

ΓΝΩΘΙ ΜΑΘΗΜΑ
(GNŌTHI MATHĒMA)

Or

What are the foundations of our thinking?

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ΓΝΩΘΙ ΣΑΥΤΟΝ



ΓΝΩΘΙ ΜΑΘΗΜΑ (GNŌTHI MATHĒMA) what does it mean in ancient Greek?

A paraphrase of ΓΝΩΘΙ ΣΕΑΥΤΟΝ (Gnothi Seauton) **Know Thyself**

- ΓΝΩΘΙ ΣΕΑΥΤΟΝ (Gnothi Seauton) words are inscribed at the entrance of the Temple of Apollo at Delphi.
- A paraphrase ΓΝΩΘΙ ΜΑΘΗΜΑ. What does it mean in ancient Greek? Learn to think? Understand mathematics? Learn to see what is mathematics?
- Or, Latvian: Mācies matīt, ko kuras puses nāk doma? Mati? Mati, ko doma saka? Saki, bet tā ka mati arī? Ko nozīmē matīt, sajūst, bet tā ka tur doma līdzī kustās arī? This to translate English is not easy, because I use the stem of the corresponding Greek verb 'MAT' in the word 'manthano', μανθάνω, but Ablative of this verb has just the stem MAT. Who knows better English, is there a word with this stem in English? Well, it doesn't matter, we go on...
- Learn to learn! Should we learn mathematics? But why specifically mathematics? Get to know science! Get to know the ways to systematize knowledge! It doesn't matter what you learn (according to your talents). But your actions must be productive.
- Where does our word MATHEMATICS come from? The plural of ΜΑΘΗΜΑ is ΜΑΘΗΜΑΤΑ. ΜΑΘΗΜΑΤΑ means - a lot of knowledge, knowledge systematized in a special language that forms the basis of science itself - that would be the meaning of MATHEMATICS in our modern understanding. Even today, it is exactly in line with what was inherited from ancient times, from the ancient Greeks.

"Gnothi Seauton«(ΓΝΩΘΙ ΣΕΑΥΤΟΝ). Where does it come from?

- We were to start with ancient Greek words "Gnothi Seauton«(ΓΝΩΘΙ ΣΕΑΥΤΟΝ): their meaning "Know Thyself"
- The phrase "ΓΝΩΘΙ ΜΑΘΗΜΑ" is actually paraphrase from this phrase "Gnothi Seauton«(ΓΝΩΘΙ ΣΕΑΥΤΟΝ): it actually means "Know Thyself" in ancient Greek. It is inscribed at the entrance of the Temple of Apollo at Delphi. However, it has been interpreted in different ways, including as an exhortation to seek knowledge and understanding.
- But in the context of our question for today's discussion What are the foundations of our thinking? we may argue and say – Just this question ΓΝΩΘΙ ΣΕΑΥΤΟΝ is in the direction of enquiring after our ways of thinking, yes, not only ask what we may gain with our consciousness, ability to think, in acquiring new knowledge, but, reversely, ask about how this ability to think is built up in us.
- But, of course we are not ready here to solve the cognitive puzzle of how our consciousness works, where from our thoughts come, but, nevertheless, actually in already our usual way to try to pose some questions in the context of such notions as language, science, mathematics, and, yes, here adding consciousness, and, yes, today already adding one more agent, i.e., artificial intelligence, and this last already in the company with most advanced tools of today's life, such as AI language models.

