

Climate Communication

Why we all need more
than good arguments

Keynote at the
ErUM Data Hub conference on
Sustainability & Ethics
Aachen
28. Juli 2025

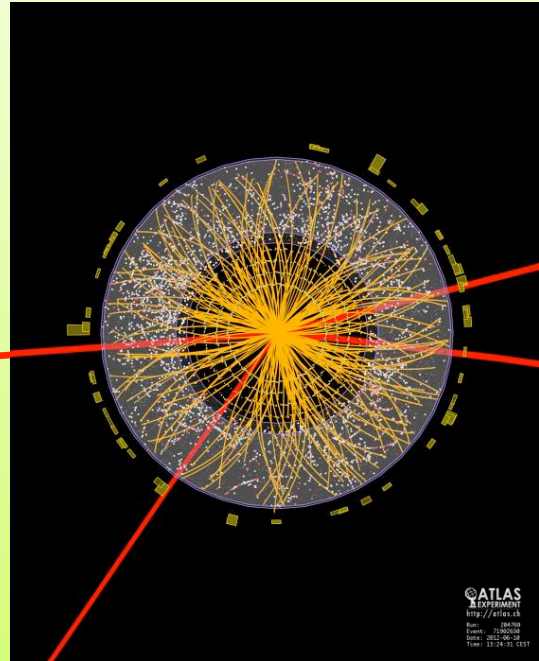
Christopher Schrader
csc@cschrader.eu



CV: Collisions and Interactions

CS:
Born
@320ppm

University
Hamburg
Desy
H1-BEMC



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Journalism
School

Facts/
CH

Geo-
Wissen

Süddeutsche
Zeitung

Climate
Communi-
cation



2000



2008



2014



2022

ErUM



What can I do for you?

- Data transformation
- Software development
- Algorithms
- Renewable Energy, load shifting
- Cultural change
- Collaboration among stakeholders

Eur. Phys. J. Spec. Top.
<https://doi.org/10.1140/epjs/s11734-024-01436-4>

Regular Article

THE EUROPEAN
PHYSICAL JOURNAL
SPECIAL TOPICS



Resource-aware research on Universe and Matter: call-to-action in digital transformation

Ben Bruers¹, Marilyn Cruces², Markus Demleitner³, Guenter Ducek⁴, Michael Düren⁵, Nicolas Eich⁶,
Torsten Enßlin⁷, Johannes Erdmann⁸, Martin Erdmann^{6,2}, Peter Fackeldey⁶, Christian Felder⁹,
Benjamin Fischer⁶, Stefan Fröse⁹, Stefan Funk¹⁰, Martin Gasthuber³, Andrew Grimshaw¹¹,
Daniela Hadasch^{9,12}, Moritz Hannemann⁸, Alexander Kappes², Raphael Kleinmühl¹³,
Oleksiy M. Kozlov¹⁴, Thomas Kuhr⁶, Michael Lupberger¹⁵, Simon Neuhaus¹³, Pardis Niknejadi¹,
Judith Reindl¹⁶, Daniel Schindler¹⁷, Astrid Schneidewind⁸, Frank Schreiber¹⁸, Markus Schumacher¹⁹,
Kilian Schwarz¹, Achim Streit²⁰, R. Florian von Cube²⁰, Rodney Walker¹, Cyrus Walther⁹,
Sebastian Wozniowski¹⁷, and Kai Zhou²¹

[Link](#)

- Will there be computing shame?
- Is precision sacrificed for sustainability?
- What about publish or perish?
- „Strive to become a role model (...) in everyday life“
- Touches people's identities
- Asks people to engage in difficult conversations



Christopher Schrader

Flight emission estimation for Belle II

Bachelor Thesis by Tobias Jakschik @ LMU 2023

Comparison between three different methods to estimate flight emissions:

- ICAO
- Atmosfair
- DBEIS

DBEIS most transparent and well documented methods + free to use + up to date

→ use (slightly modified) DBEIS method to calculate flight emissions

Takes into account:

Short vs long haul, flight class, RF-factor: 1.7, +8% detour, typical fuel consumption, passenger/cargo ratio, well-to-tank factor

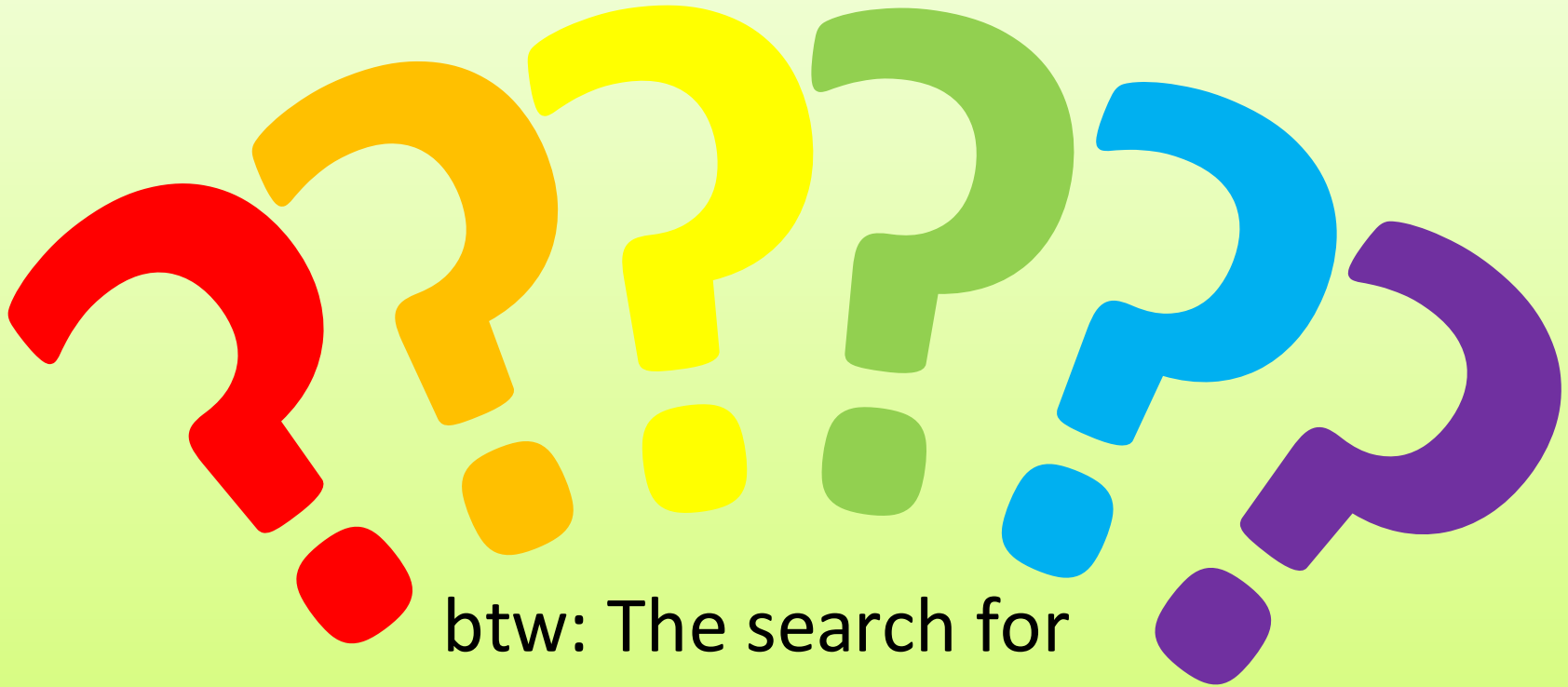
- For three B2GMs: determine participants and their home institutes
- For every institute:
 - find most common routes to destination with google
 - use DBEIS to estimate average flight emissions

