

Pesquisa Científica

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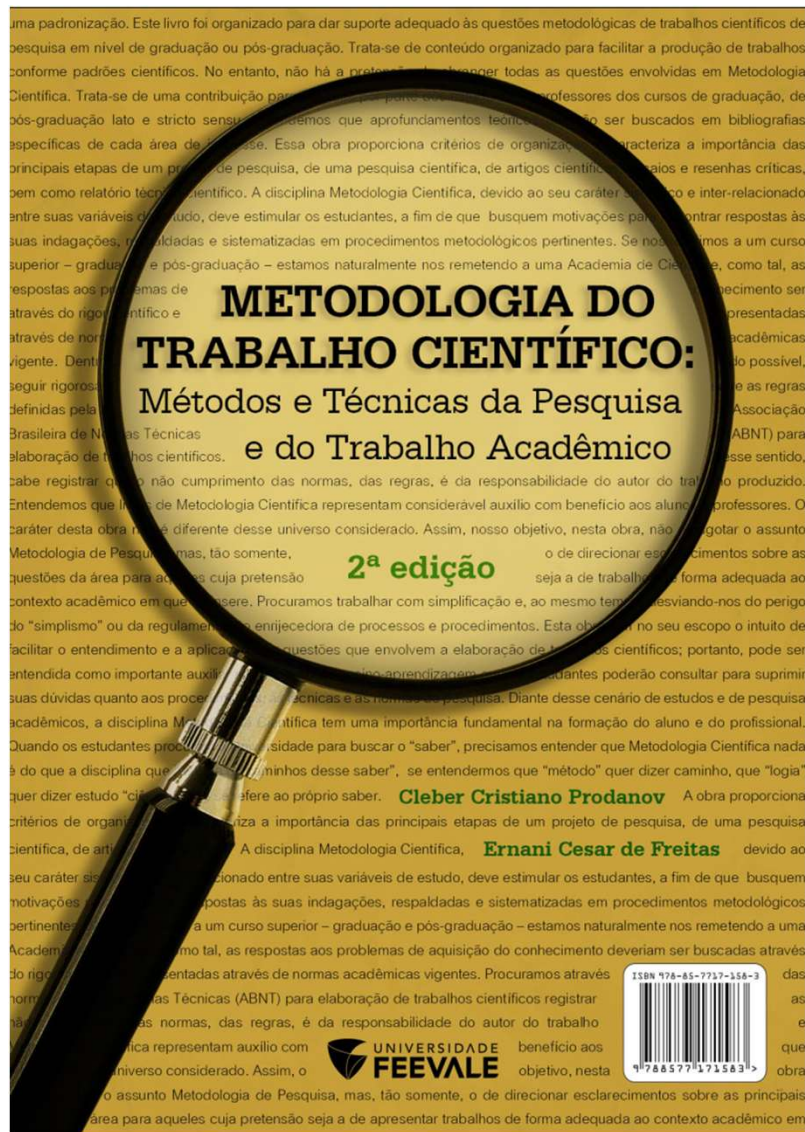


PRÉ-REQUISITOS



Curiosidade e interesse em aprender.

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Pesquisa Científica

“[Metodologia do Trabalho Científico](#)”, de Cleber Cristiano Prodanov e Ernani Cesar de Freitas, é uma obra prática voltada ao ensino dos fundamentos da pesquisa científica e da elaboração de trabalhos acadêmicos.

O livro aborda métodos de pesquisa, tipos de estudo, estrutura de projetos e normas de formatação, sendo ideal para estudantes e iniciantes na vida científica.

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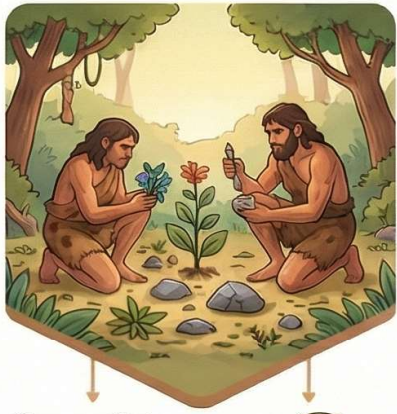
1

Fundamentos

A Evolução da Pesquisa Científica: Da Pedra ao Processador

PRÉ-HISTÓRIA: A CIÊNCIA DA SOBREVIVÊNCIA

Observar, Testar e Aprender
Nossos ancestrais usavam a observação atenta e a tentativa e erro para diferenciar plantas, pedras e animais, garantindo sua sobrevivência.



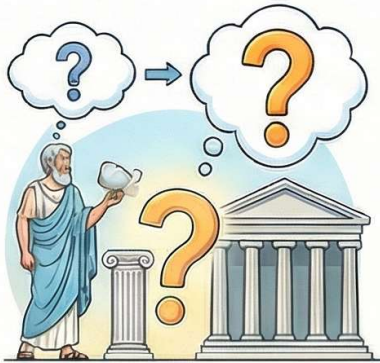
Observar, Testar e Aprender.
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Conhecimento como Memória Coletiva.
As descobertas eram registradas na memória do grupo e transmitidas oralmente de geração em geração, sem registros escritos.

ANTIGUIDADE CLÁSSICA: O NASCIMENTO DA RAZÃO

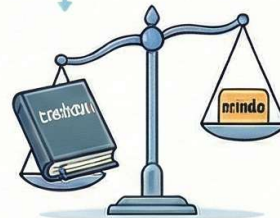
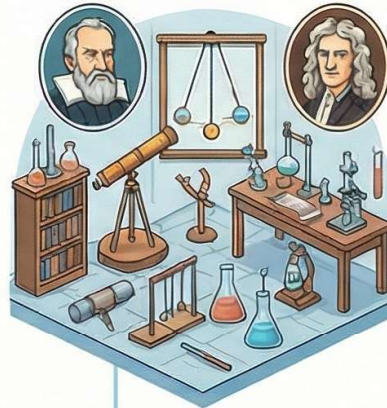
A Pergunta Fundamental Muda
A curiosidade evolui de 'funciona?' para 'por que funciona?', buscando explicações racionais para os fenômenos naturais.



Primeiras Explicações Racionais.
Pensadores como Hipócrates e Aristóteles buscaram explicar doenças e padrões na natureza sem recorrer a deuses ou mitos.

REVOLUÇÃO CIENTÍFICA: A ERA DA EVIDÊNCIA

O Nascimento do Método Científico Moderno
Galileu e Newton defenderam que o conhecimento precisa ser testado por meio de observação controlada, experimentação e repetição.



Da Opinião à Evidência.
A ciência deixou de se basear na autoridade absoluta e passou a ser fundamentada em evidências comprováveis.

SÉCULOS XIX-XX: A CIÊNCIA NO LABORATÓRIO

A Pesquisa Entra nos Laboratórios
O surgimento de instrumentos de precisão impulsionou campos como a química moderna, a microbiologia e a biologia molecular.



A Pesquisa Entra nos Laboratórios.
O surgimento de instrumentos de precisão impulsionou campos como a química moderna, a microbiologia e a biologia molecular.



A Complexidade e o Custo Aumentam.
Fazer novas descobertas passou a exigir experimentos complexos, mais tempo e um volume maior de recursos.

ERA COMPUTACIONAL: O PARCEIRO DIGITAL

Computação Acelera a Descoberta
Cálculos que demoravam meses passaram a levar minutos, e simulações permitiram prever fenômenos antes dos experimentos reais.



Do Laboratório para as Bases de Dados.
A ciência passou a integrar experimentos com a análise de grandes volumes de dados, como genomas e milhões de compostos químicos.



O Novo Desafio: Excesso de Dados.
O problema mudou da falta de informação para a necessidade de desenvolver métodos para extrair conhecimento útil de dados massivos.

