Kompetenz

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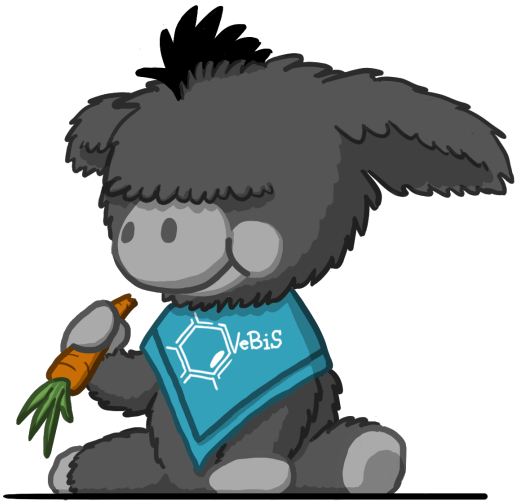


Editorial

Dear readers of the Biotikum,

I hope you had an amazing Semester. There were lots of incredibly existing and fun VeBis events and I hope you joined at least a few of them. Whether this was a studying, a sports, a relaxation or a self-finding semester for you, I'm wishing you the very best home with your family over the coming Christmas holidays. Should you stay at ETH over the semester, I quickly want to mention the **amazing VSETH Christmas program** that lets you celebrate together with other university students. Please refer to their newsletter for more information. While traveling to your family, whether it's the usual half an hour train ride or a transatlantic flight, I would recommend you take a few moments to look through this edition of the Biotikum. The topic is competence. And while that might sound like an odd topic at first, our editorial team found quite a lot of fascinating, even biological, articles referring to it. And if you're looking for a fictional story, I can recommend you the newest part of **Evocation**. A new part of the story is released every edition. Thus, if you haven't read the first parts yet, check them out on our website https://vebis.ch/biotikum/archiv.

Best regards and a merry Christmas,
Bennet Burmeister

Editor-in-Chief of the Biotikum

Präsi Kolumne

Dear reader,

For everyone wondering who this ginger woman is and where the guy with the tousled curls has gone, let me introduce myself: I'm Jasmina, and I've had the privilege of being chosen as your **new president!**

The first few weeks of this semester have been a blur, as I still cannot quite believe already seven weeks have passed?! My day to day has gotten quite different in comparison to when I was a Kulturi last semester. No more planning 3 events at once, staying up and cleaning until 1 or getting just a bit too drunk, a bit too often…

Most of my time is now spent with organizing board meetings and writing looooots of emails (and maybe getting a response). I'm still involved in the planning of events, although when you read this, most of my events will already have passed. I hope I saw some of you at Krimidinner or Cupcake decorating!

Now, you've all read the title of today's edition. Instead of boasting about my endless list of competences, I want to talk about someone who is almost unbelievably more competent than I am: Bacteria! As all of you know, bacteria have the ability to take up extracellular DNA from their environment and incorporate it into their genome. Quite cool I'd say. In some ways, students and bacteria are quite similar, as bacteria often only become competent under stress, much like the average ETH student the night before their exam…

Now I shall leave you with my nerdy analogies and let you enjoy what the Biotikum team has cooked up. If you ever need anything from VeBiS, don't hesitate to reach out!

That's all from me for now, until next time,

Jasmina

Hey there!
Do you love writing and want to publish your articles here in Biotikum ? Is it just too much for you to commit to submitting something regularly? Then send us your article at redaktion@vebis.ch and read your own piece in the next issue !
Whether it's a creative text, a review, or a recipe – we can't wait to hear from you!

The new board is here!

At the last MV (Mitgliederversammlung = general assembly) VeBiS members voted for the new board. **The board** represents VeBiS and thus the opinions and interests of biology students at ETH. Each board member has its own specific role. **If you want to apply** to become a board member, look out for the advertisements at the end of each semester in the VeBiS announcements channel!

In the following section of this Biotikum, the board members will introduce themselves and their roles. Further, you may learn something about their personal lives, by looking at the four pictures each board member provided. This is not unlike the 4 pics one word game, only here the solution is the personality of the board member!

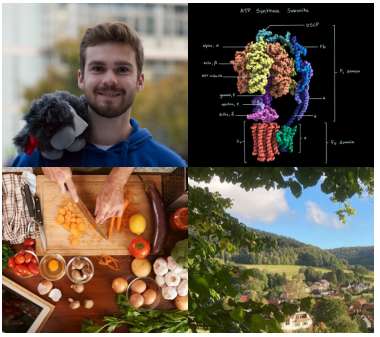
The board members were asked to provide:
-One picture about their connection to biology
-One picture about their free time
-One picture about from where they came to ETH

Now, without further ado, **let's start with the introductions:**

Jasmina Blank - President
I am responsible for leading the board meetings (VS) and ensuring that the board works well together. I also represent the voice of the students in the departmental conference (DK), the teaching commission (UK), the student association council (FR), and the members' council (MR).

Raoul Klein - Hopo Extern
I represent the interests of the biology students in our umbrella organization, the VSETH, in the Fachvereinsrat (FR). Together with our delegation, I attend the Mitgliederrat (MR), where the VSETH board is elected and the budget as well as the accounts of VSETH and its commissions are approved and reviewed. You can contact me with questions about VSETH or general questions/concerns about student politics.

Leandra Blaser - Quästur
As the person responsible for managing VeBiS's financial resources, I handle budgeting, payments, and invoices, and ensure the financial stability of our activities. I also advise the board on all financial matters. Students can contact me with any questions regarding budgets, reimbursements, or financial procedures.



Janis Jackel - Student Affairs
Working together with Ke, we are providing a variety of student-focused offers such as various course feedbacks, PVKs, the "Göttiabend", and many more. We are happy to help with all questions relating directly to your studies or issues that are not covered by other board positions :)

Ke Ni - Student Affairs
Together, Janis and I organise a variety of activities related to studying – from semester and block course feedback, PVKs, the end-of-semester apéro, and 3P talks to Götti evening as well as the upcoming Christmas event. Students can contact me for any questions regarding these events or general questions about their studies.

Salome Arias Linares - Merch & Communication

I'm responsible for keeping the students up to date with upcoming events via our Whatsapp Community, Instagram Channel, and the monthly Newsletter. Regarding the Merch part, I want to design cute merch for the VeBiS members. You can contact me if you have questions about our communication channels or anything related to that and otherwise I'm always open for new merch ideas :)

Sean Fraile - Industrial relations

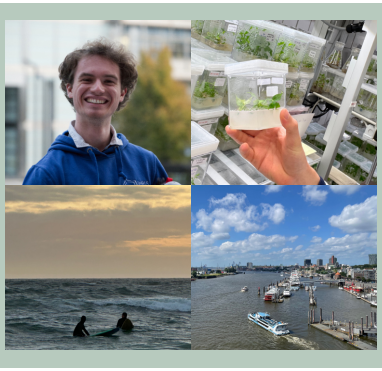
I try to connect our students with industrial interests and keep the vibes on the board high. Students can always approach me with questions about life in the D-BIOL as I have been suffering in it for a while now. But also with ideas for possible networking events or companies they would like to see more present :)

Enea Sonognini - IT

I update the site and deal with technical problems. My responsibility is to ensure everyone has the tools to fulfill their role. Contact me if you have suggestions for the site or have been having problems accessing resources.

Bennet Burmeister - Biotikum

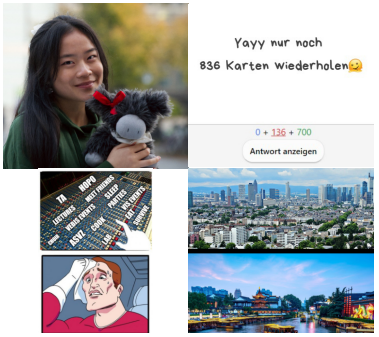
That's me! I am the Editor-in-Chief of Biotikum, this student magazine. As Editor-in-Chief, I coordinate the editorial team and manage the publication process. Please contact me if you would like to join the editorial team or have any questions about our magazines!



Max Lenhardt - Kultur
I organise events for the students. If you have an event idea or want to help out at events contact me :) .

Phoenix Zelda van Uffelen - Kultur
I help organize social events and parties, tell me if you have ideas for a cool excursion or evening.