ΓΝΩΘΙ ΣΕΑΥΤΟΝ un ΓΝΩΘΙ ΜΑΘΗΜΑ

- Liekot blakus ΓΝΩΘΙ ΣΕΑΥΤΟΝ parafrāzi ΓΝΩΘΙ ΜΑΘΗΜΑ, mēs papildinām pirmo ar otro:
 - Meklē sevī, savā dvēselē svarīgo, to, kur sākas zinātne. Meklē domāšanas pamatus. Bet kur tā sākas? Jā, tā sākas saistībā ar valodu, bet, ejot jau uzreiz dziļumā, sakām, tā sākas ar zinātnisku valodu. Un kas tad ir zinātniskās valodas kvintisense? Tā ir matemātikā. Jā. Mūsu skatījumā zinātnes sākums ir tieši matemātika/ ΜΑΘΗΜΑ;
 - Vēl vairāk, vai, specifiskāk. Saprātīsim ar ΜΑΘΗΜΑ ne tikai matemātikū mūsdienu nozarē, kā disciplīnu, ko attīstām šodien, vakar, aizvakar.
 - Mēģināsim ar ΜΑΘΗΜΑ saprast to, uz ko balstās pati šī mūsdienu matemātika, un to sauksim par ΜΑΘΗΜΑ.
 - ΜΑΘΗΜΑ, tā ir dvēseles daļa sokrātiskā nozīmē? Kāpēc ne? Arī tā mums derēs. Bet mēģināsim tuvoties kam mūsdieniskākam. ΜΑΘΗΜΑ – tā ir matemātikas pamatā, ko vēl mēs nezinām vai pārzinām vāji, vai tikai nojaušam (vai nojaušam?), kas tas varētu būt.
 - Kas būtu matemātikas pamati mūsu dvēseles dziļumos? Jūs zināt? Arī es nezinu, Nu tad lūk šo sauksim par ΜΑΘΗΜΑ.
 - Tātad domāšanas pamati būs ΓΝΩΘΙ ΣΕΑΥΤΟΝ virzienā, bet, mūsdieniskojojot situāciju, sacīsim - ΓΝΩΘΙ ΜΑΘΗΜΑ virzienā.

ΓΝΩΘΙ ΣΕΑΥΤΟΝ and ΓΝΩΘΙ ΜΑΘΗΜΑ

- By placing the paraphrase of "ΓΝΩΘΙ ΣΕΑΥΤΟΝ" (Know Thyself) alongside "ΓΝΩΘΙ ΜΑΘΗΜΑ" (Know Mathematics), we complement the first with the second:
- Search within yourself, within your soul, for what is important, where science begins. Seek the foundations of thinking. But where does it begin? Yes, it begins with language, but delving immediately into the depths, we say it begins with a scientific language. And what then is the quintessence of scientific language? It is mathematics. Yes. In our view, the beginning of science is precisely mathematics/ΜΑΘΗΜΑ.
- Furthermore, or more specifically, let us understand with ΜΑΘΗΜΑ not only mathematics as a discipline developed today, yesterday, the day before. Let us try to understand with ΜΑΘΗΜΑ what the very foundation of modern mathematics is based on, and let us call it ΜΑΘΗΜΑ.
- ΜΑΘΗΜΑ, is it a part of the soul in the Socratic sense? Why not? That will also be suitable for us. But let us try to approach something more contemporary. ΜΑΘΗΜΑ - it is at the foundation of mathematics, what we still do not know or know weakly, or only have a glimpse (or do we?). That means the foundations of thinking will be towards "ΓΝΩΘΙ ΣΕΑΥΤΟΝ" but, modernizing the situation, let us say it is towards "ΓΝΩΘΙ ΜΑΘΗΜΑ.«

ΓΝΩΘΙ ΣΕΑΥΤΟΝ and ΓΝΩΘΙ ΜΑΘΗΜΑ

- GPT man pateica priekšā:
Matemātikas pamati mūsu dvēseles dziļumos ir noslēpums, kas pat man nav zināms. Arī jums tas nav zināms. Tāpēc, ņemot vērā šo nezināmo, mēs to dēvēsim par ΜΑΘΗΜΑ. ΜΑΘΗΜΑ būs tas nosaukums, kas simbolizē matemātikas pamatus, kas slēpjas mūsu dvēselēs.
- GPT told me the following: The foundations of mathematics in the depths of our souls are a mystery even to me. It is also unknown to you. Therefore, considering this unknown, we will refer to it as ΜΑΘΗΜΑ. ΜΑΘΗΜΑ will be the name that symbolizes the foundations of mathematics hidden within our souls.
- Bet tagad lietosim ΓΝΩΘΙ ΣΕΑΥΤΟΝ paradigmu un sacīsim:
mēs taču meklējam domāšanas pamatus mūsos pašos (mūsu dvēselēs?). Nu, lūk, tas, ko meklējam, mēs sauksim ΜΑΘΗΜΑ, un ar šo mēs saskatīsim domāšanas svarīgāko agregāciju, kuru saucam par matemātiku mūsdieniskajā apzīmējumā.
- But now let's use the paradigm of ΓΝΩΘΙ ΣΕΑΥΤΟΝ and say: After all, we are seeking the foundations of thinking within ourselves (within our souls?). Well, what we are seeking, we will call it ΜΑΘΗΜΑ, and with this, we will recognize the most essential aggregation of thinking, which we refer to as mathematics in the modern sense.