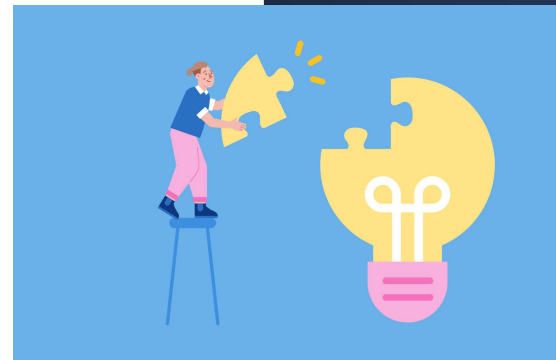
Pesquisa Científica

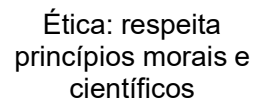
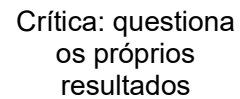
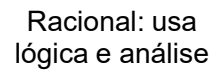
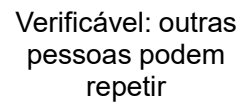
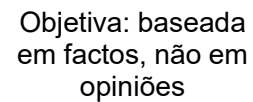
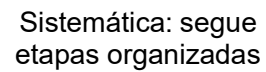
A **pesquisa científica** é um processo sistemático, organizado e rigoroso de produção de conhecimento, realizado com o objetivo de responder perguntas, testar hipóteses, resolver problemas ou compreender fenómenos da realidade, usando métodos confiáveis e verificáveis.



Pesquisa Científica

- ☐ Produzir novo conhecimento
- ☐ Confirmar ou refutar teorias existentes
- ☐ Resolver problemas práticos
- ☐ Apoiar a tomada de decisões
- ☐ Desenvolver tecnologias e políticas públicas
- ☐ Melhorar a qualidade de vida da sociedade



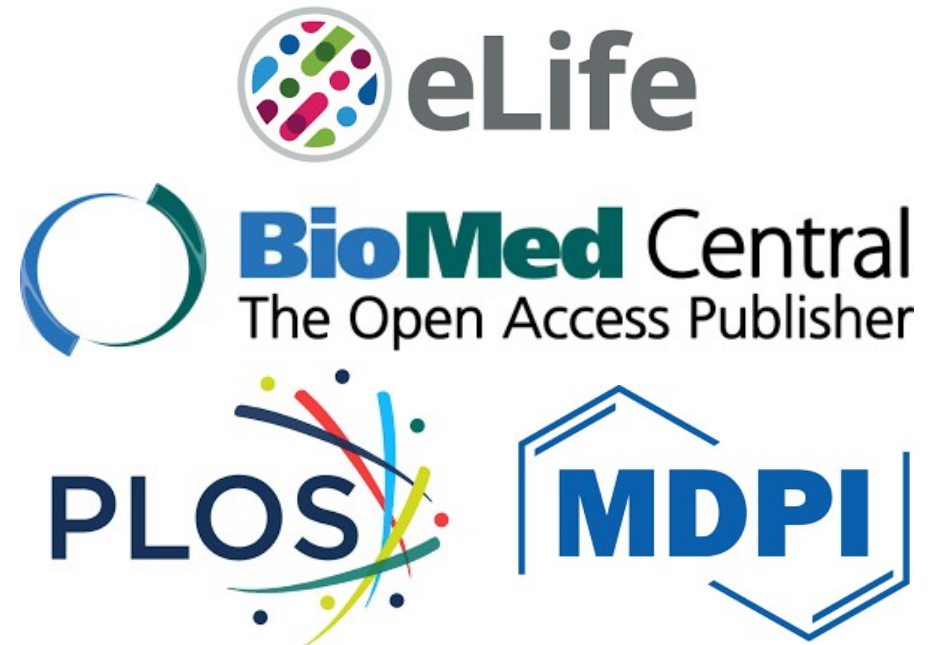
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Etapas básicas da pesquisa científica

- ☐ Identificação do problema
- ☐ Formulação de hipóteses
- ☐ Revisão da literatura
- ☐ Definição da metodologia
- ☐ Coleta de dados
- ☐ Análise dos dados
- ☐ Discussão dos resultados
- ☐ Conclusão
- ☐ Divulgação (artigo, tese, relatório, etc.)

