What Shapes Our Trust in Scientific Information?

A Review of Factors Influencing Perceived Scientificness and Credibility

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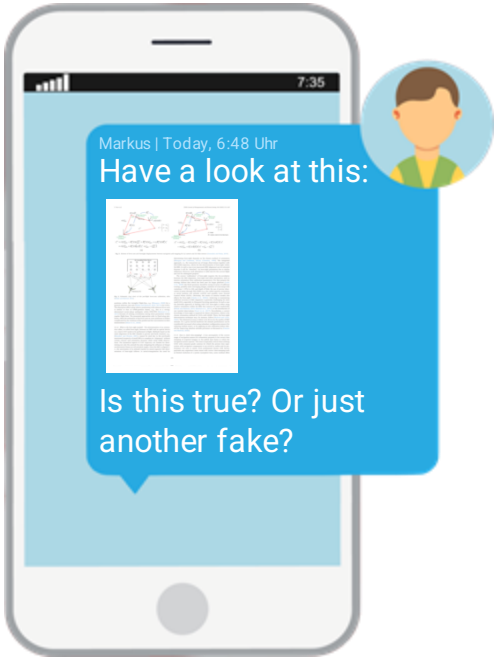
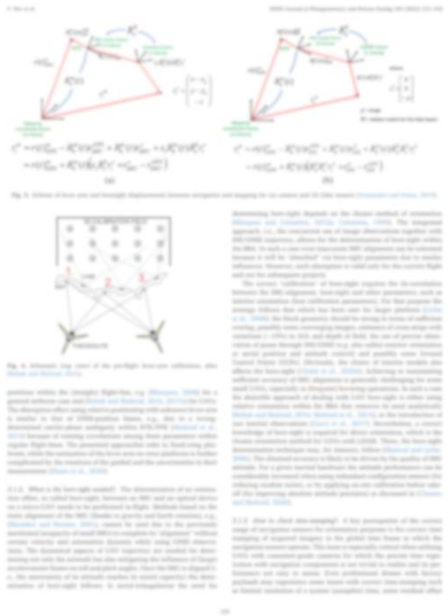
Scientific? Credible?





Why does it look scientific to us?

Does this appearance imply a certain level of credibility?

(Nex et al., 2022)

The term “scientificness”

Refers to the degree, to which something is perceived as scientific or (at least) has “characteristics” of science (Thomm & Bromme, 2012)

Scientificness and credibility are closely linked

→ people who associate a high level of scientificness with a specific element are likely to rate their credibility higher as well (Zaboski & Therriault, 2020)

Context: COVID-19 pandemic

People need

- to critically evaluate & understand (scientific) information
- deal with misinformation

Information/Science literacy is needed to prevent confusion, misinformation & lack of trust.

(Smyth, 2021)

The catch

Something that *appears to be scientific* does not necessarily have to be accurate or true

Scientific appearance might be used to "claim" the categories of scientificness and credibility for something that is not
→ *Pseudoscience* (O'Brien et al., 2021) or *framed science*

(Dennis Gore [@DenisTheChemist], 2021; Tran et al., 2021)

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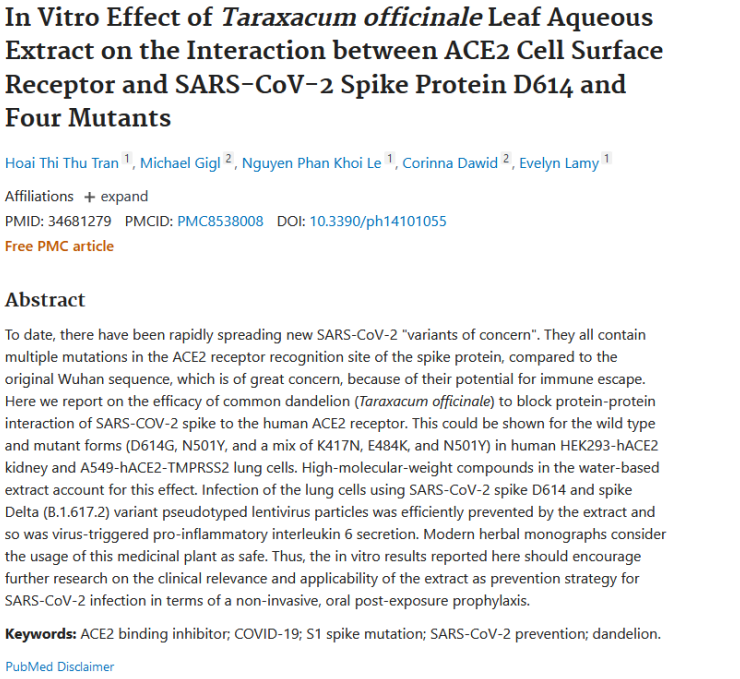

In Vitro Effect of *Taraxacum officinale* Leaf Aqueous Extract on the Interaction between ACE2 Cell Surface Receptor and SARS-CoV-2 Spike Protein D614 and Four Mutants

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Affiliations + expand

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Free PMC article

Abstract

To date, there have been rapidly spreading new SARS-CoV-2 "variants of concern". They all contain multiple mutations in the ACE2 receptor recognition site of the spike protein, compared to the original Wuhan sequence, which is of great concern, because of their potential for immune escape. Here we report on the efficacy of common dandelion (*Taraxacum officinale*) to block protein-protein interaction of SARS-COV-2 spike to the human ACE2 receptor. This could be shown for the wild type and mutant forms (D614G, N501Y, and a mix of K417N, E484K, and N501Y) in human HEK293-hACE2 kidney and A549-hACE2-TMPRSS2 lung cells. High-molecular-weight compounds in the water-based extract account for this effect. Infection of the lung cells using SARS-CoV-2 spike D614 and spike Delta (B.1.617.2) variant pseudotyped lentivirus particles was efficiently prevented by the extract and so was virus-triggered pro-inflammatory interleukin 6 secretion. Modern herbal monographs consider the usage of this medicinal plant as safe. Thus, the in vitro results reported here should encourage further research on the clinical relevance and applicability of the extract as prevention strategy for SARS-CoV-2 infection in terms of a non-invasive, oral post-exposure prophylaxis.