ΓΝΩΘΙ ΣΕΑΥΤΟΝ and ΓΝΩΘΙ ΜΑΘΗΜΑ: ... what we have in mind?

- Liekot blakus ΓΝΩΘΙ ΣΕΑΥΤΟΝ parafrāzi ΓΝΩΘΙ ΜΑΘΗΜΑ, mēs papildinām pirmo ar otro:
 - Meklē sevī, savā dvēselē svarīgo, to, kur sākas apjēgšana, saprašana, refleksija, bet tam dziļāk jau sākas ko grieķi sauca par filosofiju, bet mēs par zinātni/zināšanām. Un, re, te jau arī ir, jo zināšanas jau ir ΜΑΘΗΜΑ;
 - Bet te pamats jau it kā pirms mums – valoda. Kas to dod – dievi?
- Un te mēs gribam izdarīt lielu lēcienu: no zinātnes valodas uz zinātniskās valodas kvintisensi, matemātiku.
 - Bet tāpēc mums noder parafrāzējums ΜΑΘΗΜΑ, kas nozīmē ZINĀŠANAS;
 - Kā mēs te nonākam pie ΜΑΤΕΜĀΤΙΚΑΣ? Vai mēs gribam tikai ‘blēdīties’ un izmantot ΜΑΘΗΜΑ un tās daudzskaitli ΜΑΘΗΜΑΤΑ? Jā gan, daļēji mūs pieķērāt. Bet mēģināsim situāciju labot, un sacīsim:
 - Ar ΜΑΘΗΜΑ sapratīsim nevis ΜΑΤΕΜĀΤΙΚΑ mūsdienu nozīmē, bet to mūsu domāšanas pamatā, kas stāv pirms ΜΑΤΕΜĀΤΙΚΑ, ko tā arī sauksim – ΜΑΘΗΜΑ
 - Un te mums matemātiķi sāks uzbrukumu no savas puses. Kas tā par ΜΑΘΗΜΑ? Kas tā par pirmsmatemātiku? Varbūt metamatemātika, tev, Daini, prātā?
 - Nē, citādāk. Es sacīšu tā: mūs matemātikas attīstība tieši virza ΜΑΘΗΜΑ virzienā. Un viens no galvenajiem virzītājspēkiem ir Teorētiskā Fizika. Un atsevišķās tās disciplīnas, ΚΒΑΝΤΟ ΜΕΧΑΝΙΚΑ, ΚΒΑΝΤΟ ΛΑΥΚΑ ΤΕΟΡΙJΑΣ, ΣΤΙΓΟ ΤΕΟΡΙJΑΣ. Stop, bet Stīgu teorijas ir tieši tās, ko fiziķi gribēja kvalificēt par nezinātniskām, jo nekad nespēsīm tās eksperimentāli pierādīt. Nu, lūk, te jau mēs esam pie lielās patiesības: Stīgu teorija kā fizikāla disciplīna, jā, varbūt derīga priekš ‘miskastes’, bet kā matemātiska sadaļa, sacīšu vairāk, kā ΜΑΘΗΜΑ sadaļa, vai virzienā uz to, lai būtu kādreiz ΜΑΘΗΜΑ sadaļa, tā ir tas attīstības virziens, kas mūs ievēdis jaunā matemātikas un fizikas saprašanas līmenī, proti, caur ΜΑΘΗΜΑ.
 - Un te nu, lūk, mums der atcerēties, ka mēs nemēģinām atrisināt šodien jautājumu par fiziku vai matemātiku to savstarpējībā, bet mēs runājam par ΓΝΩΘΙ ΣΕΑΥΤΟΝ un ΓΝΩΘΙ ΜΑΘΗΜΑ attiecinājumu. Bet šis risinājums, vai precīzo jautājumu uzstādījums, var vest pie saprašanas vai spējas uzdot precīzus jautājumus arī tajā pirmajā minētajā jomā.