Nagoya
151 flying participants
~540t CO ₂ e (3.6t per person)
Rome
167 flying participants
~350t CO ₂ e (2t per person)
KEK
203 flying participants
~774t CO ₂ e (3.8t per person)

[Link](#)



Why don't we make progress?



btw: The search for
 5σ ends right here!



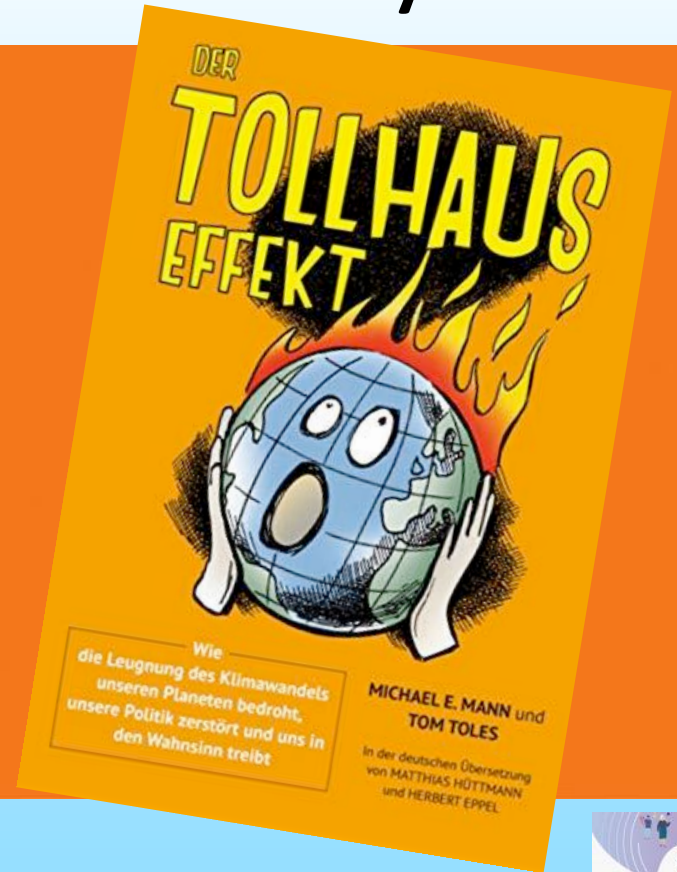
The facts are clear and easy

Carbon dioxide in the atmosphere traps heat.

We are adding more CO₂ to the atmosphere.

The rest is details.

Michael Mann (The Madhouse Effect)



© Michael E. Mann and Tom Toles. All rights reserved



Why don't facts work?

(Maybe they
are not drastic
enough yet?)

In den nächsten fünf Jahren
werden wir mehr und mehr
Extremwetterkatastrophen
sehen, dazu die Hitze.
Es klingt traurig, aber:
Die Realität wird das regeln,
die Menschen werden
aufwachen.

Susan Solomon (SZ-Interview)



Why don't facts work?

Climate Change is
a problem deeply rooted
in natural sciences.

Jein

If so then facts and
data should be
decisive, right?

It doesn't work without facts, but neither with facts alone

(necessary, not sufficient condition)

Information-Deficit-Hypothesis:
Supply missing knowledge until
people put „two and two together“
and start acting accordingly



Why don't facts work (by themselves)?

Climate Change is
a problem deeply rooted
in natural sciences.

If so then facts and
data should be
decisive, right?

