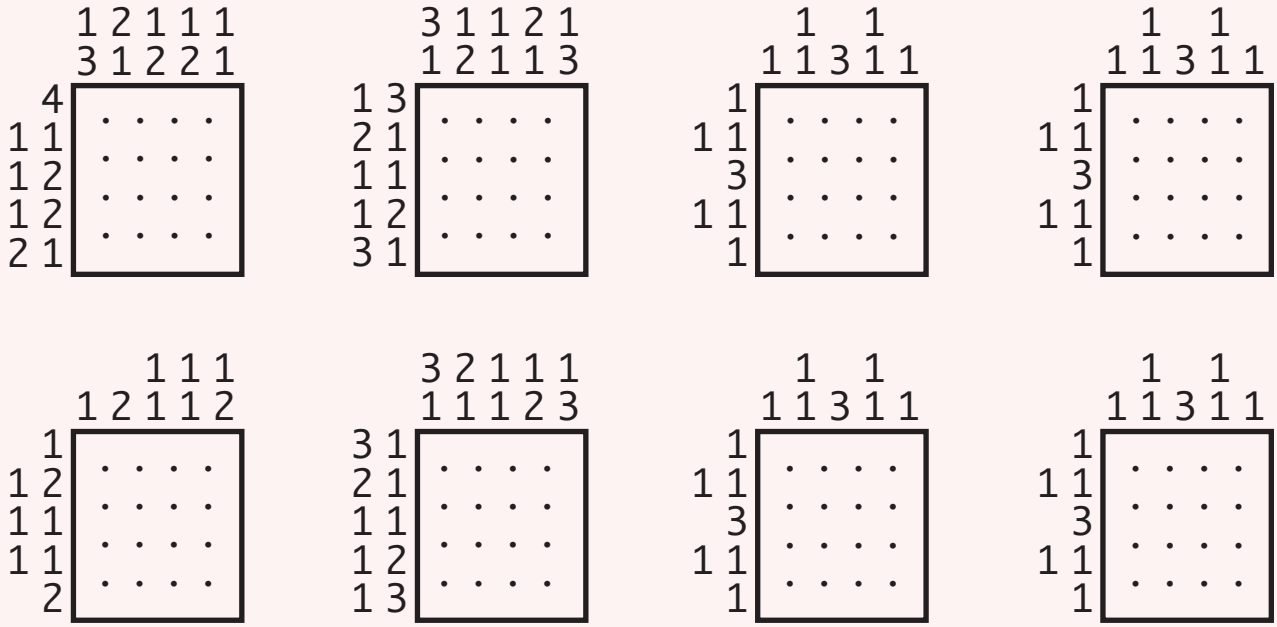
# Puzzle Corner



## Dice for every day of the month

You have two six sided dice and you want to show all the numbers from 01–31 with them. What numbers do you put on each die to achieve this?

## Little nonograms

Your task is to color some of the cells according to the clues given for each row and column. The clues tell the lengths of continuous colored patches on that row or column. For example the clue '3 1' means that the row or column has at first three consecutive colored cells, then a gap, then one colored cell. Each of these continuous patches is separated by at least one uncolored cell.

The four rightmost ones all have the same clues, but there exist four separate solutions. Can you finde them all?