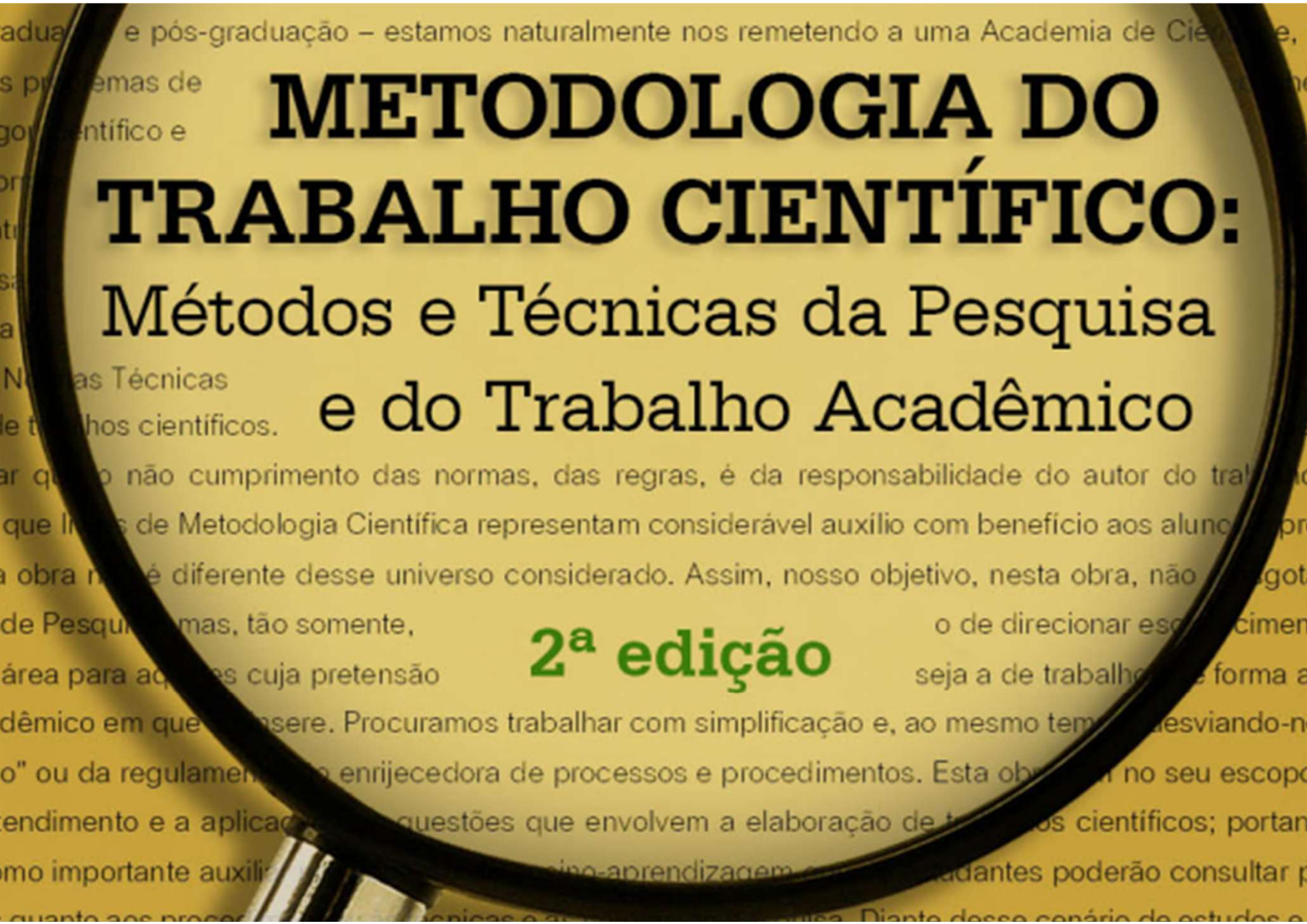


Editoras mais relevantes



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Overview

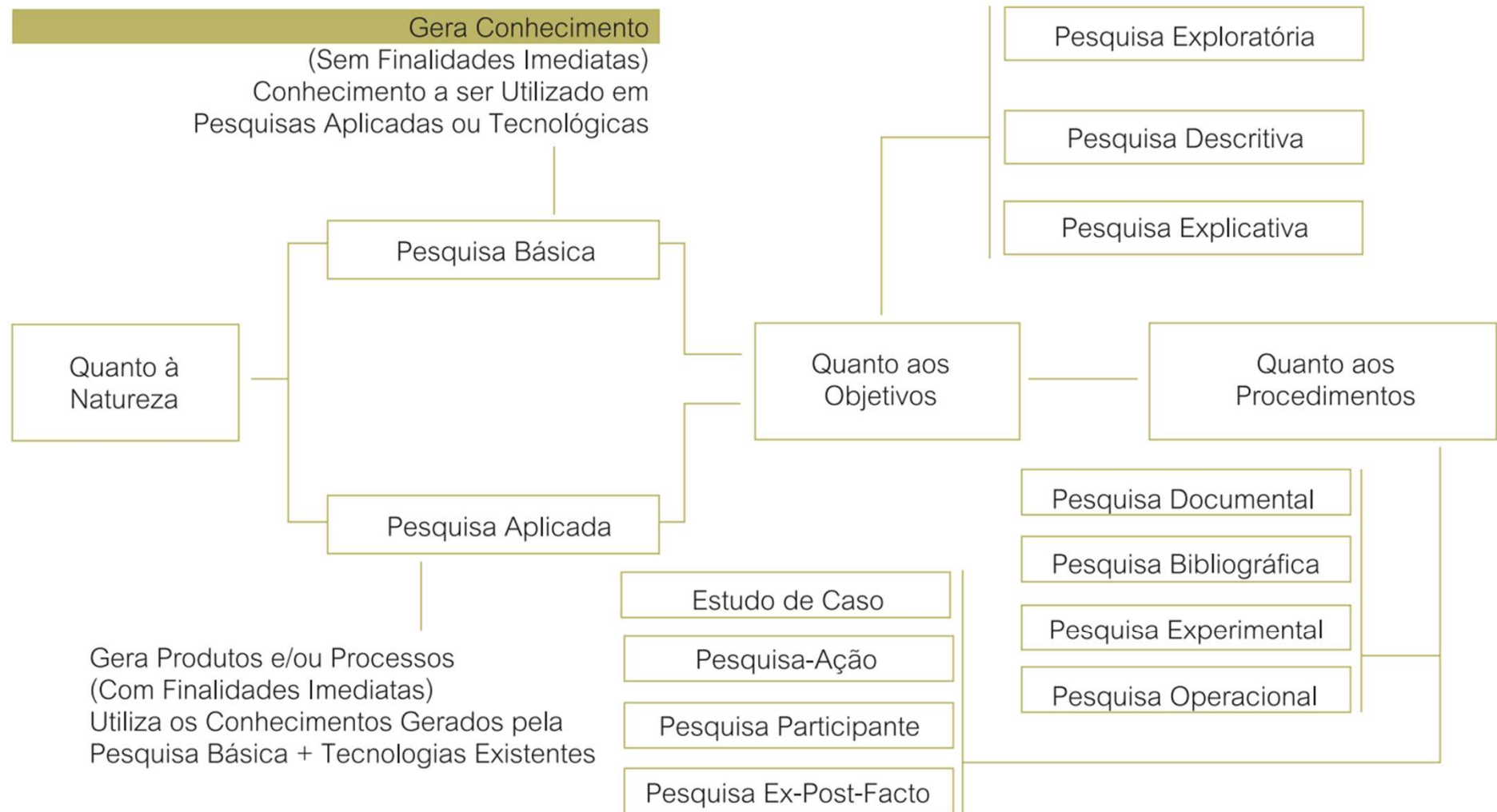


METODOLOGIA DO TRABALHO CIENTÍFICO: Métodos e Técnicas da Pesquisa e do Trabalho Acadêmico

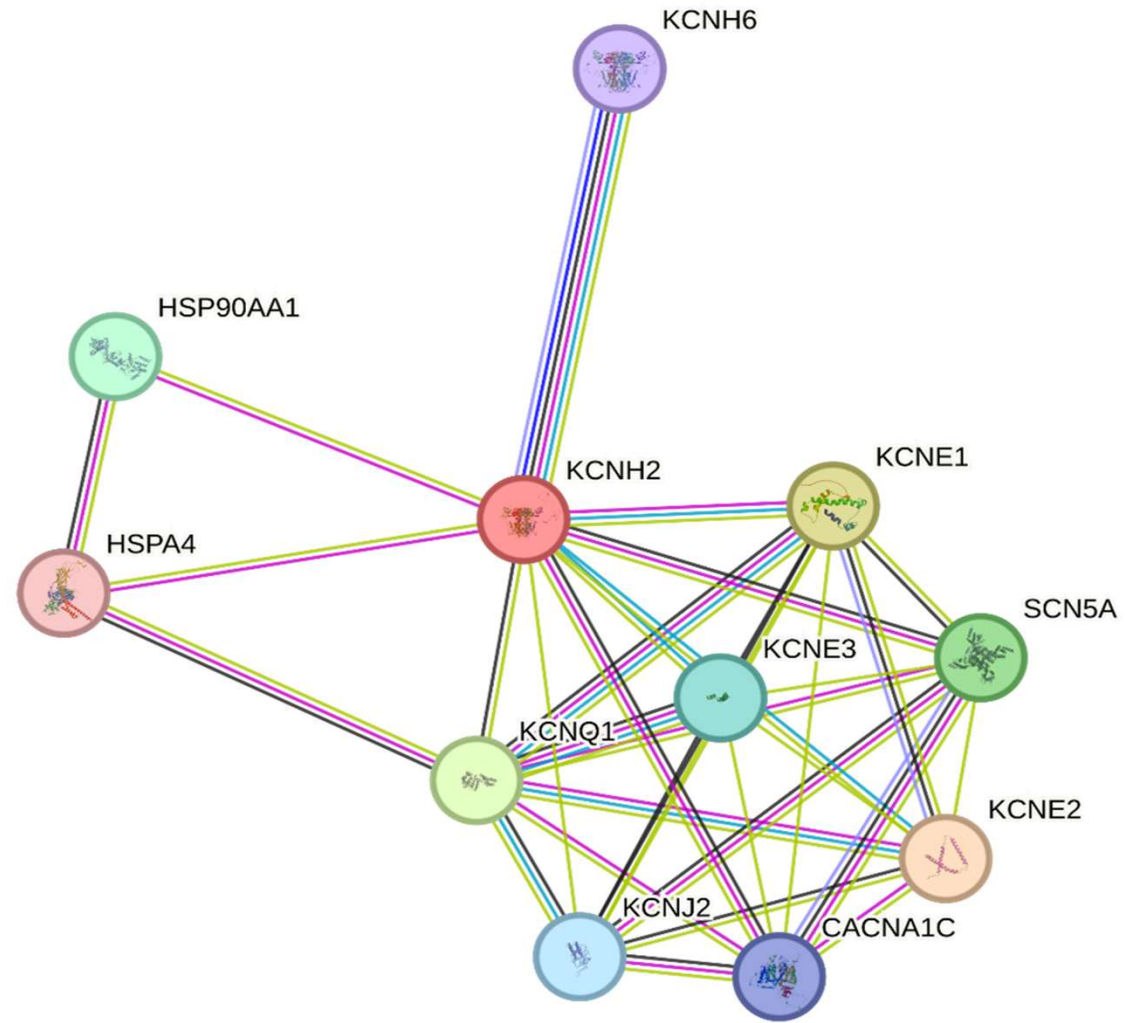
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Conhecimento científico	Conhecimento popular
real – lida com fatos.	valorativo – baseado nos valores de quem promove o estudo.
contingente – sua veracidade ou falsidade é conhecida através da experiência.	reflexivo - não pode ser reduzido a uma formulação geral.
sistemático – forma um sistema de ideias e não conhecimentos dispersos e desconexos.	assistemático – baseia-se na organização de quem promove o estudo, não possui uma sistematização das ideias que explique os fenômenos.
verificável ou demonstrável – o que não pode ser verificado ou demonstrado não é incorporado ao âmbito da ciência.	verificável – porém limitado ao âmbito do cotidiano do pesquisador ou observador.
falível e aproximadamente exato – por não ser definitivo, absoluto ou final. Novas técnicas e proposições podem reformular ou corrigir uma teoria já existente.	falível e inexato – conforma-se com a aparência e com o que ouvimos dizer a respeito do objeto ou fenômeno. Não permite a formulação de hipóteses sobre a existência de fenômenos situados além das percepções objetivas.