Jein

It doesn't work without facts, but neither with facts alone

Information-Deficit-Hypothesis:
Supply missing information until
people put "the two together"
and start acting accordingly

(necessary, not sufficient condition)

*Climate Change
has to morph from a
scientific reality
to a social reality*

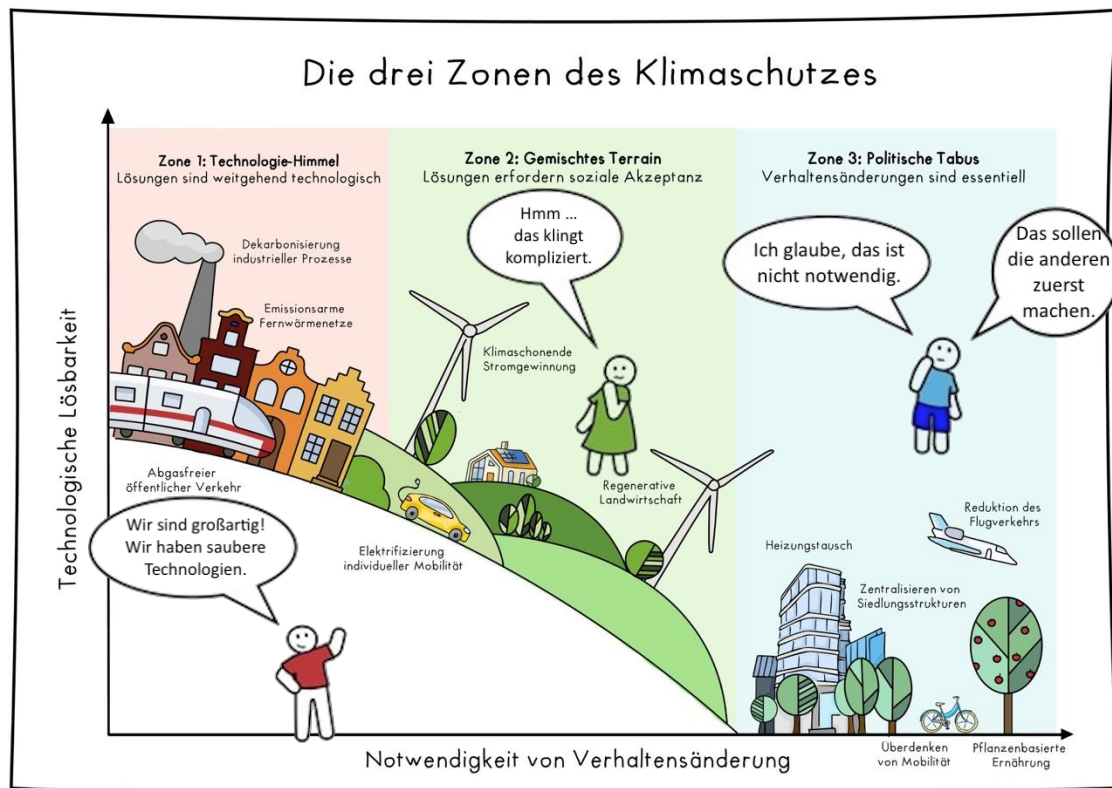


Why isn't technology enough?

Three zones of climate action:

- 1) technology
- 2) solutions require social acceptance
- 3) behaviour change

necessary



Zonen des Klimaschutzes -- CC-BY-ND -- T Brudermann & A Hoeben -- klimapsychologie.com

See also: Thomas Brudermann – Kunst der Ausrede

Christopher Schrader

28.7.25

11

Source: Thomas Brudermann und Anna Hoeben, CC-BY-ND
<https://www.klimapsychologie.com/wp/?p=479>





Justice

„Die Art und Weise, wie wir den Klimawandel aktuell hauptsächlich bekämpfen und erforschen – nämlich als **Problem der Physik** –, [greift] viel zu kurz. Natürlich brauchen wir eine Transformation dessen, wie wir Energie gewinnen. Vor allem aber brauchen wir eine **Transformation** dessen, wer wie am gesellschaftlichen Leben teilnimmt, wie politische, wirtschaftliche Macht genutzt wird, wer wie Entscheidungen trifft.“

Why doesn't action follow information?



Rationality and Emotions

Elephant-Metaphor
(Jonathan Haidt/NYU)



You have to address
all three layers

Rider = rational, conscious, deliberate,
thorough, slow

Elephant = emotional, automatic, fast,
saves effort, follows the group

Path = surroundings and circumstances

Emotional decisions are made and
rationalized after the fact

cf Kahneman: Thinking
fast and slow

Cognitive dissonance

Starting point:

Own behaviour
doesn't meet
own attitudes

Solution 1:

Change the behaviour
until it fits
the attitudes

Solution 2:

Change the attitudes
until they fit
the behaviour



Knowing all that, isn't enough either

Information-Deficit-Communication 2.0:
Understand, take into account and inform on
the psychological and sociological barriers
in the climate crisis

and just like that ...



Instead of an Outline – an Earworm



Das Sesamstraßen-Lied

Der, die, das,

wer, wie, was,

wieso, weshalb, warum,

wer nicht fragt, bleibt dumm



Instead of an Outline – an Earworm



Wer?
Wie?
Was?

Rule of Thumb for
Climate
Communication



Know your audience & target group

Possibly very diverse:



Fotos: C. Schrader

Many among them would take action, but
under no circumstance do they want to be called „Klimaschützer“
... or „Klimaschützer:in“



Get to know your target group

Integral part of planning: How do I reach and talk to this target group?

For you: Maybe you already know them well, but not on this topic

In general: Prepare for talk or workshop by talking to the people who invited you or the group's leadership about:

What is important to participants (Values!), what moves them (Emotions!), what is happening, what do they want to achieve, to prevent?

Pick people up emotionally, make yourself likeable (without twisting yourself), build up trust, **form a group** (humor!)