Julia Huang - Kulturi
As Kulturi, I organize events and parties together with Phoenix and Max during the semester — so you can look forward to lots of fun bondings and get-togethers :-D



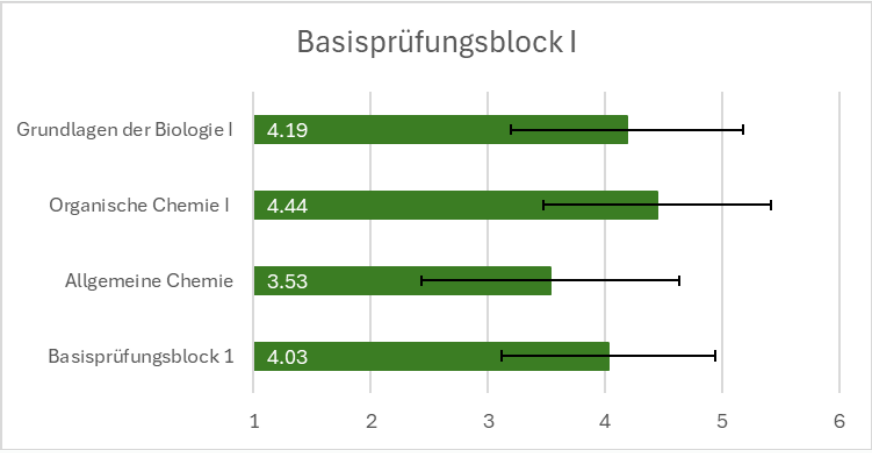
Olivia Zhang - Hopo Intern
I make sure that our students' opinions are heard within the Biology Department. Please feel free to contact me if you have any feedback or suggestions for D-BIOL! You can also come to me for confidential issues or questions related to your studies and I'd be happy to help out. :)

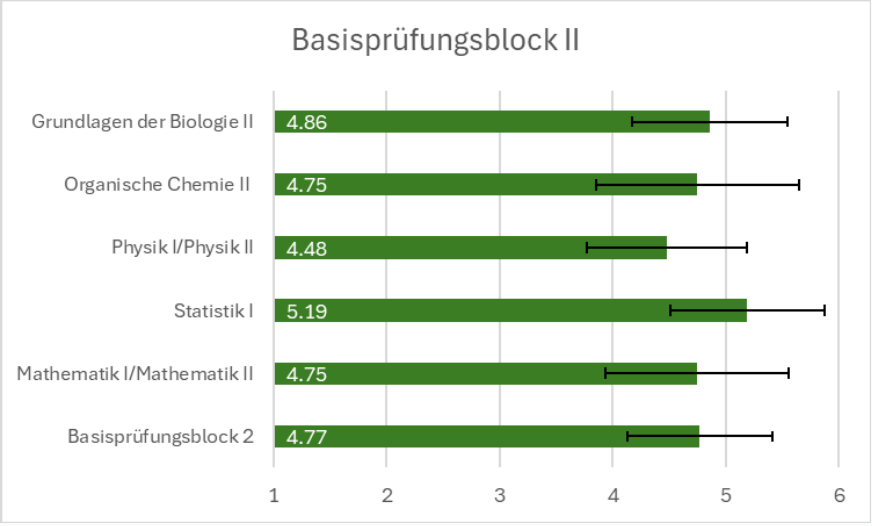
Prüfungsstatistiken

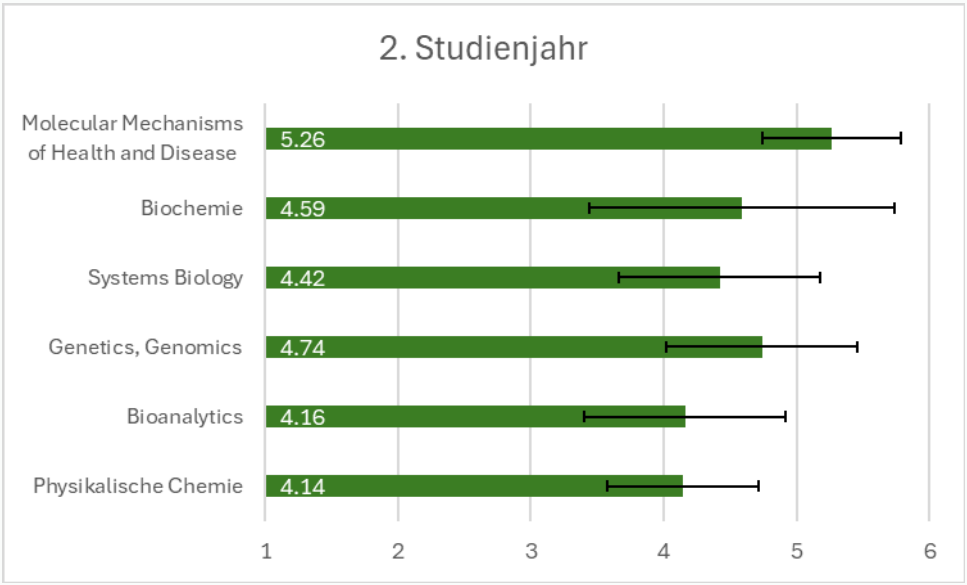
Hier findet ihr die Durschnittsnoten der letzten Prüfungssession.

Der Basisprüfungsblock I in der Sommersession 2025 wurde von 10 Studierenden geschrieben, der Basisprüfungsblock II von insgesamt 66 Studierenden. Herzliche Gratulation an alle, die es geschafft haben, weiterhin viel Erfolg, Motivation und Durchhaltevermögen! Ihr könnt es gebrauchen. Innerhalb der Balken könnt ihr jeweils die Durchschnittsnoten finden.

Um den Datenschutz zu gewährleisten, sind für die Konzeptkurse des 3. Studienjahres nur diejenigen Prüfungen aufgeführt, die 10 oder mehr Studierende absolviert haben.






2. Studienjahr
Molecular Mechanisms of Health and Disease
5.26
Biochemie
4.59
Systems Biology
4.42
Genetics, Genomics
4.74
Bioanalytics
4.16
Physikalische Chemie
4.14
1
2
3
4
5
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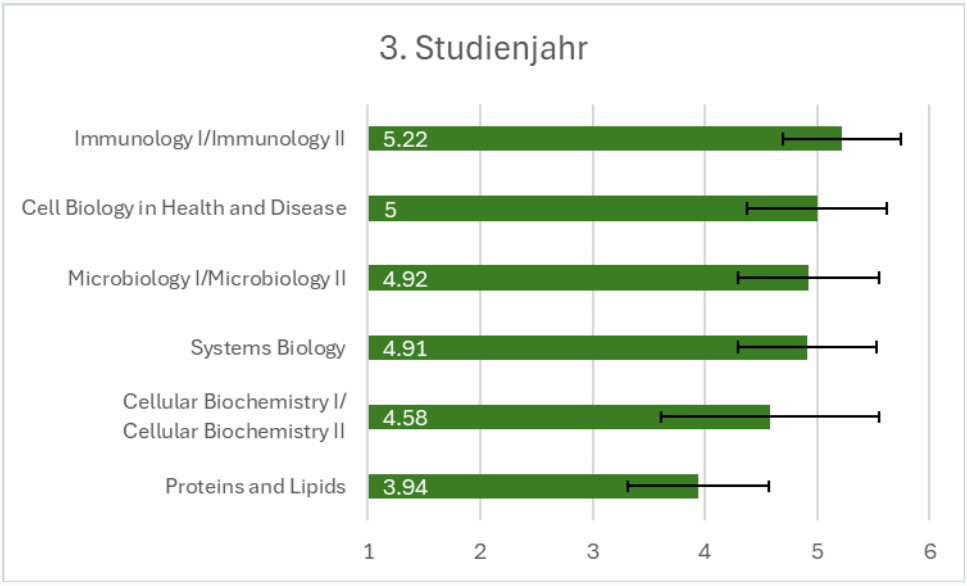

3. Studienjahr
Immunology I/Immunology II
5.22
Cell Biology in Health and Disease
5
Microbiology I/Microbiology II
4.92
Systems Biology
4.91
Cellular Biochemistry I/ Cellular Biochemistry II
4.58
Proteins and Lipids
3.94
1
2
3
4
5
6

Power, Pause, Burnout – der Preis des Könnens

Wie das Gehirn unser Können belohnt, antreibt und uns schließlich erschöpft

Keyi Fang

Wusstest du schon?

- Dopamin erreicht seinen Höchstwert vor dem Erfolg, nicht danach.
- Chronischer Stress kann den Hippocampus um bis zu zehn Prozent schrumpfen lassen.
- Burnout senkt die Aktivität im präfrontalen Kortex, unserem Kontrollzentrum.
- Tagträumen aktiviert das „Default Mode Network“, die Quelle kreativer Einsichten.