ΓΝΩΘΙ ΣΕΑΥΤΟΝ and ΓΝΩΘΙ ΜΑΘΗΜΑ: ... what we have in mind?

- By juxtaposing the paraphrase of ΓΝΩΘΙ ΣΕΑΥΤΟΝ with ΓΝΩΘΙ ΜΑΘΗΜΑ, we complement the first with the second:
 - Seek within yourself, within your soul, for what begins understanding, comprehension, reflection. But at a deeper level, it already begins what the Greeks called philosophy, but we call it science/knowledge. And lo and behold, there it is because knowledge is already ΜΑΘΗΜΑ;
 - But here the foundation seemingly precedes us – language. What provides it – gods?
- And here we want to make a big leap: from the language of science to the quintessence of scientific language, mathematics.
 - But for that, we need the paraphrase ΜΑΘΗΜΑ, which means KNOWLEDGE;
 - How do we arrive at MATHEMATICS? Do we want to just "wander" and use ΜΑΘΗΜΑ and its plural ΜΑΘΗΜΑΤΑ? Yes, indeed, we might catch ourselves doing that. But let's try to improve the situation and say:
 - With ΜΑΘΗΜΑ, we will understand not just MATHEMATICS in its modern sense as a discipline we develop today, yesterday, the day before. Let's use ΜΑΘΗΜΑ to understand the foundations on which modern mathematics is based, and let's call it ΜΑΘΗΜΑ.
 - Now mathematicians will launch an attack from their side. What is this ΜΑΘΗΜΑ? What is this pre-mathematics? Maybe metamathematics, Dainis, is on your mind?
 - No, it's different. I will say this: our development in mathematics directly leads in the direction of ΜΑΘΗΜΑ. And one of the main driving forces is Theoretical Physics. And within it, the individual disciplines of QUANTUM MECHANICS, QUANTUM FIELD THEORY, STRING THEORY. Stop, but String Theory is precisely what physicists wanted to classify as unscientific because we will never be able to experimentally prove it. Well, here we are at the great truth: String Theory as a physical discipline, yes, perhaps useful for the "garbage bin," but as a mathematical branch, I would say more as a section of ΜΑΘΗΜΑ or in the direction of becoming a section of ΜΑΘΗΜΑ, it is the developmental direction that will lead us to a new level of understanding mathematics and physics, namely through ΜΑΘΗΜΑ.
- And here, indeed, we must remember that we are not attempting to solve today the question of the interrelation between physics and mathematics. We are talking about the interpositioning of ΓΝΩΘΙ ΣΕΑΥΤΟΝ and ΓΝΩΘΙ ΜΑΘΗΜΑ. However, this solution or the precise formulation of the question can lead to understanding or the ability to ask precise questions even in that first mentioned field.

ΓΝΩΘΙ ΣΕΑΥΤΟΝ and ΓΝΩΘΙ ΜΑΘΗΜΑ: ... in place of conclusions

- Divi lielie jautājumi mūsu zinātniskās domāšanas pamatā: 1) vai zinām, kas ir mūsu domāšanas pamati? 2) vai zinām, kas ir matemātika?
- Ar pirmo, proti, ΓΝΩΘΙ ΣΕΑΥΤΟΝ mēs jautājam pēc pirmā, bet ar otro, proti, ΓΝΩΘΙ ΜΑΘΗΜΑ, mēs jautājam pēc otrā.
- Bet, vai tad mēs nejautājam to pašu abos variantos? Arī abi ΓΝΩΘΙ varianti nejautā pēc viena un tā paša?
- Šie jautājumi tad ir arī mūsu atbilde.
- Dixi.
- Two big questions at the foundation of our scientific thinking: 1) Do we know what the foundations of our thinking are? 2) Do we know what mathematics is?
- With the first, namely ΓΝΩΘΙ ΣΕΑΥΤΟΝ, we inquire about the first question, but with the second, namely ΓΝΩΘΙ ΜΑΘΗΜΑ, we inquire about the second.
 - By inquiring with ΓΝΩΘΙ ΣΕΑΥΤΟΝ we inquire What are the foundations of our thinking;
 - By inquiring with ΓΝΩΘΙ ΜΑΘΗΜΑ we inquire about What is mathematics, what are the foundations of what we call mathematics.
- But don't we ask the same thing in both variants? Do both ΓΝΩΘΙ variants not inquire about the same thing?
- These questions then are also our answer.
- Dixi.