Transport competence AND warmth: plan for that, tell own story



Motivation-Types

Stimulation

Dominance

Curious

Performers

Harmony
lovers

Conservers

Balance

Method developed/
applied by:
Nymphenburg Consulting (Marketing)
Oro Verde (NGO für Biodiversity)



Motivations

Mixed audience?
Address these
types first

- + enthusiastic for new ideas
- + trial and error, find new connections
- ≈ Optimism overcomes fear of risk
- systematic work
- + interested in people >> concepts
- + generous, care for (future) others
- ≈ change threatens harmony: no go

Curious

Performers

Harmony
lovers

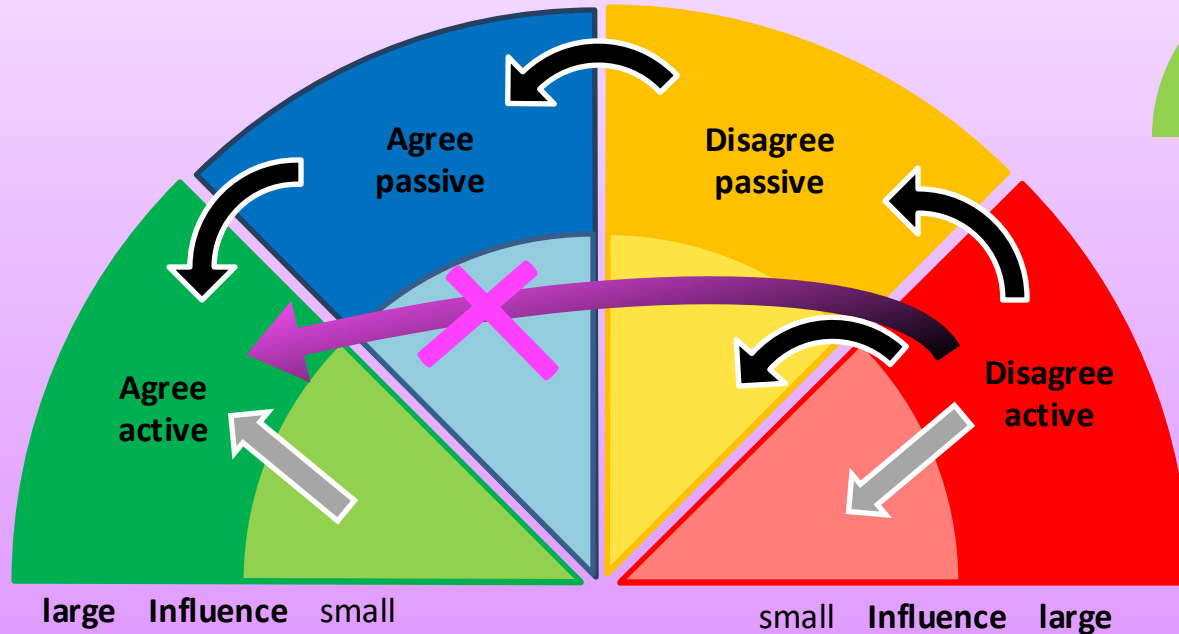
Conservers

- + ambition for personal goals
- + Success as important as power
- ≈ strong drive and perfectionism
- get bored fast
- + honest, incorruptable
- + work systematically on new concepts
- + take over responsibility, value fairness
- ≈ quality before speed

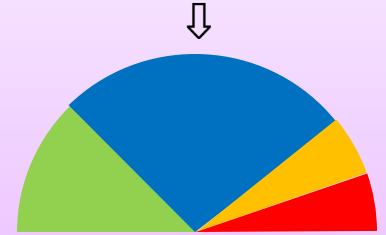


Spectrum of actors

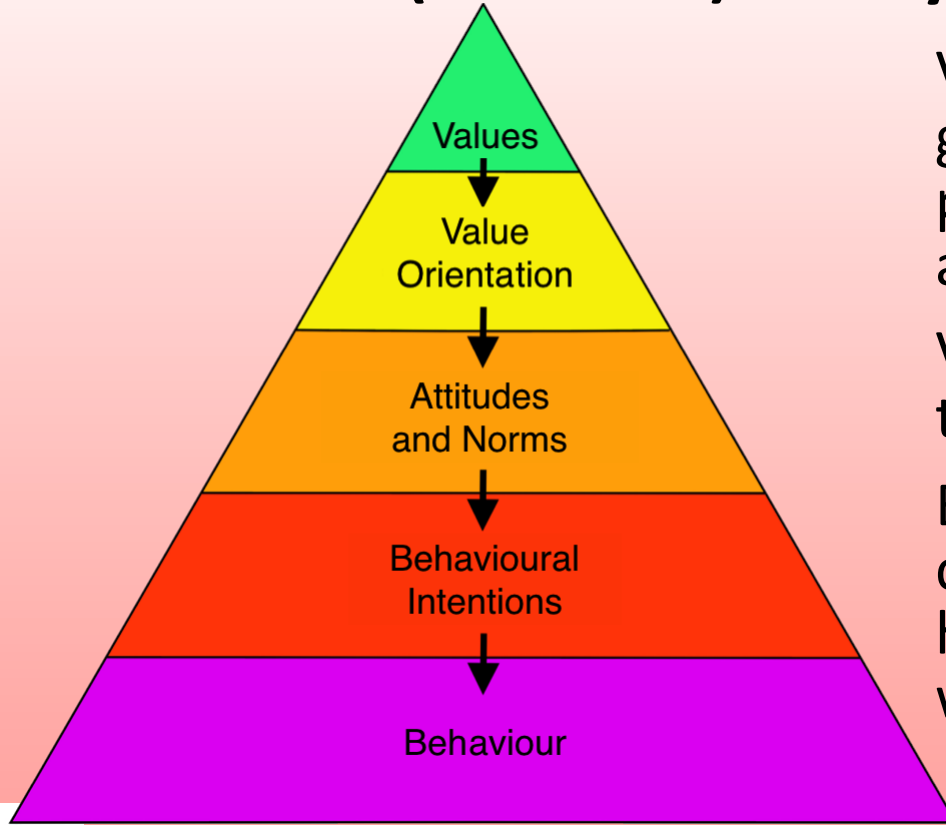
(and possible shifts)