Das Gefühl, etwas richtig zu machen, ist elektrisierend. Wenn sich ein Problem löst, eine Formel aufgeht, ein Satz harmonisch klingt oder eine Prüfung gelingt, reagiert das Gehirn mit einer Welle von Dopamin, dem Neurotransmitter der Belohnung. Es sagt uns: Mach das nochmal. Dieses Signal ist tief in unserer Biologie verankert. Es motiviert uns, aus Erfahrungen zu lernen, Muster zu erkennen und unser Verhalten zu verbessern. Ohne diesen Belohnungskreislauf gäbe es keine Entwicklung, kein Können, keine Kultur.

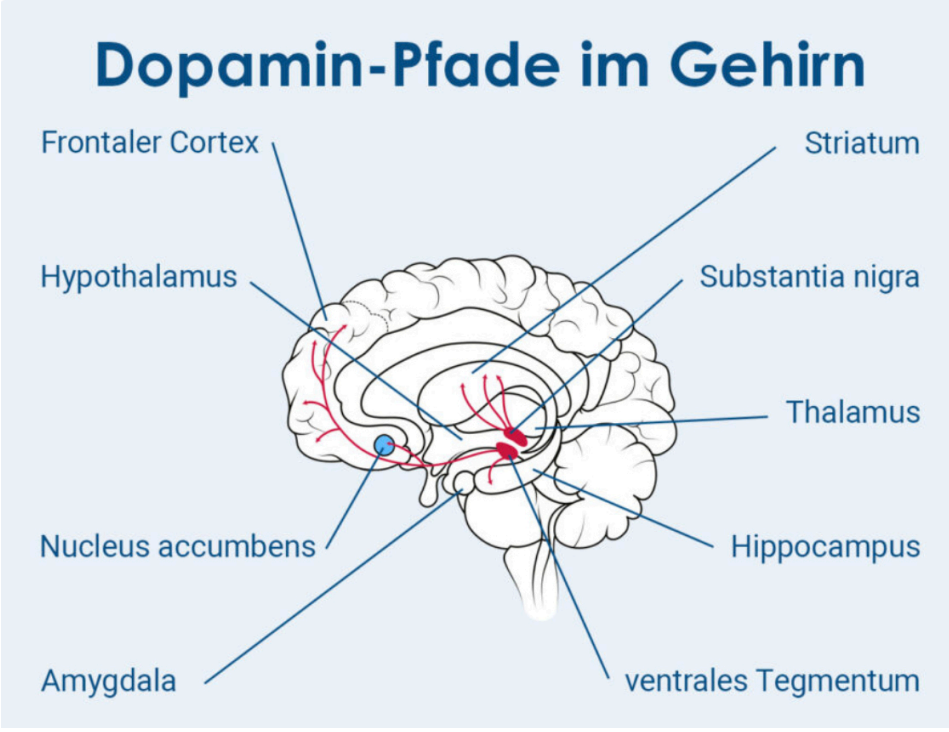
Dopamin verwandelt Versuch und Irrtum in Fähigkeit, Anstrengung in Meisterschaft. Schon unsere Vorfahren profitierten davon: Wer lernte, Werkzeuge besser zu nutzen oder Spuren genauer zu lesen, hatte größere Überlebenschancen. Erfolg fühlte sich gut an, also suchten die Menschen weiterhin nach ihm. Lernen wurde durch Lust gesteuert und genau dieses Prinzip gilt bis heute. Wenn wir Fortschritte spüren, wird das Gehirn aktiv, die Belohnung zündet, Motivation entsteht.

Doch das System, das uns zu lernenden, kreativen Wesen macht, hat auch eine dunkle Seite. In einer Welt, in der Leistung ständig gemessen, geteilt und verglichen wird, steht das Belohnungssystem des Gehirns unter Dau-

erstrom. Jeder Klick, jede Note, jedes Lob aktiviert dieselben Schaltkreise wie einst der Jagderfolg oder das gelungene Werkzeug. Aber der Strom reißt nicht mehr ab. Wir sind permanent gefordert, schneller, besser, effizienter zu sein. Was uns antreibt, erschöpft uns zugleich.

Im Moment des Erfolgs schüttet das Gehirn Dopamin aus, vor allem im Striatum und im präfrontalen Kortex, den Regionen, die für Motivation, Planung und Lernen zuständig sind. Interessanterweise ist der Dopaminrausch am stärksten kurz vor dem Erfolg, nicht danach. **Das Gehirn belohnt die Erwartung, nicht die Erfüllung.** Deshalb fühlt sich der Weg zum Ziel oft lebendiger an als das Ziel selbst. Sobald wir es erreicht haben, fällt die Spannung ab, die Motivation sinkt. Das erklärt, warum viele nach großen Erfolgen in ein emotionales Loch fallen.

Jeder kleine Fortschritt stärkt die Verbindung im Gehirn zwischen Anstrengung und Belohnung. Mit der Zeit verfestigen sich diese Bahnen, das Gehirn „verdrahtet“ sich für Leistung. Doch wenn Dopamin zu oft ausgeschüttet wird, reagiert das System empfindlich. Die Rezeptoren regulieren sich herunter, das Hochgefühl wird schwächer. Was früher motivierte, wird zur Routine. Um das vertraute Gefühl von Zufriedenheit zurückzuerlangen, steigern wir den Einsatz: längere Tage, kürzere Pausen, höhere



Ansprüche. So entsteht ein Teufelskreis. Das Gehirn, das uns eigentlich motivieren soll, beginnt, uns zu „versklaven“.

Kompetenz kann zur Sucht werden. Nicht, weil wir Neues entdecken wollen, sondern weil wir das angenehme Gefühl der Selbstwirksamkeit suchen, das Wissen, etwas zu können. Wir jagen dem vertrauten Rausch nach, fähig zu sein. Doch in diesem Streben verlieren wir oft das Gleichgewicht, das wahre Kompetenz ausmacht.

Am Anfang ist Stress hilfreich. Das Hormon Cortisol sorgt kurzfristig für Fokus, Energie und Wachheit. Aber wenn der Druck dauerhaft bleibt, verändert sich das Gehirn. Der Cortisolspiegel bleibt hoch, und das hat Folgen: Der Hippocampus, zuständig für Gedächtnis und Lernen, wird geschwächt. Die Amygdala, unser emotionales Alarmsystem, wird überaktiv. Wir werden gereizter, ängstlicher, impulsiver. Gleichzeitig drosselt der präfrontale Kortex seine Aktivität, jene Region, die für rationales Denken, Selbstkontrolle und Planung zuständig ist.

Das Ergebnis ist paradox: Je kompetenter wir werden, desto eher überfordert uns unsere eigene Kompetenz. Konzentration lässt nach, Kreativität versiegt, emotionale Stabilität bricht ein. Neurowissenschaftlich betrachtet ist Burnout keine Schwäche, sondern ein Schutzmechanismus. Das Gehirn zieht die Notbremse. Bildgebende Verfahren zeigen, dass in Erschöpfungszuständen die Aktivität im präfrontalen Kortex sinkt, als würde das Gehirn selbst sagen: Genug. Doch unsere Kultur deutet dieses Signal anders. Wir sehen Müdigkeit als Versagen, nicht als Warnung.

Der Psychologe Mihály Csíkszentmihályi beschrieb den Zustand des Flow als das perfekte Gleichgewicht zwischen Herausforderung und Fähigkeit. In diesem Zustand sind wir völlig konzentriert, verlieren das Gefühl für Zeit, handeln mühelos und effizient. Neurologisch ist Flow die harmonische Zusammenarbeit zwischen dem Dopamin-System und der Stressachse. Zu wenig Reiz führt zu Langeweile, zu viel zu Angst. Flow entsteht genau in der Mitte, dort, wo wir gefordert, aber nicht überfordert sind.

Doch unsere Welt lässt diesen Zustand kaum noch zu. **Dauerleistung zerstört den Flow.** Wenn das Belohnungssystem ständig aktiviert ist, überflutet es das Gehirn mit Reizen. Irgendwann erschöpft es sich und fällt ins Leere. Cortisol steigt, Dopamin sinkt, die Motivation bricht zusammen. Das Gehirn verliert die Fähigkeit, Freude zu empfinden und mit ihr die Fähigkeit, zu lernen.

Dabei trägt das Gehirn selbst die Lösung in sich. Erholung, Spiel und Abwechslung reaktivieren das Belohnungssystem. Neues Lernen, etwa eine

Sprache, ein Instrument oder eine Tätigkeit außerhalb des Berufs, baut Dopaminbahnen wieder auf. Schlaf regeneriert den Hippocampus, Tagträumen stärkt die kreativen Netzwerke des Gehirns. Kompetenz entsteht also nicht durch ständige Anstrengung, sondern durch rhythmisches Wechseln von Spannung und Entspannung.