Mathematics and consciousness

- «God created integers»- who said these words? This is the title of the book of Steven Hawking, so, we have rights, in some sense, attribute these words to Steven Hawking. Many people would protest, saying, S.H. was one of greatest atheists. I would allow myself not to believe in that. But, let us not be judges in this matter:
 - <https://www.amazon.com/God-Created-Integers-Mathematical-Breakthroughs/dp/0762430044>
 - https://www.ozon.ru/product/bog-sozdal-tselye-chisla-matematicheskie-otkrytiya-izmenivshie-istoriyu-hoking-stiven-530404083/?oos_search=false&sh=3LR9MvQGuw
 - We have several times attacked this question concerning mathematics and consciousness.
 - <http://scireprints.lu.lv/435/> **Dažas domas, lasot Mario Livio grāmatu «Vai Dievs ir matemātiķis?»**
Some thoughts while reading the book "Is God a Mathematician?" by Mario Livio
 - <http://scireprints.lu.lv/297/>. **Vai matemātika būtu pretrunā ar Dieva eksistenci?** Would mathematics be in contradiction with the existence of God?
- Let me fix one argument here that I take from S.H. book's title «God created integers» and from trying to answer to question – Is Mathematics to be discovered or invented?
- And we say vary simply: Steven Hawking's book gives us right to say that mathematics has both sites, being both discovered but invented too.
 - The best side of mathematics is that what was discovered. But other part is very important too.
 - Actually theoretical physics work just in this way: it is building mathematical issues in ways both discovering, both inventing, and so on...
 - And in this way we have all this science working: firstly some issue in mathematics is invented, but afterwards, after maybe of some refreshments, this same issue already being dressed in a new beautiful disguise is being discovered as a very important and mostly necessary buildingblock in the general building of mathematical universe.

Where the solutions?

- But, nevertheless we are as if outside of the crucial question: How both things, consciousness and mathematics, might come in touch (or distouched) of each other, if one is on the one side and other on the other side (are they?) in the division of the world into material and cognitive existence?
- According to traditional views, if mathematics is a product of our consciousness? Then what? So what I suggested is a way to try to "mystify" the truth itself?
 - But I'm trying to move away from just this simplistic picture of our world, yes, I'm mystifying it;
 - But I want to do it by asking questions, asking as many questions as possible to try to gain new insights, new perspectives;
- May the depth of our insights be measured by the depth of our questions.
 - And, today, what might AI and its tools like language models introduce as new cognitive «agents» in our discourse?

What we did in our previous talk about AI language models?

- The title of the report was (<http://scireprints.lu.lv/503/>): Inside GPT: What can be done with GPT? The perspective of a mathematician. My perspective.
 - In place of GPT, please, read AI language model. Up to now I use only GPT3 or GPT3.5, but, of course my questions are addressed about the AI, all AI language models.
- But how far did we get previously?
- Thus, who are we, or me alone before my AI language model, and who are they, AI agents, AI tools?
 - As I understand general situation in understanding of AI tools can be characterized as follows, ourselves, human beings are many, but artificial consciousness, AI 'clever' machine before us is alone, in some sense, or, if many, then different products of different companies, and so on.
 - Now I made change in this arrangement, saying, from side of human being there actually is one person, its me, or, well, say, other scientist, but nevertheless, in his inner world he is «alone before actual AI agent».
 - But, going further, we may even say that AI machine before us is not something 'alone' but much more like as something multiple, it has different threads, how we see it today, but in future we might see AI already as something like multimachine.

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ΓΝΩΘΙ ΣΑΥΤΟΝ

One more meaning?

We must learn to ask correct and precise questions.

We need to learn to ask the most adequate questions.



Thank you for attention!