Figura 2 – Tipos de pesquisa científica



Saúde



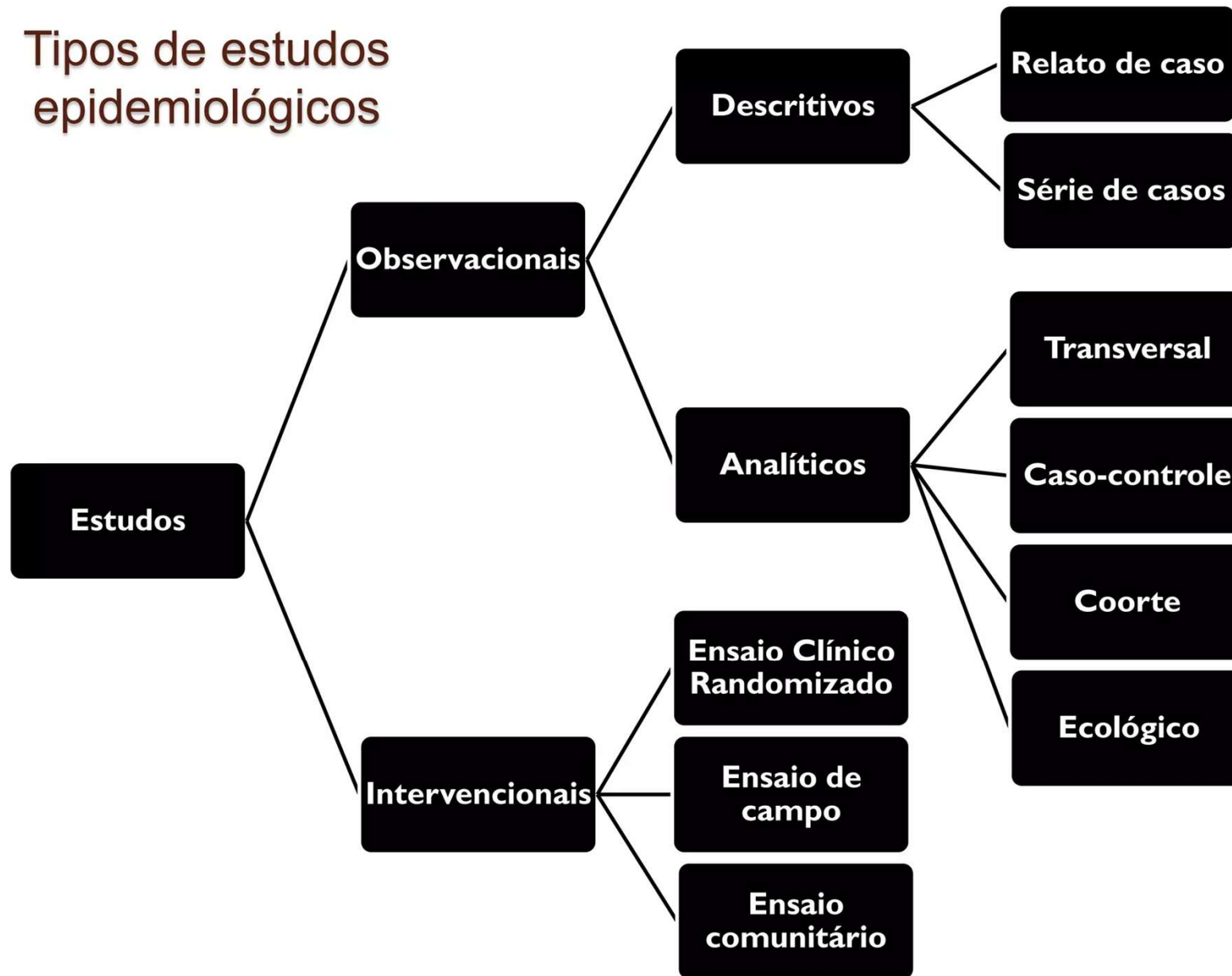
Estudos epidemiológicos

Estudos epidemiológicos são investigações científicas que analisam como as doenças e outros eventos relacionados à saúde se comportam nas populações — ou seja, quem adoece, por que adoece, quando, onde e em que condições.

Medidas de associação



Tipos de estudos epidemiológicos





1

Revisões sistemáticas metanálise

2

Ensaio clínico randomizado

3

Estudo de coorte

4

Estudo de caso-controle

5

Estudo de casos e transversais

3

Artigos Científicos

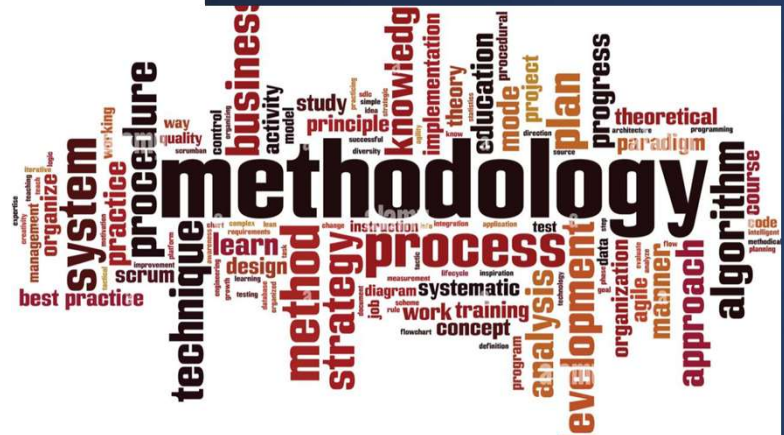
Introdução

- ☐ Contexto geral: panorama do tema e relevância;
- ☐ Lacuna (gap): o que ainda não está resolvido;
- ☐ Importância: por que o estudo é necessário;
- ☐ Objetivo: o que o trabalho busca demonstrar;
- ☐ Hipótese: expectativa central do estudo



Metodologia

- ❑ Desenho do estudo: tipo, abordagem e escopo definidos;
- ❑ Dados / amostra: fonte, critérios e tamanho justificados;
- ❑ Procedimentos: etapas padronizadas e reprodutíveis;
- ❑ Análise: métodos analíticos/estatísticos adequados;
- ❑ Validade e ética: controle de viés e conformidade ética



Resultados

- ❑ Dados principais: resultados diretamente ligados aos objetivos;
- ❑ Análises-chave: métricas, comparações e testes relevantes;
- ❑ Padrões observados: tendências, diferenças ou relações identificadas;
- ❑ Significância: relevância estatística/prática dos achados;
- ❑ Figuras e tabelas: apresentação clara e objetiva dos dados



Discussão

- ❑ Interpretação: significado dos principais resultados;
- ❑ Comparação: relação com a literatura existente;
- ❑ Contribuição: avanço em relação ao conhecimento atual;
- ❑ Limitações: restrições e possíveis vieses do estudo;
- ❑ Implicações: relevância científica e/ou prática



Conclusão

- ❑ Síntese: principais achados em relação aos objetivos;
- ❑ Resposta ao problema: o que o estudo demonstrou;
- ❑ Contribuição: impacto científico e/ou prático;
- ❑ Limitações finais: reconhecimento das restrições;
- ❑ Perspectivas: direções para estudos futuros

Conclusion



4

Prática



Vamos aprender
Ciência juntos

vídeos toda semana :)