Das Gehirn braucht Pausen, um Leistung langfristig zu erhalten. Wahre Kompetenz bedeutet nicht, ununterbrochen zu funktionieren, sondern zu wissen, wann man aufhören muss. Denn gerade im Zustand des Loslassens arbeitet das Gehirn am Kreativsten. Beim Tagträumen verknüpft es Erinnerungen, entdeckt Zusammenhänge, erzeugt neue Ideen. Das sogenannte **„Default Mode Network“**, das Standardnetzwerk des Gehirns wird aktiv, wenn wir scheinbar nichts tun. In diesen Momenten entsteht oft die Inspiration, die wir im Stress vergeblich suchen.

Vielleicht ist genau das die Fähigkeit, die wir am meisten verlernt haben: die Kunst, still zu werden, damit das Denken weitergehen kann. Kompetenz ist also nicht nur die Summe unserer Fähigkeiten, sondern auch die Weisheit, das richtige Maß zu finden zwischen Tun und Lassen, Spannung und Ruhe, Ehrgeiz und Gelassenheit.

Vielleicht bedeutet wahre Kompetenz nichts anderes, als den Mut zu haben, im eigenen Takt zu bleiben, während die Welt immer schneller wird.

Mini-Test:
Wie gehst du mit Kompetenz um?

Finde heraus, wie dein Gehirn mit Können, Ehrgeiz und Erholung umgeht.

Keyi Fang

Anleitung:
Lies jede Aussage und kreuze an, wie stark sie auf dich zutrifft.
Zähle am Ende deine Punkte zusammen.

Punkte	Bedeutung
0	trifft gar nicht zu
1	trifft teilweise zu
2	trifft voll zu

Fragen:

1. Ich habe oft das Gefühl, dass andere kompetenter sind als ich selbst, wenn ich gute Ergebnisse erziele.
   ☐ 0 ☐ 1 ☐ 2

2. Wenn ich ein Ziel erreicht habe, hält die Zufriedenheit nur kurz an, bevor ich schon das Nächste suche.
   ☐ 0 ☐ 1 ☐ 2

3. Ich bin oft unzufrieden, wenn andere Aufgaben übernehmen. Ich mache Dinge lieber selbst, um sicherzugehen, dass sie richtig gemacht werden.
   ☐ 0 ☐ 1 ☐ 2

4. Wenn ich etwas nicht sofort kann, verliere ich schnell Motivation oder Selbstvertrauen.
   ☐ 0 ☐ 1 ☐ 2

5. Ich fühle mich produktiv, aber selten wirklich ruhig oder stolz.
   ☐ 0 ☐ 1 ☐ 2

6. Ich finde es schwierig, Pausen zu machen, ohne ein schlechtes Gewissen zu haben.
   ☐ 0 ☐ 1 ☐ 2

7. Ich bemerke, dass ich manchmal arbeite, ohne Freude, einfach, weil ich „funktioniere“.

☐ 0 ☐ 1 ☐ 2

8. Ich lerne gern Neues, auch wenn ich anfangs viele Fehler mache.

☐ 0 ☐ 1 ☐ 2

9. Wenn etwas schiefgeht, versuche ich zu verstehen, was ich daraus lernen kann.

☐ 0 ☐ 1 ☐ 2

10. Ich fühle mich am kreativsten, wenn ich mich nicht unter Druck setze.

☐ 0 ☐ 1 ☐ 2

Auswertung
Zähle alle Punkte zusammen. (Minimum 0 / Maximum 20)

0–7 - Balanced Learner
Du hast ein gesundes Verhältnis zu Leistung und Erholung. Dein Gehirn weiß, wann es Energie bündeln und wann es sie sparen muss. Das ist echte Kompetenz: Du funktionierst nicht, du steuerst dich bewusst.

→ Hüte dieses Gleichgewicht, es ist seltener (und klüger), als du denkst.

8–14 - Driven Expert
Du bist ehrgeizig, neugierig und willst Dinge wirklich verstehen. Dein Dopamin-System arbeitet stark: Erfolge geben dir Energie doch du vergisst manchmal, innezuhalten. Das ist kein Nachteil, sondern ein Zeichen von Leidenschaft.

→ Achte nur darauf, dass Ehrgeiz nicht zu Daueranspannung wird. Selbstmitgefühl und kleine Pausen sind kein Stillstand, sie machen dich langfristig besser.

15–20 - Overloaded Achiever
Du hast hohe Standards für dich und oft auch für andere. Du funktionierst zuverlässig, auch wenn dein Kopf längst auf Reserve läuft. Dein Gehirn steht häufig unter Strom; Cortisol und Adrenalin halten dich wach, aber sie rauben dir Fokus und Kreativität.

→ Das bedeutet nicht, dass du „zu viel“ bist, sondern, dass du dich neu auftanken darfst. Wahre Kompetenz zeigt sich nicht im Durchhalten, sondern im bewussten Loslassen.

Diese Umfrage stammt von Biologiestudierenden und zeigt, wie unterschiedlich sich Kompetenz anfühlen kann. Manche fühlen sich stark, wenn sie gut schlafen oder jemandem helfen. Andere, wenn sie etwas erklären, pünktlich abgeben oder einfach mal frei haben. Es geht also nicht nur um Leistung, sondern um Momente, in denen wir mit uns selbst im Einklang sind.

Und jetzt mal ehrlich: Wann hast du dich zuletzt wirklich kompetent gefühlt? ganz ohne Druck, einfach weil du wusstest: Ich kann das?

Competence without consciousness

When skill doesn't require a mind

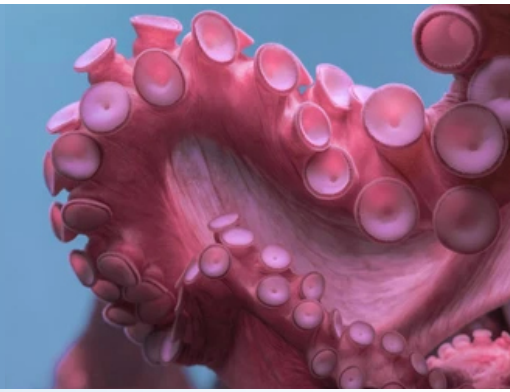
Clara Leo

We tend to think of skill as something intentional. A pianist trains for thousands of hours to master a chord progression; a surgeon's precision is earned through practice and reflection. We call this competence: the ability to do something well, on purpose, with understanding. But biology loves to surprise us: expertise emerges more often than not without any awareness at all.

There are countless examples in the living world of beings, tissues, and even single cells performing astonishingly skilled actions without knowing what they're doing. This raises an unsettling question: **Is consciousness really necessary for competence?**

When brains delegate skill

Consider the octopus: each arm has its own cluster of neurons, able to explore, grasp, and solve small problems independently. An arm detached (under "unfortunate lab circumstances") will still reach toward objects and try to manipulate them. **Eight semi-autonomous geniuses** work in cooperation but none of them are aware of their skill.



Then there's the slime mold Physarum polycephalum. It's a single cell. No brain, no nerves, no hierarchy. And yet, given a maze, it will explore, test dead ends, and find the shortest path to food. To scientists, this behavior looks suspiciously like **problem-solving**. To philosophers, it looks like trouble for the idea that intelligence requires thought.

What about us? Our own bodies are quietly outperforming us every day. Think of learning to ride a bike: shaky at first, but soon you glide without thinking. This is **procedural memory**, a kind of knowledge stored so deeply that conscious awareness just slows it down. Athletes call it being in the zone. Neuroscientists call it **unconscious competence**.

And while we sleep (unconscious by definition) our brains replay and refine skills learned during the day. Songbirds dream their songs; humans strengthen neural circuits for memory, piano pieces, and skateboarding tricks. Some of our greatest learning happens when **we aren't conscious**.

The invisible expert

What ties these examples together is the idea that **competence can be distributed**, hidden in limbs, in tissues, in networks of cells, or in evolutionary algorithms that act like blind engineers. Nature produces mastery without introspection. Animals hunt with precision. Immune cells adapt and remember. Plants track sunlight with remarkable accuracy. None of these need a moment of doubt or a spark of self-awareness.

So, where does that leave us: a species that takes pride in thinking?
We often assume consciousness sits at the top of the skill pyramid. But what if thinking is just one layer of competence … and maybe not always the most efficient? Some of the best performances, human or otherwise, **happen without thinking at all**.

What does it mean to know?