In reality
more like this



Wie? (How?) – Pyramid of Values



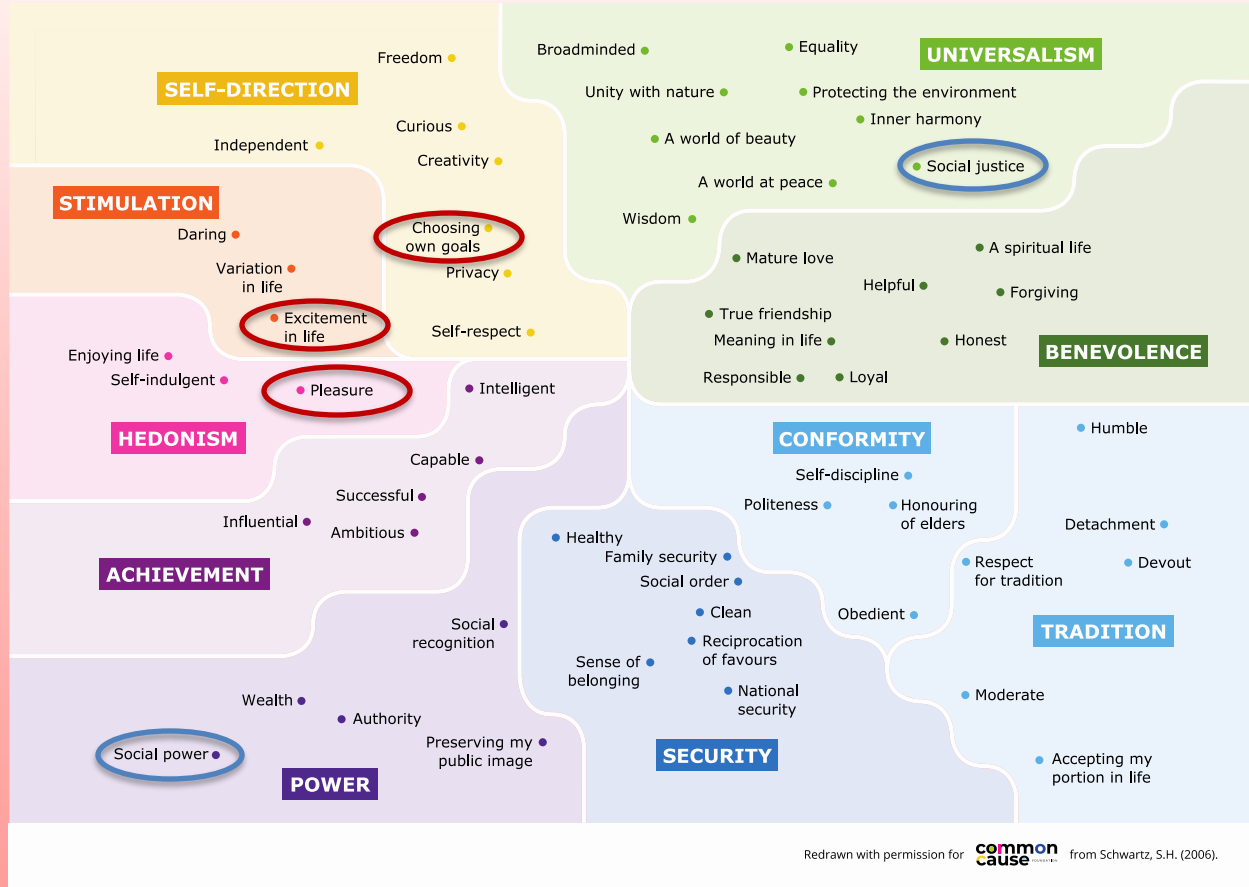
Values are important personal goals and motivations which people want to keep stable across concrete situations.

Values themselves are very hard to change (in a person or society).

But your goal in communication can be: Show the target group how climate action resonates with their values (and yours).



Map of Values



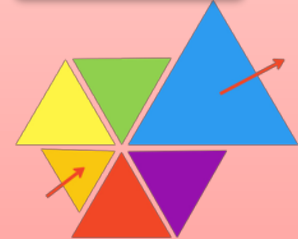
Redrawn with permission for **common cause** from Schwartz, S.H. (2006).



Circumplex

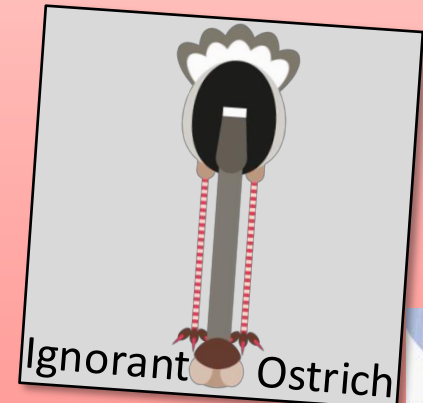
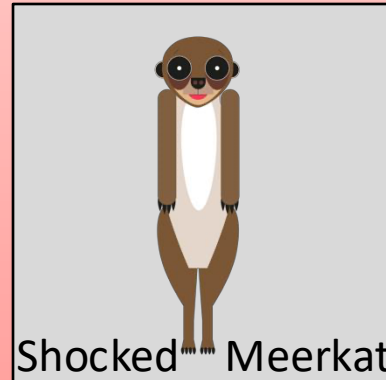
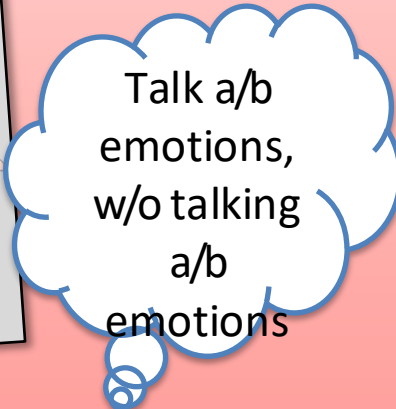
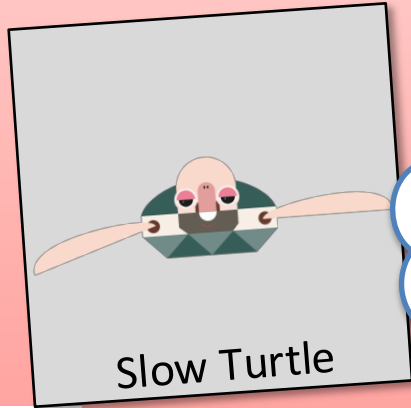
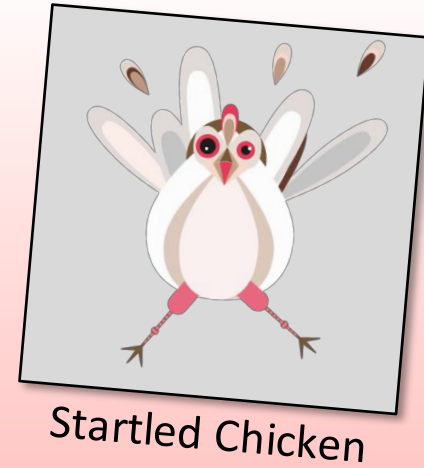
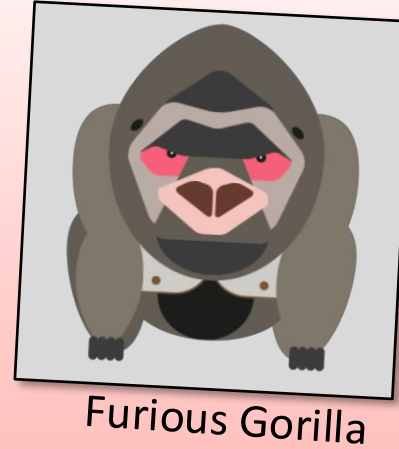
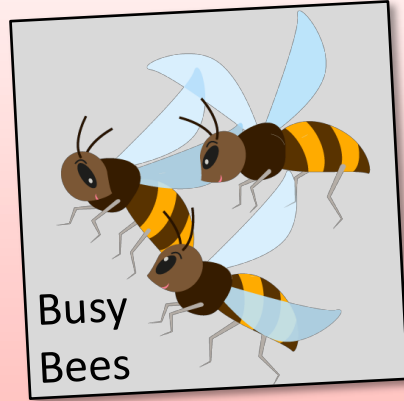