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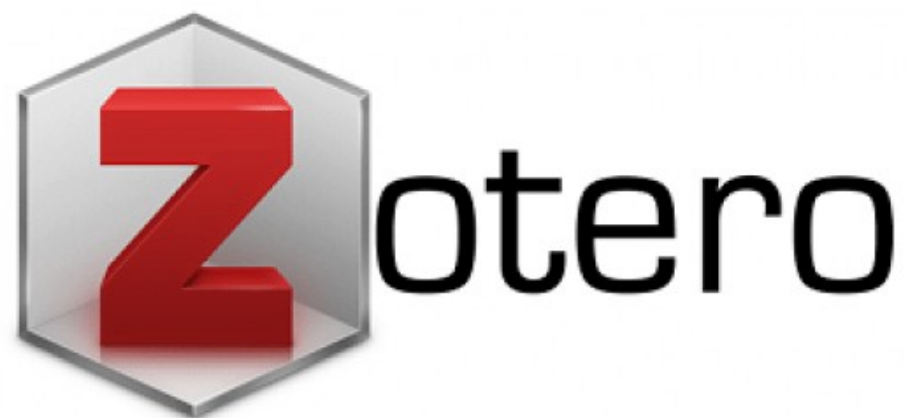
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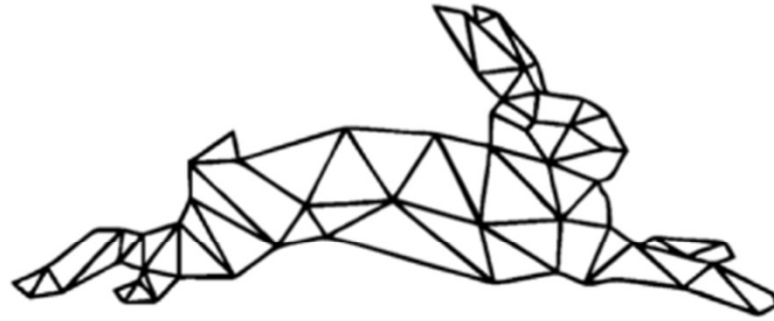












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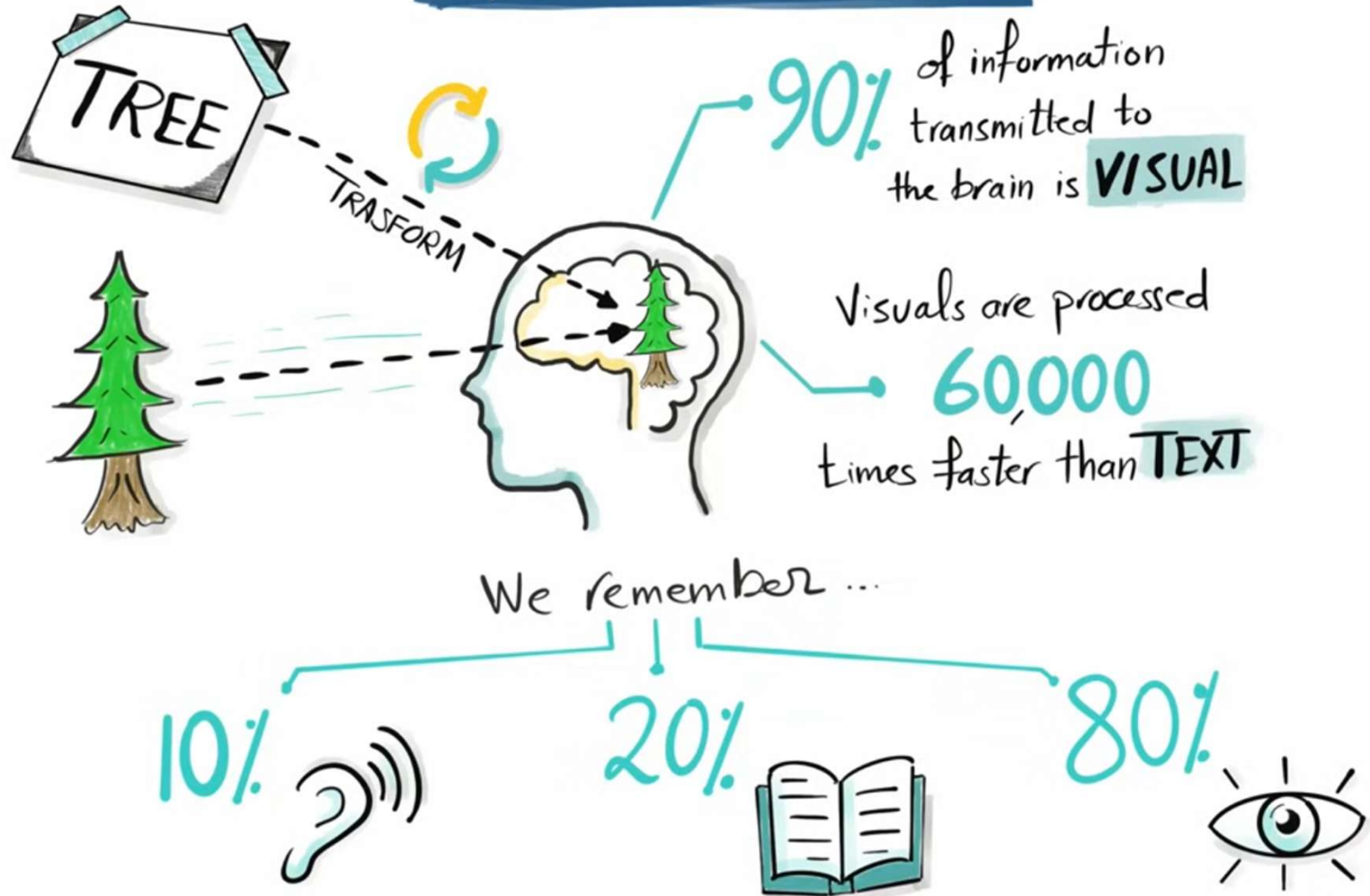


NotebookLM

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Figuras

POWER OF VISUAL





SPRING 2015

25

First Hand: Great Horned Owl

BY SHARIF GALAL

Human love for owls started long ago. Drawings of different owls are present in ancient Greek and Egyptian artifacts. In fact, the owl symbol was one of the letters in the hieroglyphic alphabet and a symbol of wisdom for the ancient Egyptians.

In most of the story books, the Great Horned Owl (*Bubo virginianus*) is representative of all owl species. It is the most common owl in North America. It can be found in all the Canadian provinces including Alberta, equally in wetlands, forests, mountain valleys, grasslands, backyards and cities –

easily recognizable because of the feather tufts that resemble horns, hence the name "great horned."

Great Horned Owls are adaptable birds and live from the Arctic to South America. They are at home in suburbia as well as in woods and farmlands. Northern populations migrate in winter, but most live permanently in more temperate climates.

These birds don't build nests, usually taking the abandoned nests of other large birds or nesting in tree holes or stumps. The nesting pair have one to five eggs (2-3 average). January to

ALMOST TIME TO FLY FROM THE NEST! SHARIF GALAL

NO WORRIES – JUST SLEEPY –
WHEN YOU'RE WELL FED. SHARIF GALAL



If you have a first-hand experience with nature, send it in and share it with other naturalists. After all – there are 8 million stories in the Nature City. Yours... could be one of them.



Dr. Sharif Galal is a medical doctor, biotechnology researcher, enthusiastic wildlife photographer and nature advocate. He currently resides in Calgary, Alberta and can be contacted at: galalsharif@calgary.ca

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NatureAlberta

early February is a popular time for the Great Horned Owl to lay eggs, and both the male and female incubate. In addition to that, the male also hunts for food. The owlets at birth are the cutest little birds, covered with down like fluffy balls; it's not until later that they develop feathers. The young owlets leave their nest when they are able to fly, around nine to ten weeks following birth. The mother and father are very protective of their young and will often attack intruders, including humans, which come too close to the nest or young. This protection is vital, as their young owlets are not able to protect themselves; unfortunately they often don't reach adulthood.

Like other birds of prey, owls have a very strong digestive system. Most of the time, they swallow their prey whole and later regurgitate pellets composed of bone, fur, and the other unwanted parts of their meal. Owls prey on different small animals and birds and sometimes on different species of smaller owls like Pigmy and Northern Saw-whet Owls. Surprisingly, it is reported that Great Horned Owls

- The Great Horned Owl is the second largest owl in North America after the Great Gray Owl.
- The "horns" of the Great Horned Owl are also known as ear tufts, although they don't actually have anything to do with hearing.
- Length: 18.1–24.8 in
- Wingspan: 39.8–57.1 in
- Weight: 32.1–88.2 oz



"COVERED WITH DOWN LIKE FLUFFY BALLS." SHARIF GALAL

hunt skunks and porcupines as well – one of the few animals that can handle the usually formidable defenses of skunks and porcupines. They have also been known to prey upon cats and little dogs. I personally know a lady who lost her chihuahua dog when a Great Horned Owl took it while she was camping.