This brings us to the philosophical twist:
If a slime mold can solve a maze…
If an octopus arm can make decisions on its own…
If we perform our most fluent actions without consciousness…
Where do we draw the line between skill and knowledge?
Does competence require reflection, or just effective action?
Is consciousness a cause of skill or a means of spectating or governing it?

It's tempting to say that understanding is uniquely human. But the deeper we study life, the more that confidence feels like hubris. Competence seeps through biology, from the smallest cells to the most complex minds.

Maybe consciousness isn't the origin of skill but a story we tell ourselves about it.

In the end, competence might not be about knowing what we're doing. It might simply be about doing it well.

Was heißt eigentlich „biologische Kompetenz“?

David Michailov

Wer ist in der Biologie „kompetent“? Der Wolf, der jagt? Die Bäckerhefe, die Zucker spaltet? Oder eine Zelle, die entscheidet, ob sie teilt, stirbt oder schweigt? Oft benutzen wir das Wort „Kompetenz“ als Synonym für die Fähigkeit, vieles zu können. In der Biologie jedoch ist Kompetenz präziser definiert: Es geht um die Fähigkeit eines Systems, unter Unsicherheit und begrenzten Ressourcen die richtigen Entscheidungen zu treffen. Aber wie genau zeigt sich diese Fähigkeit im biologischen Kontext? Welche Mechanismen garantieren, dass ein System tatsächlich kompetent handelt, und was passiert, wenn diese Mechanismen versagen?

Beispiel 1: Bakterielle „Kompetenz“
Ein faszinierendes Beispiel für biologische Kompetenz finden wir bei Bakterien. *Bacillus subtilis*, ein weit verbreitetes Bakterium, kann unter bestimmten Bedingungen in einen Zustand eintreten, den wir als „kompetente Zelle“ bezeichnen. In diesem Zustand ist das Bakterium in der Lage, fremde DNA aus seiner Umgebung aufzunehmen. Es ist ein Prozess, der als Transformation bekannt ist. Dies passiert nicht einfach aus Zufall, sondern unterliegt klaren Regeln und Umständen, die das Überleben der Bakterien in einer unsicheren Umwelt sichern.

Die Kompetenz des Bakteriums, Fremd-DNA aufzunehmen, ist ein Beispiel für ein System, das dynamisch auf seine Umwelt reagiert. Die Bakterien sind nicht jederzeit „offen“ für fremde Gene. Die Aufnahme von DNA wird nur in einem speziellen Zustand aktiviert, der durch äußere Faktoren wie Nahrungsmangel oder Stress ausgelöst wird. In diesem Moment ist das Bakterium „durchlässig“, um potenziell nützliche Gene aufzunehmen, die ihm helfen, sich besser an seine Umgebung anzupassen. Diese Entscheidung ist jedoch nicht ohne Risiko, denn die DNA könnte auch schädlich sein. Aber genau diese Möglichkeit zur Adaptation macht das Bakterium kompetent.

Beispiel 2: Kompetenz bei der Kontrolle von Stomata
Ein weiteres Beispiel für biologische Kompetenz finden wir im pflanzlichen Bereich: Pflanzen, die ihre Stomata (Spaltöffnungen) kontrollieren. Diese Öffnungen sind entscheidend für die Aufnahme von CO_2 und die Abgabe von Wasserdampf. Doch die Kontrolle über diese Öffnungen ist ein ständiger Kompromiss zwischen zwei konkurrierenden Bedürfnissen: der Aufnahme von CO_2 für die

Photosynthese und dem Erhalt von Wasser.Pflanzen sind hier in einer ständigen Balance. Zu viele Stomata offen und es geht viel Wasser verloren, zu wenige und es fehlt CO_2 für die Photosynthese. Die Kompetenz einer Pflanze, ihre Stomata effektiv zu steuern, ist eine der bemerkenswertesten Anpassungen an wechselnde Umweltbedingungen. Eine intelligente Entscheidung darüber, wann die Poren geöffnet oder geschlossen werden, kann den Unterschied zwischen Überleben und Vertrocknen ausmachen. Diese Kompetenz basiert nicht auf einer ständigen Offenheit, sondern auf einer flexiblen, auf den Moment abgestimmten Reaktion, die die Pflanze effizient mit den Ressourcen umgehen lässt.

Beispiel 3: Komplexe Anpassungen in der Zellteilung
Zellen in einem Organismus müssen ständig entscheiden, ob sie sich teilen, differenzieren oder sterben sollen. Ein eindrucksvolles Beispiel für diese Entscheidungskraft ist die „Zellkompetenz“ bei der Vermehrung. Besonders interessant wird diese Entscheidung bei der Entwicklung von Krebszellen, die oft aus einem Fehler in diesem Kontrollmechanismus entstehen.

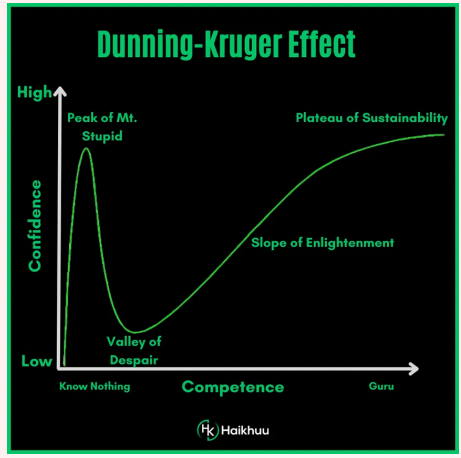
Die Kompetenz einer normalen Zelle, in einer sich verändernden Umwelt Entscheidungen zu treffen, wird durch verschiedene Kontrollpunkte reguliert, darunter das Tumorsuppressorprotein p53. Wenn eine Zelle mutiert oder geschädigt wird, erkennt p53 dies und setzt Mechanismen in Gang, um entweder die Reparatur der DNA zu fördern oder den Zelltod (Apoptose) auszulösen. Diese Entscheidung, ob die Zelle sich teilen oder sterben soll, ist von zentraler Bedeutung für die Aufrechterhaltung der Integrität des Organismus. Wenn diese Kontrolle versagt, wie es in Krebszellen der Fall ist, können die Zellen unkontrolliert wachsen und sich vermehren, ein Zeichen für den Verlust biologischer Kompetenz.

Biologische Kompetenz zeigt sich in vielen Formen und auf unterschiedlichen Ebenen, von einzelnen Bakterien, die ihre DNA aufnehmen, über Pflanzen, die ihre Stomata kontrollieren, bis hin zu Zellen, die entscheiden, ob sie sich teilen oder sterben. In all diesen Fällen geht es nicht um eine universelle Fähigkeit, sondern um die dynamische Anpassung an die Umwelt und die Fähigkeit, zur richtigen Zeit die richtige Entscheidung zu treffen. Diese Beispiele verdeutlichen, dass Kompetenz nicht mit Intelligenz im herkömmlichen Sinne gleichzusetzen ist. Vielmehr ist sie das Produkt aus der perfekten Passung von Regeln, Umwelt und Ressourcen und damit eine der entscheidenden Eigenschaften für das Überleben in einer Welt voller Unsicherheiten .

A 3AM Thought Taken Too Far

Confidence Compromised Competence in Context: Expanding the Dunning Kruger Curve into the Nth Dimension

Andrin Bär



You have likely seen the following graphic before. It is referred to as the **Dunning Kruger curve**, and is used to depict in visual form, a cognitive effect described by one David Dunning and one Justin Kruger, whom during their tenure at the university of Cornell in 1999, first described the tendency of those with a lower ability in a task to overestimate their knowledge and ability in said task. Today, this effect is usually referenced in a jovial or joking context, typically linked to an innate desire to call out another for their perceived overconfidence. But one must ask themselves, is such a curve truly adequate to describe the complex association between confidence and competence?

Well, it is certainly adequate given its current use cases. To suggest otherwise, particularly in my position as a second year biology student, would be a prime example of having reached the “peak of mount stupid.” Yet as I gazed upon this graphic, a pen between my lips, and a blank page before me, the longer I contemplated it, the more I felt there were some fundamental interactions missing. This piece, then, is not about convincing you to discard this model. Nor am I attempting to point out some perceived flaw within it. Verily, in the spirit of furthering our understanding of such a complex interaction as that of confidence and competence, I seek to muse upon the Dunning Kruger graphic, and attempt to build from these mere two dimensions, a whole landscape. To form missing axes upon this graph that would allow us to deepen our understanding of ourselves, as well as explain with greater reliability, the anomalous happenings related to competence and confidence that this graphic alone may not account for.