Neighbours



See-saw effect

Climate animals



How? – Tell Stories

Humans are story creatures: myths, fairytales, novels, movies

Stories allow us to see (from) the perspective of others.

- Help, where arguments fail.
- Dampen to urge to challenge facts.
- Are already used by the „other side“.

Two important variants:

1) **personal** w/ Hero – Villain – Victim, plot, twist, conflict, lesson.

2) **Narratives** are patterns for stories, broad frames, in which arguments fit: eg „economic consequences of climate action“
... oder „Habecks Heizungshammer“

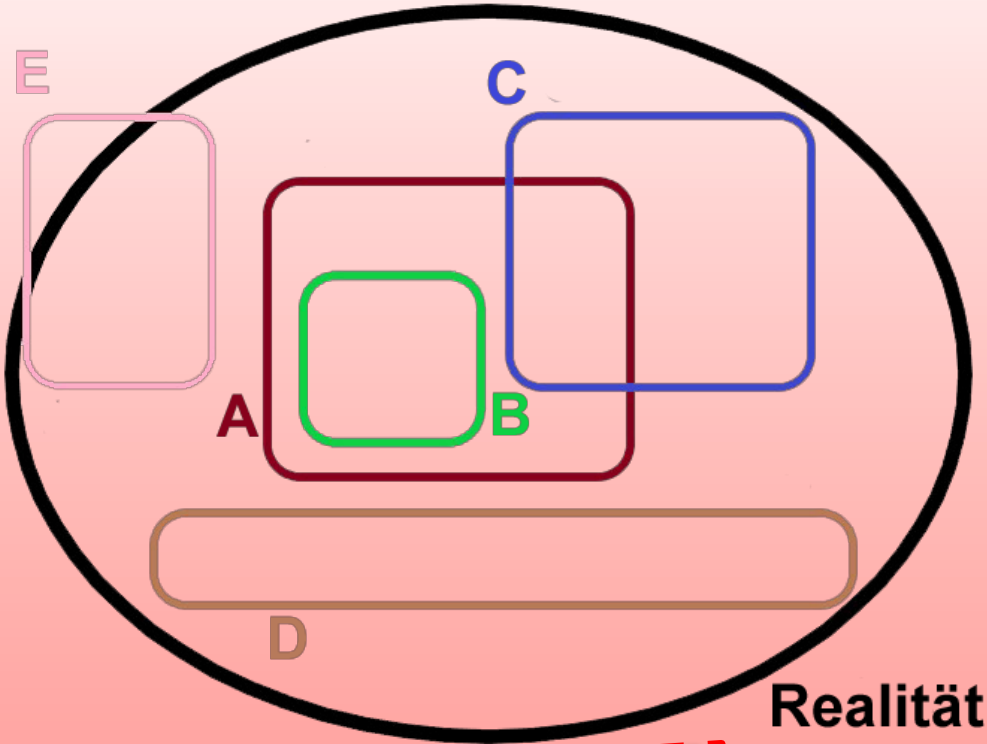
They also determine who to listen to.

Storytelling is the idea and practice of packaging facts and knowledge to make them more attractive.

Centrally important: Stories tell of „people like me“, who carry out plans of solutions instead of whining about the problems – and thereby inspire the audience.



How? – Framing



Everytime we use

- words and expressions
- arguments and metaphors
- narratives,

we position language in a frame the audience (possibly) already knows.

It can shake their heads or nod just b/c of that frame (and all it carries).

Using the wrong frame means working against yourself.

Using your own frame or an established one helps the message.

(No magic!)

You can't *not* frame!