I observed a family of Great Horned Owls with their three owlets and was fortunate enough to document different steps of their life cycle. I had been there several times in many weeks watching them growing up. One morning when I arrived, it seemed that one of them was not feeling well and was laying down on its back not able to move; the other little one was showing signs of sympathy and tried several times to let it stand up (see the back cover photo). I thought for a moment that this owl would not survive because it looked very ill to me but luckily, a week later, I found all three young owls in a very happy and healthy status. They were



EVEN AS DOWNY YOUNG, THE CLAWS ARE QUITE LONG AND SHARP. SHARIF GALAL

exercising with their wings in order to leave the nest soon.

Every time I see an owl, I can't resist the urge to observe them and take several pictures; my love for owls started very early in my childhood. I always remember the kindergarten song:

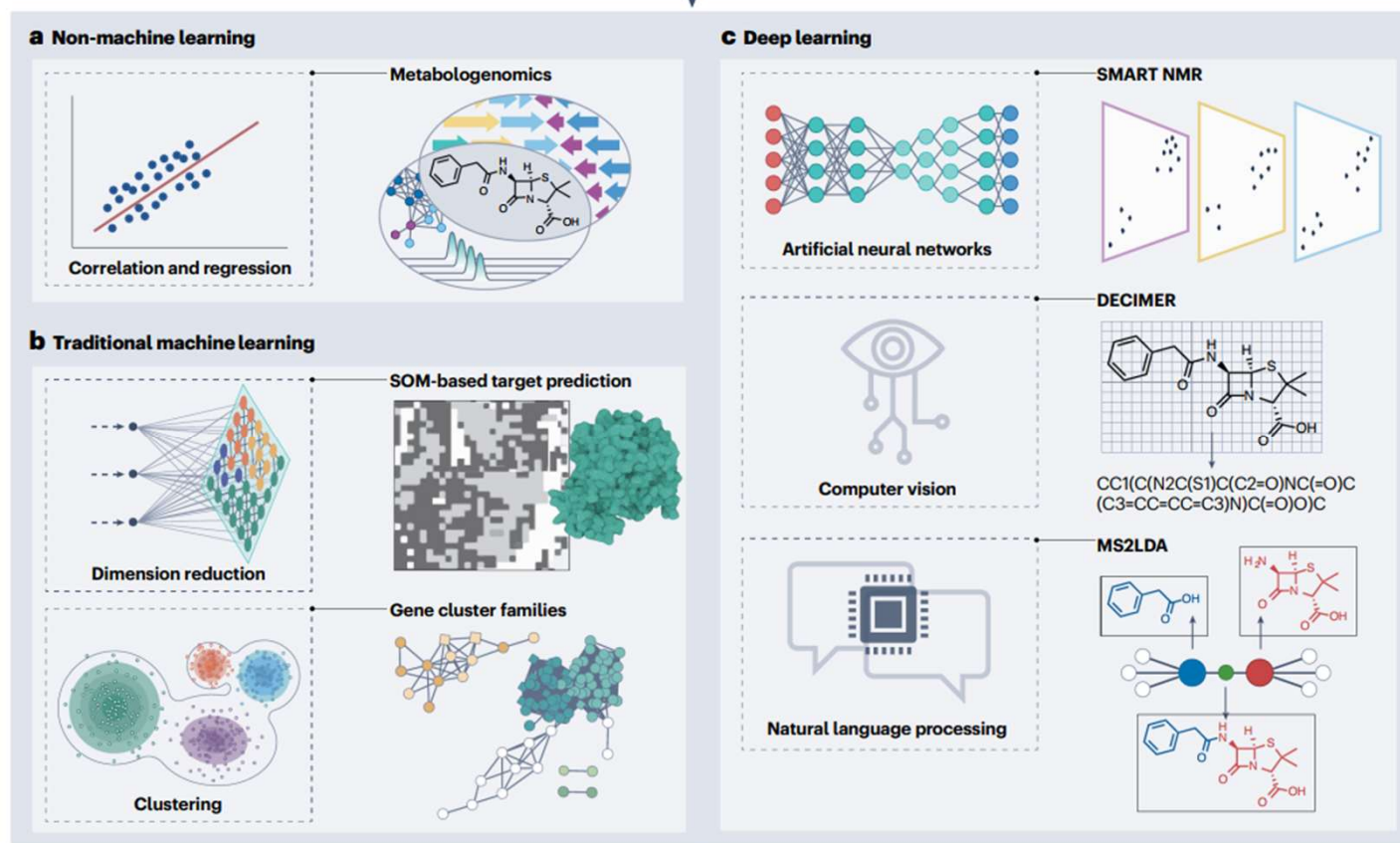
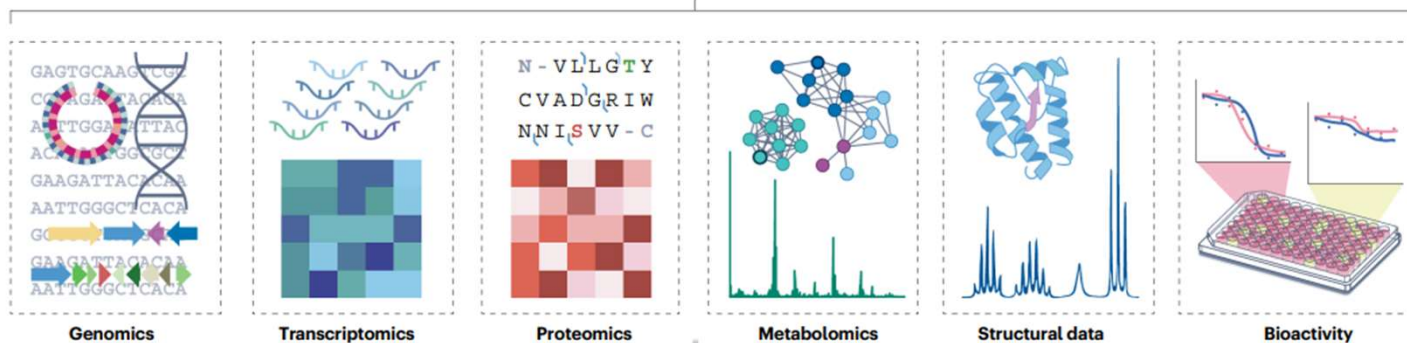
A wise old owl lived in an oak

The more he saw, the less he spoke

The less he spoke, the more he heard

Why can't we all be like that bird?

Reference: Cornell Lab of Ornithology, www.allaboutbirds.org/





VECTOR GRAPHICS DECLUTTER STORY

Principles of Beautiful Figures

Illustration—Creating high-quality figures for research papers is a difficult and time-consuming task. It requires extensive testing of various techniques to present the results of a study in the best possible way. Yet, there is limited training on developing high-quality illustrations. Many students and young researchers have to learn graphic design for scientific publications by trial and error. The authors of this book have written a guide for the development of a pictorial language, which serves both as a text and as a means to choose of colors and shapes supporting its contents. This manuscript, accompanied by a video tutorial and a plotting code example, shares the author's experience in creating beautiful vector-based figures tailored specifically for research papers. Various aspects of the book include: the importance of a good figure, the importance of plotting practices, examples of the readability of figures, including adjustments using vector graphics software, and selecting the most effective color schemes.

Index Terms—Data visualization, figures for research papers, Julia programming language, vector graphics.

1. INTRODUCTION

The importance of beautiful, professionally designed figures in research papers cannot be overstated. Figures serve as a critical tool for visual communication, helping convey complex data and concepts in a more accessible and understandable way. A well-designed figure can quickly transmit information, whereas a figure that is not only easy to figure but also more engaging for the reader. This is especially important in academic and scientific research, where the audience may span a wide range of expertise levels. Effective figures help ensure that the research is accessible not just to experts in the field but also to a broader audience, including policymakers, educators, and even the general public.