In the interest of expansion, we must first recognise what material has been provided. Thankfully, the curve is presented in a clear, paved format. One can imagine the ascent up treacherous slopes toward the peak of stupidity, only to plummet down the other side, into the valley of despair, to rise, reborn, and fight

along the logarithmic curve to the plateau of stability. Yet how may we travel if there is no passage of time? Thus, any attempt at expansion of the Dunning Kruger landscape must first account for the already present passage of time implied within its curve. The current Dunning Kruger curve appears, then, to be a partial derivative of the "Dunning Kruger Function", taken to search for the interaction between the variables of competence and confidence. Through this derivative, we are able to see the broad strokes of a competence journey, similar to how the journeys of many fictional protagonists may be derived to "the hero's journey." It is clear, that were we to attempt to vectorise the Dunning Kruger curve, we must undeniably have a "counting" variable, such as time, to describe the passage from one part of it to another. Yet what of the speed of traversal through this landscape?

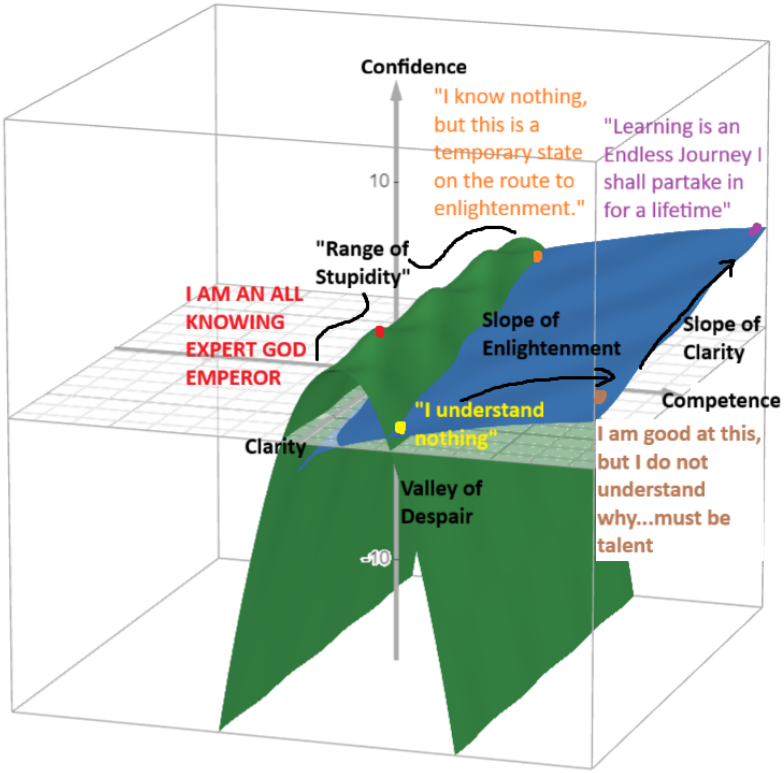
For our first properly introduced factor, I propose the incorporation of a factor of **"complacency"** into the Dunning Kruger landscape. This factor serves, fundamentally, to resist the passage of time that would naturally flow (though weakly) through the basic competence journey. If one is to spend enough time engaging with a subject, even halfheartedly, they are certain to learn at least a little about it. Complacency, however, serves as a sort of friction, a force generated in opposition to this natural motion along the curve. Though unlike friction, complacency, if stoked and nurtured like embers to a flame, has the potential to cause a reversal in motion. For those who suffer an unwillingness to engage with knowledge, or perhaps, feel by their ego, that they already know all there is to know, thus harbouring contempt for those who would dare to complicate what they see as clear and simple, these people would at the very least not plunge into the pit of despair by their own accord. Nay, they would enjoy their palace upon the peak, say something of the nice view, the fresh air, claim it was good for the soul, or something of the sort. They would look down upon those who plunge into the deep dark unknown of the pit of despair, and think of them only as careless fools, for what rational individual would ever allow themselves to suffer incompetence willingly? Yet the opposite may also be true. For there are those who are indeed willing to temper their ego, and allow themselves to accept that they, in fact, know nothing. To these people, the pit of despair is less of a pit, and more an old friend, a dark pool into which they plunge, trained divers, their technique refined, trained, and tempered, by the

many times they have done so before. They need not fear that they shall hit the bottom, for they know from experience that that pitch black water below, though perhaps nearly invisible from the peak of mount stupid, shall catch them. Perhaps even, they have swam these waters before…dragged themselves up the steep banks of the shoreline, and begun the tiring ascent up the arduous slope, toward the promised land of stability above. **What to call such a potent driving force? Passion? Experience? Nay. Conviction.** Conviction, that great force that may drive even the sane man to madness in its pursuit, no matter how seemingly nonsensical the initial path may be. Conviction, that may cultivate from cautious curiosity a captivated compulsion, despite cowardly, callous complacency's cruelty.

The addition of these factors allows us now to model the rate of travel through this Dunning-Kruger landscape we are weaving. An excellent start, for we now have a plane in space, and are able to model our speed and position relative to said plane. But what of the surroundings? What of the journey itself? Are all doomed to climb to the crest of a now formed **"wall of stupidity"** if they are to reach the eventual table of stability? Or is there perhaps another way? Does experience unlock access to the "mines of humility" through which one may enter the valley of despair without need for crossing the misty mountaintop? What of the eagles? Could we simply have flown to the plateau of stability and cast the ring into the fires of mount competency without having had to bother with this whole journey? I mean seriously Gandalf LITERALLY tells us "Fly You Fools" with his presumed final words…wait…I think I am losing the metaphor a bit here. Let us get back on track.

Is there a short cut to competency? Certainly, there are many who would wish this claim to be true. Of course, no one would deny there are factors that may reduce complacency or boost conviction, thus serving as a catalyst to speed up the process of attaining competency. These are for the purposes of this musing, to be herein defined as circumstance. **Circumstance** may be both a positive or negative catalyst, to the attaining of competency. Yet, rather infuriatingly, it becomes quite difficult to attempt to understand, let alone categorise the exact catalytic activity of circumstance almost immediately upon attempting to do so. It is much like trying to understand the importance of circumstance from a biological perspective (this IS a biological newspaper after all). After our old notion of "the selfish gene" as a governing body for an organism was proven to be outdated, biology had to reach for a new model. The new view, then, is that genes are

a sort of a tool box, but which tools are accessed when, and how and when those tools may be modified, is still not fully clear. Certainly, we understand many of the mechanistic aspects of what happens inside cells at a proteomic or genomic level, but the true trigger or triggers for such changes are oftentimes not fully traceable. Similarly, it is nigh on impossible to make any outright statement on the effect of circumstance on the Dunning-Kruger landscape without seemingly reaching toward stochastics. After all, how can it be that circumstances that satisfy some to be complacent with the status quo drive others with such deep conviction toward change? For the purposes of this thought experiment, we shall leave circumstance as a random variable, one that we know must govern certain parts of our forming landscape, but the full extent of which cannot yet be determined with current methods. **Thus, we must accept circumstances for the time being, as the result of random variables.** Yet this leads to another issue. If we have introduced variance to the path of competency, this may change our original curve drastically. Initially, we may account for this if we come to accept the original path as the "mean" or "average" of many competence journeys. After all, variance was an inevitability in this pursuit, for no two human beings are exactly the same, nor live the exact same life. Thus, to try to



capture as many experiences as possible, one must make certain statistical compromises. Yet who says circumstance is only effective in the x or y axes?

Thus, we must take the time here to create a fourth axis within this landscape. We shall dub it “clarity”. **Clarity** is a measurement of one's self perception and insight. Much as traversal in the positive y direction is defined as “gaining confidence” and traversal in the positive x direction is defined as “gaining competence” so too will travel in the positive z axis be considered “gaining clarity.” Clarity, however, is far more anomalous than competence or confidence. It is far less easily measured, yet no less important to understanding the machinations of the human mind. For it is ultimately clarity that allows us to adjust to circumstance. If circumstance throws us from our original path, clarity is the means by which we may find our way back toward it, or, failing this, adjust to our new path. Beyond this, clarity may even allow us to mold the very curve itself. For high clarity may lead to an uncoupling of competence from confidence, as one may acknowledge both their ignorance, as well as their progression, whilst low clarity may lead to delusion of grandeur or despair.