Framing: Facts/Theories

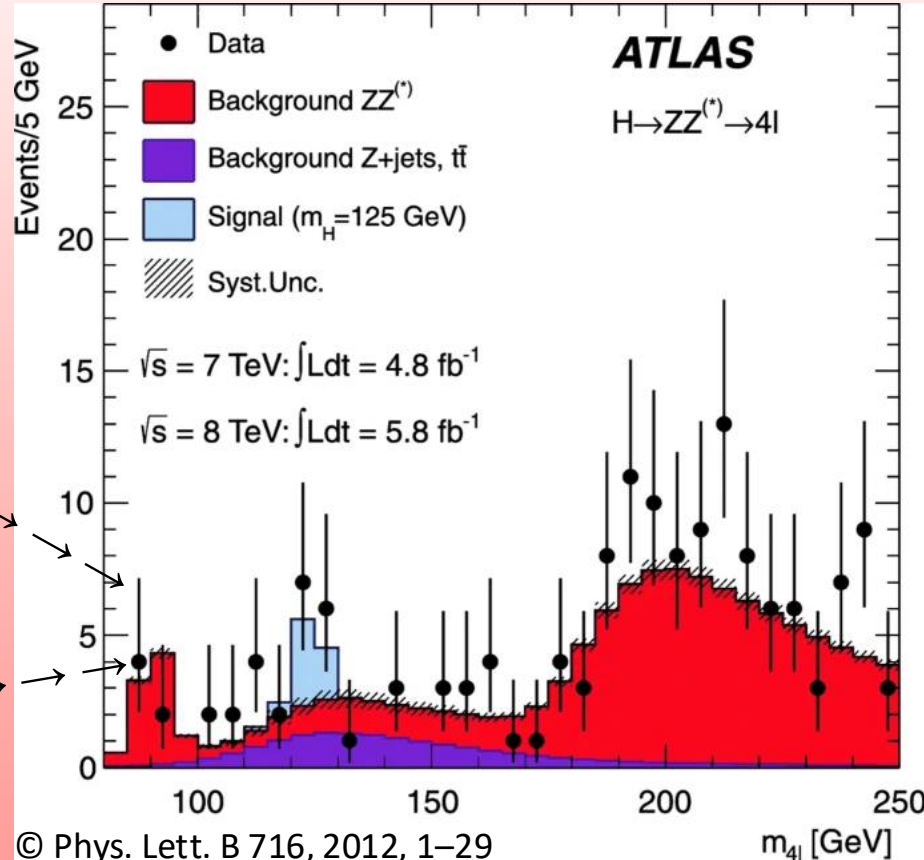
(Taking Higgs as example)

Physics:
Theory

Model

Statistical
Analysis

Facts



Everyday life:
Facts

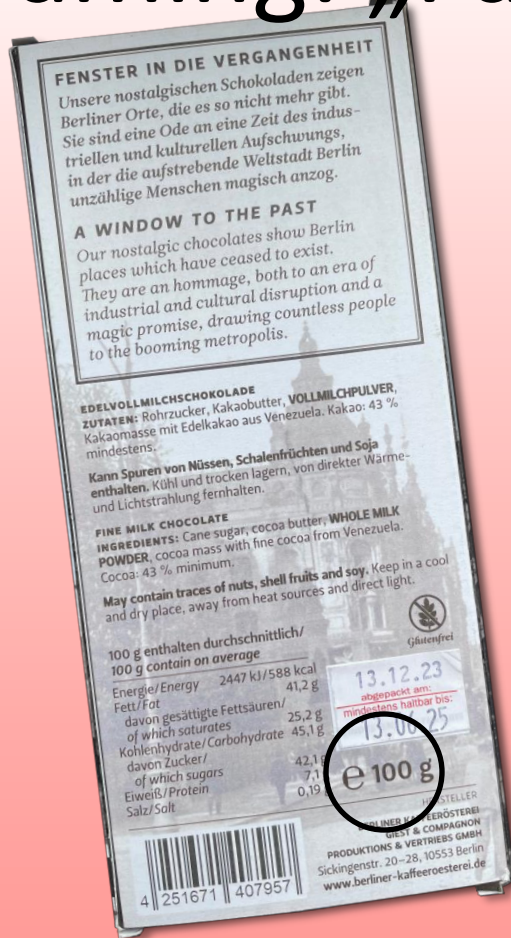
Statistical
Analysis

Model

Theory



Framing: „Facts“ without error bars



e-Sign

EU regulation on packaging
by weight

([76/211/EWG](#)):

for production in series
of items 50-200g

Average has to be ok!

Individual pieces -4,5 g ok!



Framing: Unsicherheit $\Rightarrow$ Ungewissheit

I largely skipped over the next slide in my talk. It is meant to encourage you to not use the word „Unsicherheit“ when taking about uncertainty in scientific results in German. Preferable would be „Ungewissheit“ because it at least the Framing of Sicherheit/Security. I would have argued with the quote from an editorial in Süddeutsche Zeitung, that the Framing „Unsicherheit“ can even contain notes of „not well thought through“.



Framing: Unsicherheit $\Rightarrow$ Ungewissheit

Home > Meinung > Demokratie > Die Blockade von Habecks Fähre: So etwas passiert nicht einfach so

Mob gegen den Vizekanzler

Das passiert nicht einfach so

5. Januar 2024, 13:17 Uhr | Lesezeit: 3 min

80 Kommentare



Die Fähre legt besser nicht an: Szene vom Donnerstagabend in Schlüttsiel an der Westküste von Schleswig-Holstein. (Foto: Screenshot X)

Kommentar: Süddeutsche Zeitung, 5.1.2024

„Eine Regierung, die zum wiederholten Mal nach Protesten rasch ihre Beschlüsse widerruft, erweckt den Eindruck, diese vorher nicht **wirklich** durchdacht zu haben. Damit strahlt sie **Unsicherheit** aus. Nichts aber fragen die Leute in aufgewühlter Zeit weniger nach als **Unsicherheit**. Und so meinen offenbar immer mehr, nach Belieben mit ihren Repräsentanten umspringen zu dürfen.“



How? – Build trust

Better like this? Or like th

1) Be expert and human.
(Rationality and Emotion)



2) If there is already mistrust (or in the air) the audience will ramp up its rational analysis to find errors (or be able to explain the content to others later).

In that case: transparency, small steps and a culture of errors



What – ... the ball is in your court

Just some
general
thoughts



What? – Problems? Solutions!!!