Moreover, beautiful professional figures enhance the credibility and professionalism of a research paper. In academic publishing, presentation quality can significantly impact the perception of the research itself. High-quality figures demonstrate attention to detail and a commitment to clearly and accurately presenting findings. They also help the paper stand out in a crowded field, making it more likely to be noticed and remembered by readers. A visually appealing figure can draw the eye, guiding the reader's attention to the most critical aspects of the data and helping to reinforce key messages of the research.

In addition to appearing clearly and credibly, well-designed figures can also facilitate better retention and recall of information. Research in cognitive psychology has shown that visual information is often easier to remember than text alone. Incorporating thoughtfully designed figures, researchers can help ensure that their findings leave a lasting impression on their audience. Figures that are visually compelling and easy to understand are more likely to be shared and cited, thereby increasing the reach and impact of the research.

Andrew Chalkin is with the Design School of Design Engineering, Imperial College London, London, U.K. (e-mail: a.chalkin@imperial.ac.uk; website: <http://andrewchalkin.co.uk/>)

Finally, professional figures can also enhance the overall flow and readability of a research paper. They can break up large blocks of text, providing visual relief and making the paper more approachable. This is particularly valuable in fields where papers tend to be long and dense, as it helps maintain the reader's engagement and prevents them from losing interest. Creating beautiful, creative figures, professional graphics, and effective tables can be beneficial, professional-looking, and not just about aesthetics—it is a strategic decision that can significantly enhance the effectiveness, reach, and impact of a research paper. Creating beautiful and effective figures for research papers involves following several key principles that ensure clarity, accuracy, and visual appeal. One of the foundational principles is simplicity. A figure should be as simple as possible while still conveying the necessary information. Overly complex figures with too much detail can overwhelm the reader and obscure the main message.



Fig. 1. Examples of vector graphics and vector graphics.

No coordination, VW limits imposed (H)

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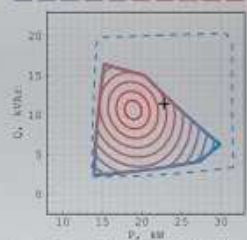


Fig. 7. Example of a vector-based image used in the analysis [1].

COLOURS





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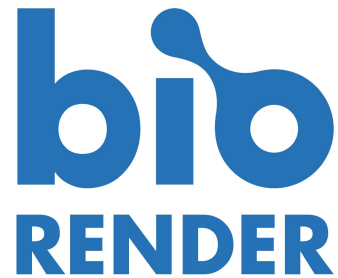
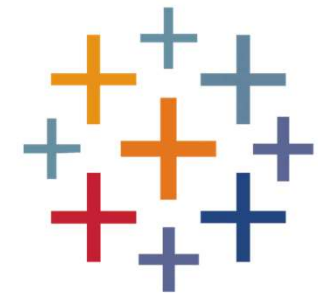
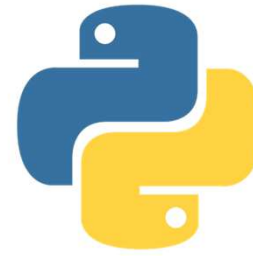
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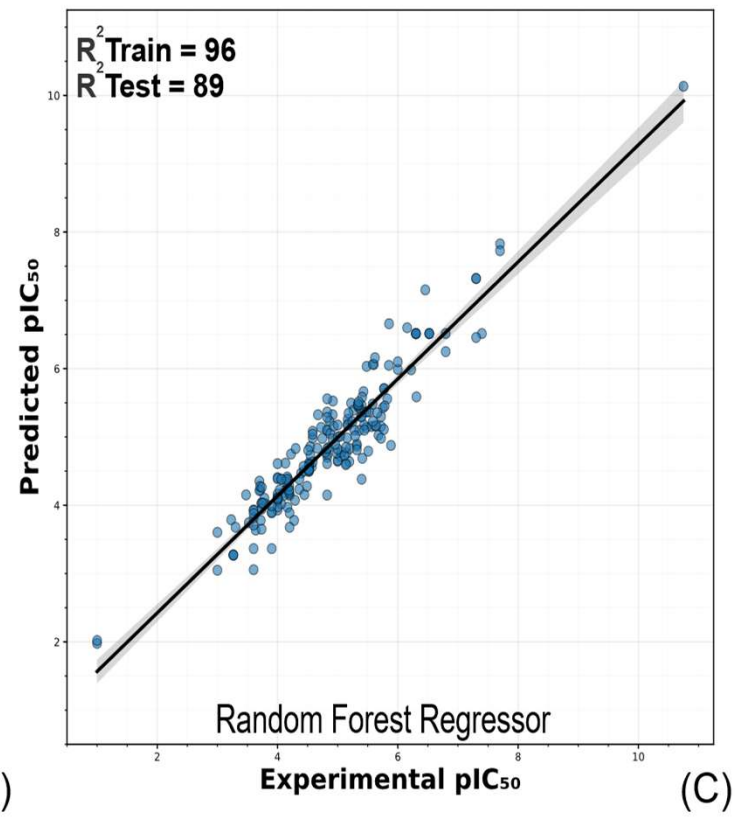
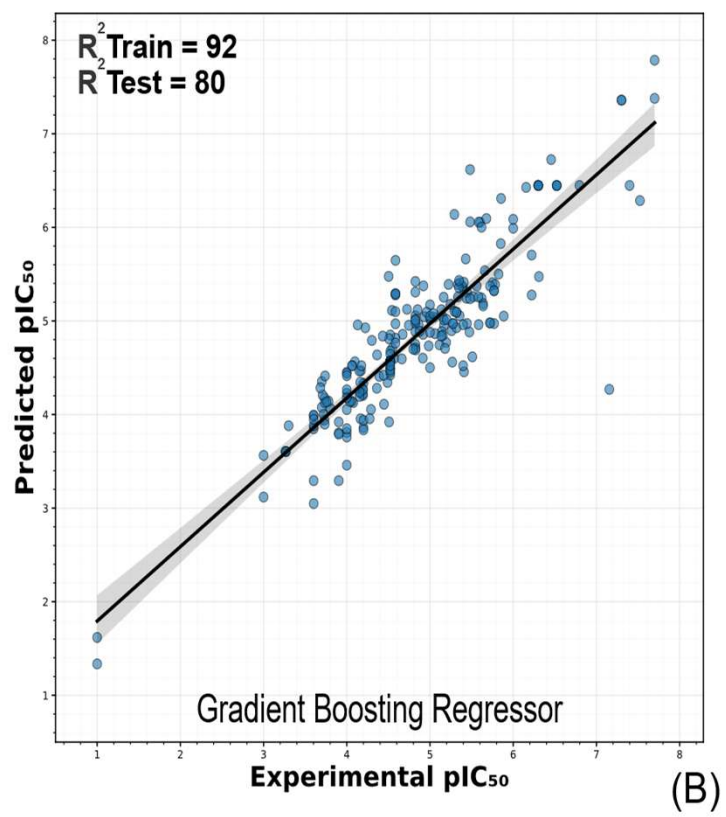
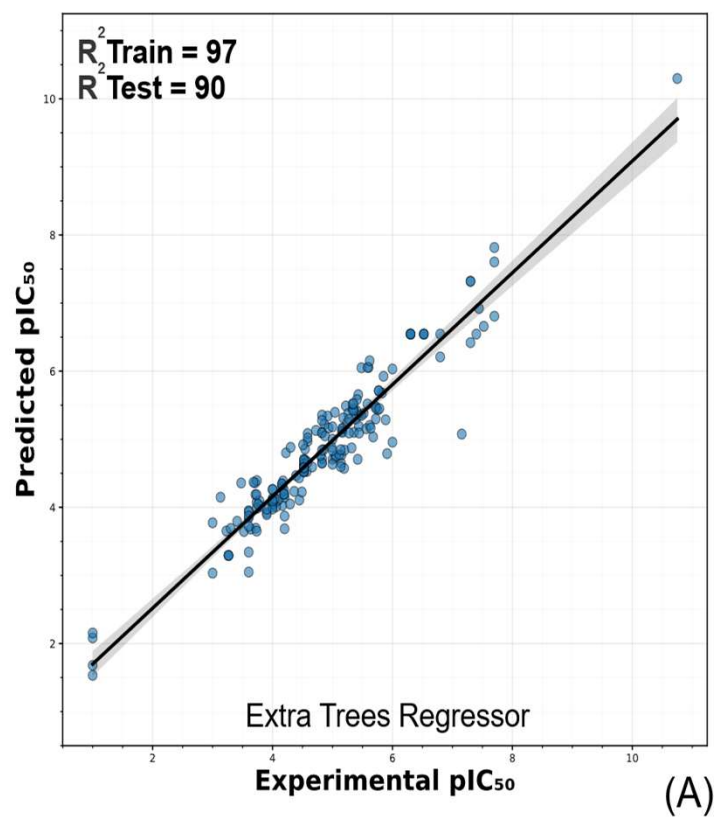