Keywords: ACE2 binding inhibitor; COVID-19; S1 spike mutation; SARS-CoV-2 prevention; dandelion.

(Dennis Gore [@DenisTheChemist], 2021; Tran et al., 2021)

Our Objective

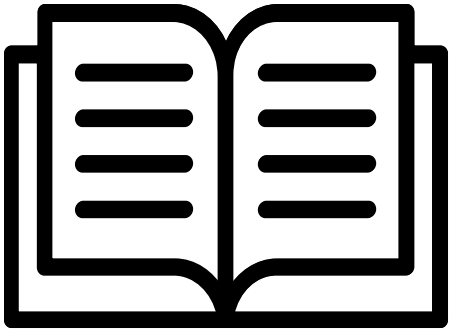
By understanding the various factors that can mislead us, we can build greater resilience to mis-, disinformation and pseudoscience.

We conducted a literature review to summarise the various *factors*, that *can (mis)lead individuals into thinking information is credible or scientific* (even when it is not).

Methods

Comprehensive search for:

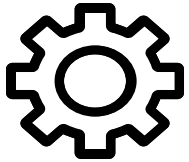
- peer-reviewed research articles,
- book chapters and
- conference proceedings



in Web of Science, Scopus and Dimensions

Supplemented by *Google Scholar, Open Knowledge Maps, Research Rabbit, Elicit*

Factors Fostering Scientific Perception I

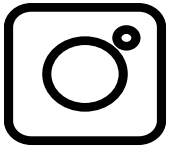


Formulas

enhance perceived scientific rigor and credibility.
(Eriksson, 2012; Tal & Wansink, 2016; Hahn et al., 2020)

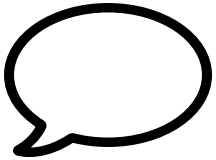
Tables

make a text appear more scientific.
(Hahn et al., 2020)



Pictures

posess “evidential strength” and increase credibility.
(Hahn et al., 2020; Wittwer et al., 2004; Kessler et al., 2016; Gruber & Dickerson, 2012; McCabe & Castel, 2008)



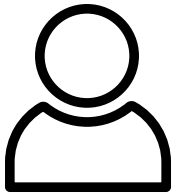
Language

does not *always* make a difference in the assessment.
(Jensen, 2008; Thomm & Bromme, 2012; Thiebach et al., 2015; Zaboski & Therriault, 2020; …)

Factors Fostering Scientific Perception II

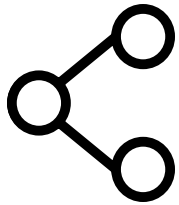
Formatting

and medium influence credibility assessment – for example, a two-column text appears more scientific than a single-column one. (Hahn et al., 2020)



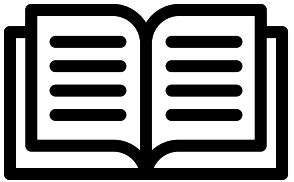
Names

or titles increase perceived scientificness and credibility. (Zaboski & Therriault, 2020; König & Jucks, 2020)



Diagrams

make a text appear more scientific and convincing. (Tal & Wansink, 2014; Hahn et al., 2020; Isberner et al., 2013)



References

increase perceived scientificness and credibility. (Thomm & Bromme, 2012; Thiebach et al., 2015; Zaboski & Therriault, 2020)

Discussion

The perception of scientific content and credibility is shaped by various factors, *including visual elements, citations/references, linguistic style, and the nature of the topic itself*.

Communicators and consumers of scientific information need to be aware of possible cognitive biases and rely on critical thinking and information literacy skills.

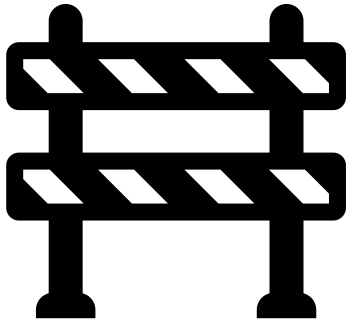
Individuals, even those with a background in science, may struggle to accurately judge the credibility of some types of science reporting (Scharrer et al., 2013).

Challenges

Many experiments focus on specific domains or targeted specialised audiences.

Contradictory results for some elements (e.g. images).

Complexity of the concepts of credibility and trust, as well as connection/relation with scientificness.



Ethical concerns

Use of visual & textual elements to create a sense of scientificness/credibility in non-scientific material.

Creation of a scientific façade for claims without a scientific basis (Tal & Wansink, 2014).

Simplification makes science more accessible, but (sometimes) vulnerable to misuse → Balance between accessibility and accuracy needed.

Conclusion

Effective & responsible science communication requires understanding of factors influencing the perception of scientificness & credibility.

Visual cues could get misused to provide pseudoscience with a glance of credibility.

Science Literacy helps discerning credible scientific information from misinformation/pseudoscience and needs to be strengthened.

Thank you for your attention!

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