But alas, this article grows long. I wish not to tire the reader with further musings that are not yet fully formed. Instead, I find it apt to provide a summation. We have before us, a stochastic landscape, the average of which may be modelled as a plane in a (currently) 4 dimensional space with 3 axes, x: competence, y: confidence, z: clarity, as well the variables of time, complacency conviction, and circumstance, that allow us to regulate the directionality, as well as the speed, of traversal through said landscape. Alas, much as the plateau of stability climbs ever upward, so too is the journey to true enlightenment a never ending, some may argue sisyphean, pursuit. To suggest this model is complete would once again be to return to the peaks of stupidity, driven backward by complacency. Yet I do hope that despite this, in my musings, I have provided the reader some further clarity, or at the very least cultivated the conviction to help expand this model further, for what is true competence, if it is not shared in cooperation?

Three Truths and A Lie - Competence Edition!

Aiyi Lyu

Dear readers,
To answer all the questions correctly, you'll either need exceptional biological and general knowledge, or the luck of a gambler. Alternatively, you could take the… less honorable route, be a "cheater". Instead of investing time in the clonal stalk (trying to figure things out yourself), you can jump straight to the fruiting body—the answer sheet! Fortunately, there are no receptors here to detect your behavior. If you caught that reference, congratulations, you've already proven your biological competence. Props to you! ☺

1. The so-called Hawk Moth caterpillar will transform into a snake-like creature to scare off predators like birds. Not only is this caterpillar able to swell its body, but it can also change its head shape!
2. Researchers recently found out that there are sex-reversed individuals among 5 species of birds, meaning that these birds are genetically female but have male reproductive organs.
3. Even though the bodies of jellyfish are mainly (99%) made out of water, they do have brains!
4. The largest living organism is actually a colony of genetically identical fungi.

1. Most fish have only short-term memory. However, they are still able to consciously avoid certain dangerous situations if they've experienced them in the past.
2. Using the method of radiocarbon dating of crystals in the lenses of their eyes, scientists concluded that the Greenland sharks have the longest known lifespan of all vertebrate species at least 272 years.
3. Virtually all parrots prefer to use either their left hand and left foot, or right eye and right foot. Many of them are entirely left-handed.
4. Stonefish are extremely venomous. The highly effective venom they possess can kill humans.

Answer sheet

3) Unlike us, jellyfish don't have brains! They also don't have bones, lungs, blood, or a heart, but they're still a very competent species!

Figure 1: Caterpillar, snake mimic species, Amarakaeri Communal Reserve, Peru

1) While it is true that fish have relatively small brains compared to other species, it has been scientifically proven that fish have memories lasting months or even years, as well as the ability to recognize.

Figure 2: A swimming reef stonefish

Debrief - EVOCATION - Log 6 (Godseye)

To the offices of our Numen Percival. EVOCATION continues. The mole has gained personal contact with the researcher involved in the Ginohne-Lhok project, see Cicerone's message above. Whilst protocol typically discourages a mole from gaining any sort of personal contact with a surveilled asset, so long as it continues to grant us intelligence, I will once again allow it for the time being. All is well with EVOCATION then. Our war against the AIS rages on, but we are close! Reports from the frontlines are excellent. The troops fight with renewed vigour, for they, like us, can sense that victory is within our grasp. Every day, the enemy's numbers dwindle further. They face desertion, exhaustion, and have nowhere left to run. It has been a hard fight. We have spent many billions in the pursuit of galactic peace in our time, but soon, soon all will be duly rewarded. For peace and prosperity in our time!

Godseye.

> Log IX: [URGENT] - Operation Day: 277 (Cicerone)

HAVEN, it is urgent! See to it that Godseye gets her hands on this report ASAP! I will try to keep it short and let the transcript speak for itself, but some context is needed. During the last thirty seven days, the mole has paid numerous visits to the Oaurrou City Sail Club, to the point where he has become a regular. There are even talks of hiring him as a member of the facilities cooking staff, as he is known to help out the cooks with their menial labour. It would certainly be a step up from his current position. This, however, matters very little. Fifteen days ago, after a long day of sailing, Rados Barterrion announced his plans to hold a press conference in seven days' time at the Kindler Institute of Technology. He invited all members of the sailing club to attend, stating that he had an important announcement about a project he had been working on. Needless to say, the mole was first in line seven days later. A recorded transcript from the press conference, sent to the Kindler media has been attached below. Our worst fears have been confirmed.

“Conference Hall 39A, Kindler Institute of Technology, Oaurrou, Ecvilteh.

> J. X. Mientias (President of KIT):

Citizens of the Kindler Confederation. It is not often that I have the honour, nor the privilege, to stand before you with an announcement of such magnitude, or scale, as with which I stand before you today. Since its founding, the Kindler Institute of Technology has prided itself on our never ending pursuit of our founding principles: to improve the lives of all Kindler citizens, and the galaxy as a whole, through enlightenment, and progress, in the fields of science and technology. Today, I stand before you to announce that we have once again made a major discovery, the likes of which have not been seen at this institute since the invention of the metallic hydrogen capture-synthesis-engine. I stand before you today, as the galaxy's last strains of Ginohne-Lhok succumb to the Shadowvein plague, to announce that our efforts have been answered. As I am sure you are all aware, Professor Rados Barterrion has been working with Ginohne-Lhok for quite some time now, and successfully synthesised the galaxy's first strain of living-use Ginohne-Lhok approximately two Ecviltehen rotations ago. Though at the time of this paper's publishing, his research was only in its early stages, and the strain created was for all intents and purposes unusable- on account of what I believed he himself has dubbed “general cattiness, and refusal to cooperate” (The crowd laughs)- it would appear that, unsatisfied with just one breakthrough, Rados has been back in the laboratory. As such, it is with great honour, and pleasure, that I would like to welcome Rados Barterrion to the podium. (Applause).

> R. Barterrion:

Thank you kindly Jesirleone. Fellow citizens of the Kindler Confederation. It is my greatest honour to stand before you today, as your humble gardener, and announce to you all that, after almost ten rotations worth of patience, that this garden, that you have ever so graciously watered with your continued contributions, support, and funding, has finally bore its first edible fruit. Sixty days ago, a new lineage of Ginohne-Lhok was successfully synthesised by my research team aboard the KRS Speultima, and it is everything we could have ever hoped for. Though I am sure you are all anxiously awaiting further information about this exciting new strain, I request that we first take the time to acknowledge, and pay our solemn respect and gratitude, to a man who is not in the room with us today, but without whom none of this would have been possible.

Fidesios Andris Eoalloz was a man whose legacy I may only hope to live up to in my lifetime. He was kind, compassionate, enormously patient, and a brilliant researcher, with an equally brilliant sense of wit. It was Fidesios who first got me interested in Ginohne-Lhok, early on into my studies. He had a way of speaking that could entice even the most weary student to pay attention, and it has been my greatest honour to serve alongside him. Though unfortunately Fidesios is no longer with us, having passed away five days ago at the ripe old age of 267, his legacy shall live on. I remember distinctly that he bid me in the final days of his life, to come up with a good name for our new discovery. When I suggested naming it after him, he refused, exclaiming: "Absolutely not! I am nowhere near important enough for that! Do you know how many things we've named after some old dead professor?" It is for this reason, among many others, that we here at the Kindler Institute of Technology, have unanimously decided to dub this new strain Gin-Oh Lhoksibilius Fidesios Eoalloz, in tribute, and to honour the legacy of, my fellow researcher, mentor and friend. I am certain if Fidesios was here today, he would be honoured. Then again, he may also give me a stern talking to for daring to name such an important discovery after "some old dead professor," but to that I say, there is no man here today more deserving of having their legacy forever tied to the future of the galaxy as he. A toast then, to that legacy! (Applause)

In tribute to my good friend, I would like to tell you more about the strain GL-FE47, as it was known to us during our research. The strain grows a perfectly clear crystalline structure, with near perfect edge alignment, much like its Vellocular father, whilst maintaining the living-usability as well as immunity to Shadowvein, of its Ecviltehen mother. It is the crowning achievement of centuries of research, much of which was done by Fidesios himself. As with our previous living strain project, GL-FE47 enters a form of hibernation when outside of ideal growth conditions, during which time it ceases all growth, while maintaining its flexstalline properties, thus allowing for its live-usage. If damaged, a hibernating sample can undergo self repair, if the required resources are at hand, though it survives even in a damaged state for quite some time before beginning to embrittle. GL-FE47 is also significantly less prone to mutation than its mother strain. Despite this, it does unfortunately maintain her fiery temper. It would appear the same tolerance to high temperature and pressure required to successfully survive explosive reproduction are responsible for providing immunity from Shadowvein, and the two characteristics are impossible to separate, at least for the time being. So far, we have four successful seedlings of GL-FE47. One sample, dubbed "Ouroboros" has unfortunately mutated in the course of our experiments, and has taken on a deep purple, almost black colouration, making it

ill suited to technological applications. The other three strains, however, have remained entirely colourless, despite our attempts to mutate them. The most promising seedling has, as of six days ago, already been implanted in a quarantine zone of the Ecvilteh Deep Crust Basin, and is being monitored for an expected gemburst later this Ecviltehen year. During implantation, a small ceremony was held, during which a plaque was placed above the seedlings capsule. I would like to read the message upon that plaque to you now. It reads: "Herein is implanted, by Rados Barterrion, the first seedling of Gin-Oh Lhoksibilius Fidesios Eoalloz, synthesised through the efforts of the citizens of the Kindler Confederation. We plant it here in peace for all sentient life." (Applause). I will now open the floor to any questions, though please be advised that by order of the Kindler High Council, the precise requirements and methodologies for the synthesis of GL-FE47 must remain classified for the time being. Nevertheless, I can assure you that the research has been peer reviewed by multiple institutions, two of which have been granted access to the two remaining samples for their own testing purposes. Additionally, those of you who know my wife Verie, will know that I must be extra careful not to slip up, as I do not wish to be decapitated for making her fill out all the ensuing paperwork if I speak too much. (The crowd laughs) Nevertheless, please, do not hesitate to ask away regardless. (Applause)."