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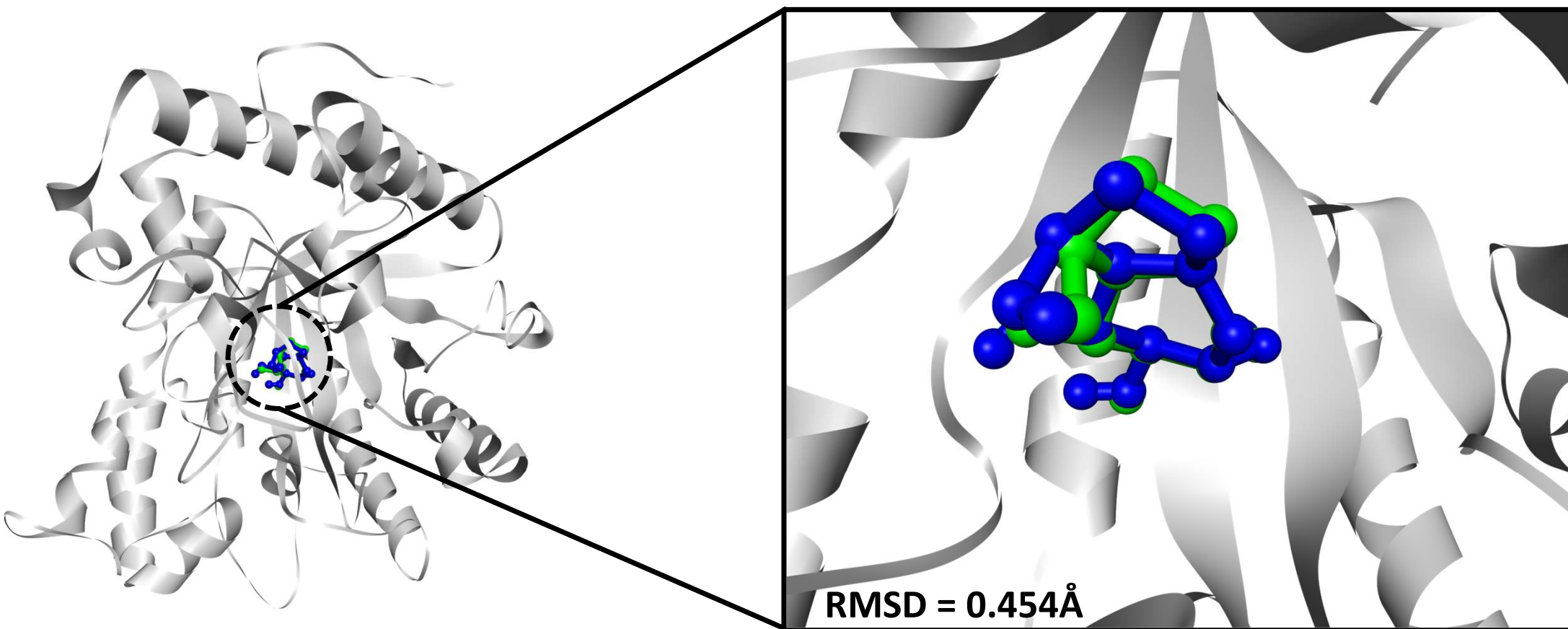


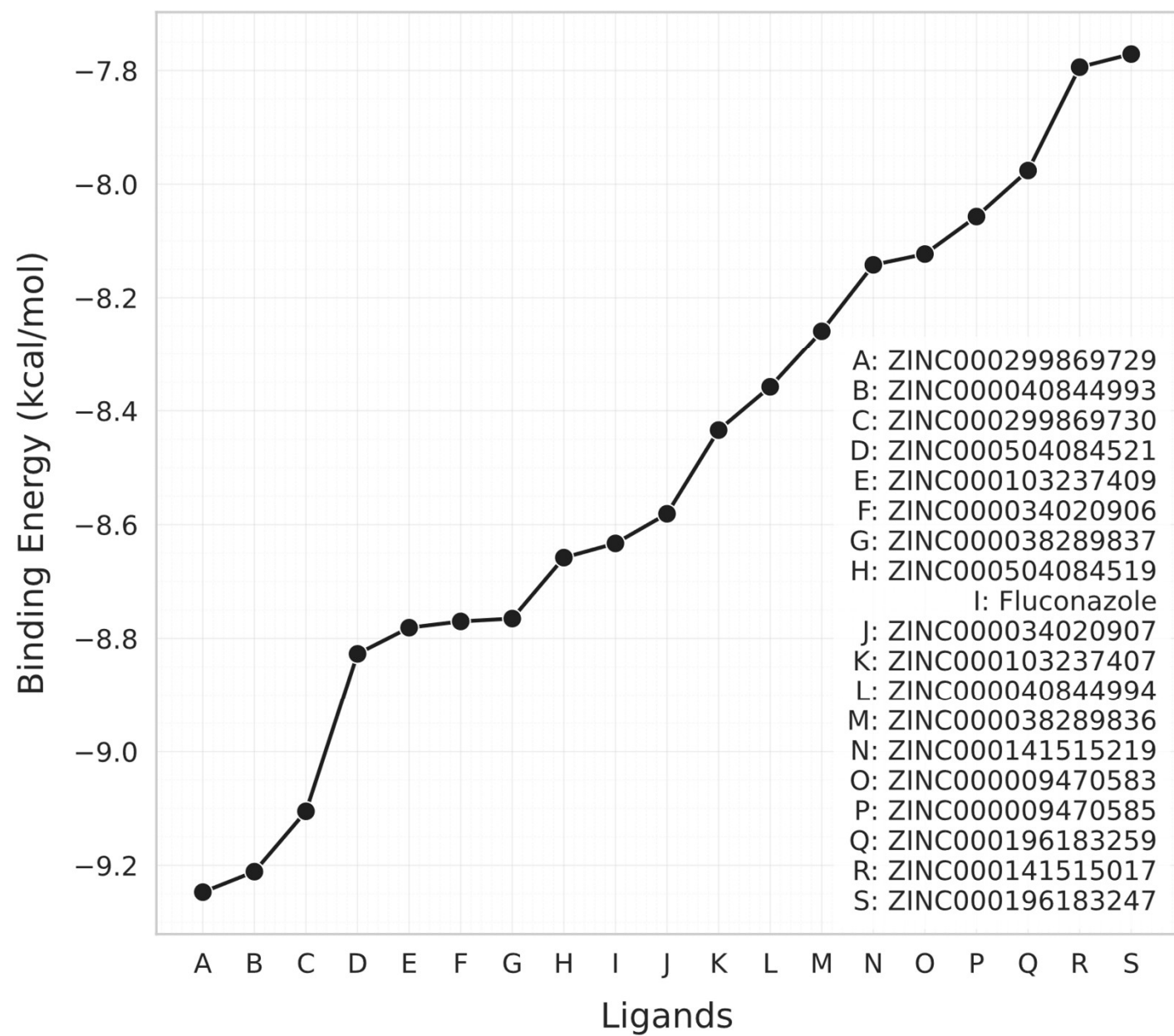
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RESULTADOS





RESULTADOS

A IA está aqui para potencializar nosso trabalho, não para substituí-lo.
Precisamos identificar os principais desafios da nossa área,
compreendê-los e buscar soluções com o apoio de ferramentas
poderosas como a IA, aplicadas de forma estratégica e consciente.