Key Words (for those who are just jumping in)

Do be sure to head back to our earlier issues to catch up with the whole project ;)

"Ginohne-Lhok" An organism whose remains are used in various technologies on account of its "flexible crystalline structure." Essentially the backbone of all modern technologies in the galaxy.

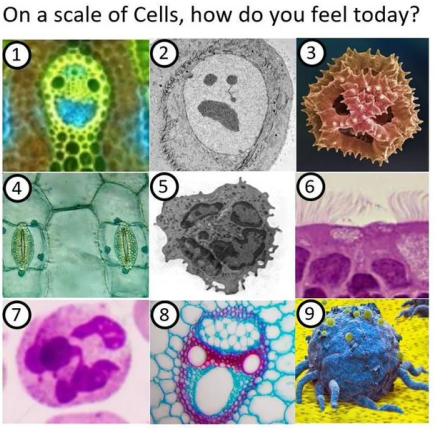
"Shadowvein": A widespread parasitic organism that infects Ginohne-Lhok. Upon death, Ginohne-Lhok embrittles, becoming less useful as a result.

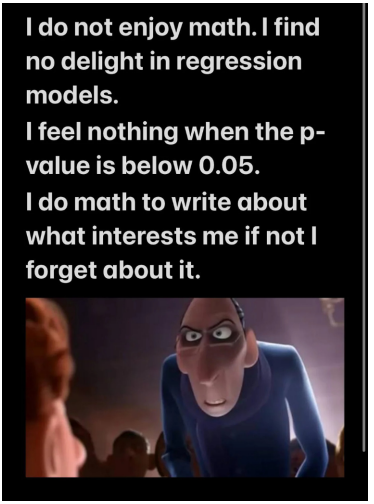
Keep your sensors tuned to **B10-T1kum** for further updates!

(To be continued...)

- Adrian Bär

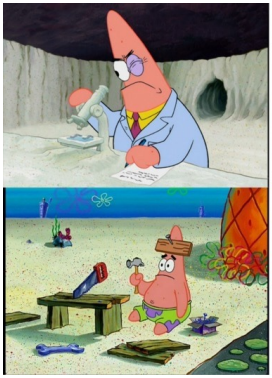
Puns and Funs





Food: *Falls on the floor*
Me: *Picks it up in 3.88 seconds*

Bacteria:



A star-nosed mole, able to detect scent underwater and decide if food is edible at the speed of a neuron

Me, a human who takes all day to decide what I want for dinner and would drown if I tried to smell something underwater

Alex Rogaski
@AlexRogaski

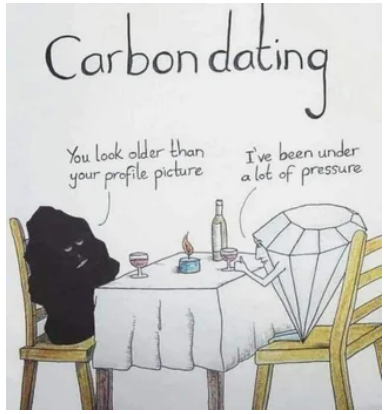
Biologist screws up:
Mutant killer virus

Physicist screws up:
Deadly black hole

Geologist screws up:
Rock on table is now rock on floor

1/20/16, 8:35 PM

Photos Source: rockhardgeolo...



Science Is Fun
@sciencefunn

Vertebrates planning their invasion of land (358 million years ago, colorized)

jumpingjacktrash
what is the code entomologists use for "i stepped on it, i'm so sorry, it was dark out and the specimen was very small"

coolmanfromthepast
"Impromptu dissection was performed under less-than-optimal lighting conditions."

jumpingjacktrash
'impromptu dissection' is an alarming phrase in any context and i thank you for it

inky-petrel
What's biologist for "the little fucker BIT me and I yote it into the undergrowth on reflex"?

tawghasa
"Specimen was removed from the study pool due to abnormal interaction responses"

Closing your eyes for 'just another 2 minutes' after your alarm goes off and waking up 25 years later married with 3 kids and a dog

Neighbouring cell: Don't kill yourself

Cell: Ok

Neighbouring cell: Don't kill yourself

Cell: Ok

Neighbouring cell: Don't kill yourself

Cell: Ok

Neighbouring cell:

Cell:

Cell: WHY ARENT YOU SAYING ANYTHING, IM GOING TO KILL MYSELF

Das Letzte

So schnell ist das Biotikum auch schon durchgelesen. Aber halt, der Spass muss kein Ende haben:

Redakteur*in gesucht!

Schreibst du gern? Hast du Interesse an Journalismus? Möchtest du andere an deinem Schreibtalent und deinem Wissen teilhaben lassen? Oder einfach mal deine Schreiblust stillen?

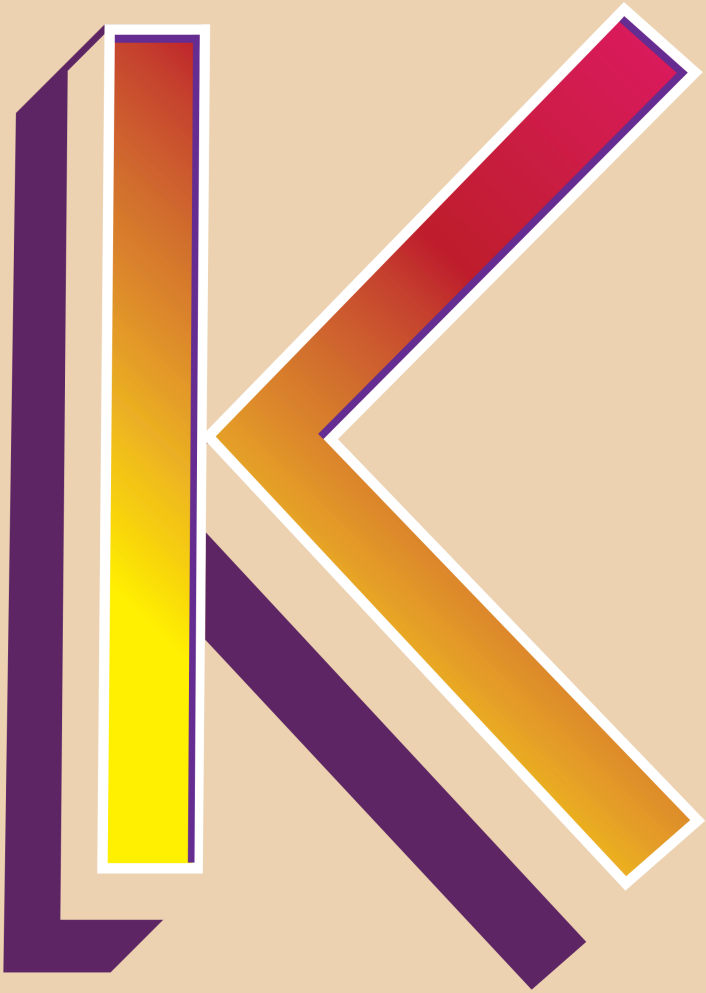
Wenn du alle oder auch nur eine dieser Fragen mit ja beantworten würdest, dann melde dich bei redaktion@vebis.ch und unterstütze unsere Kommission!

Dankeschön

Ein grosses Dankeschön an Noelia Rodríguez Carballo fürs Layout sowie an die ganze Redaktion für die vielen Artikel!

Bis zur nächsten Ausgabe!

vseth



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