*„Talking
about problems
makes problems
grow.*

*Talking
about solutions
makes solutions
grow.”*

Steve de Shazer

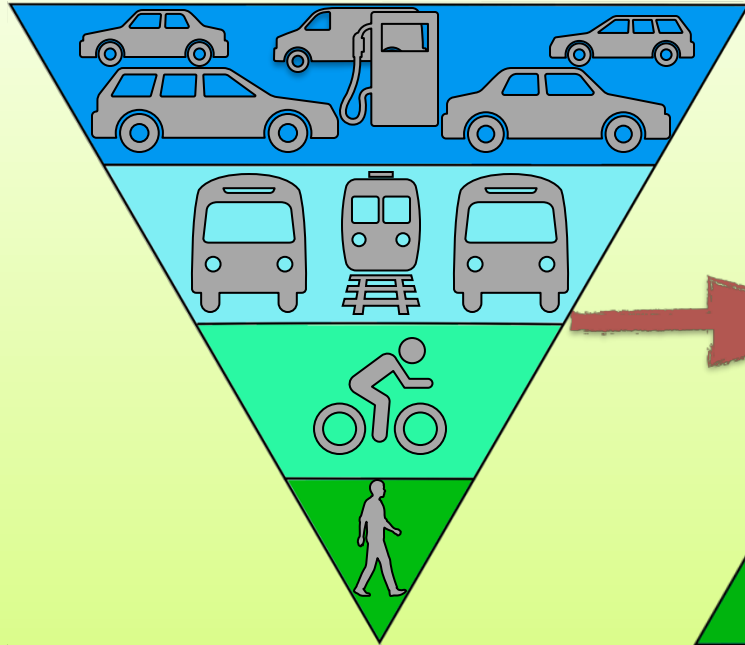


What? – the „good life“

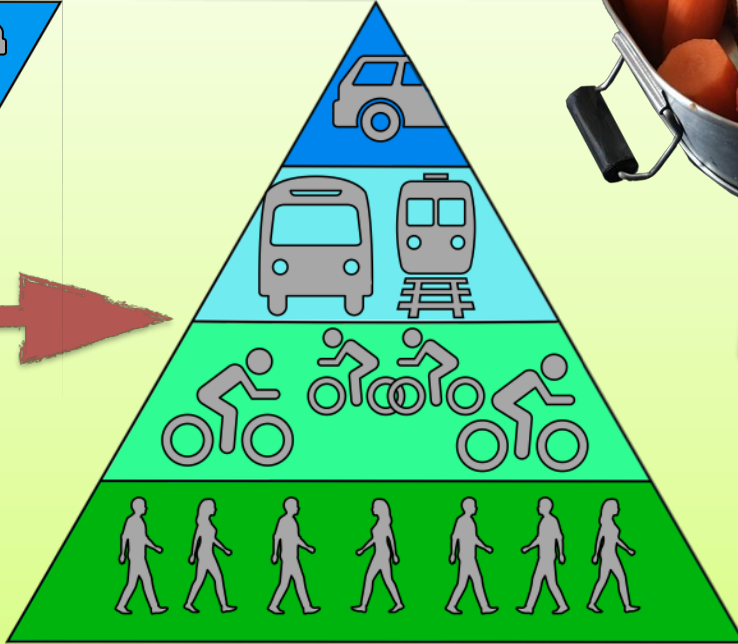
I skipped over this part in my talk. It deals with the concept of „a good life“ which today is often deeply connected to activities related to GHG-emissions. It needs to be redefined in a positive way, eg by presenting attractive visions of the future. The following slides show visions like that from Paris and Hamburg. The book on 2045 contains more as do many illustrations by gifted artists.



What? – the „good life“



Before



After



but beware of making this a/b individual behaviour only

What? – Redefining „good life“



© Nicolas Bascop for Paris en commun



What? – Redefining „good life“



www.realutopien.de | Hamburg Michel 2045, Zukunftsbilder 2045 | Reinventing Society & Wire Collective & Germijn Zero (CC BY-SA 4.0, Foto: NEWS&ART)

© 2045: realutopien.de (CC-BY-NC-SA 4.0)



What? – Doubt and Disinformation

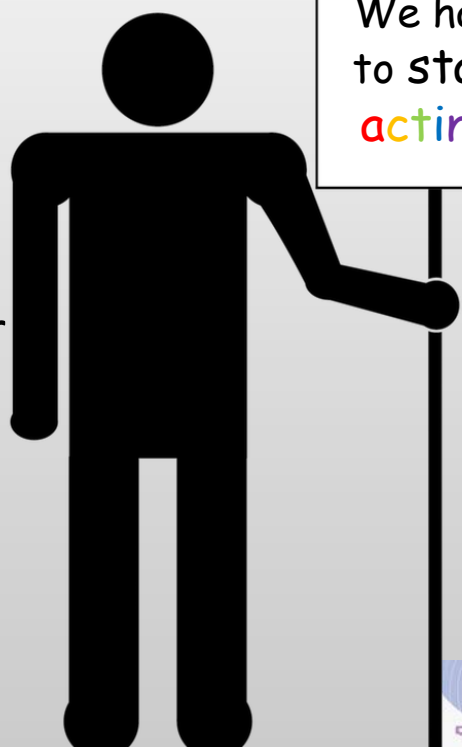
People have the **expectation or suspicion** that climate action will be uncomfortable, burdensome, expensive und unjust.

In that case they can find emotional relieve from claims that the climate crisis was neither urgent nor dangerous – even when those claims are BS.

That means there is **demand for doubt and disinformation**, not just a lot of supply.



Climate crisis – now what?



We have to start **acting!!**



Doubt and Disinformation

I largely skipped over this part in my talk. The pdf contains info on recurring patterns of disinformation and a preferred (and scientifically grounded) method of debunking to avoid strengthening the deniers' framing.



Typen der Desinformation: PLURV

Wiederkehrende Muster

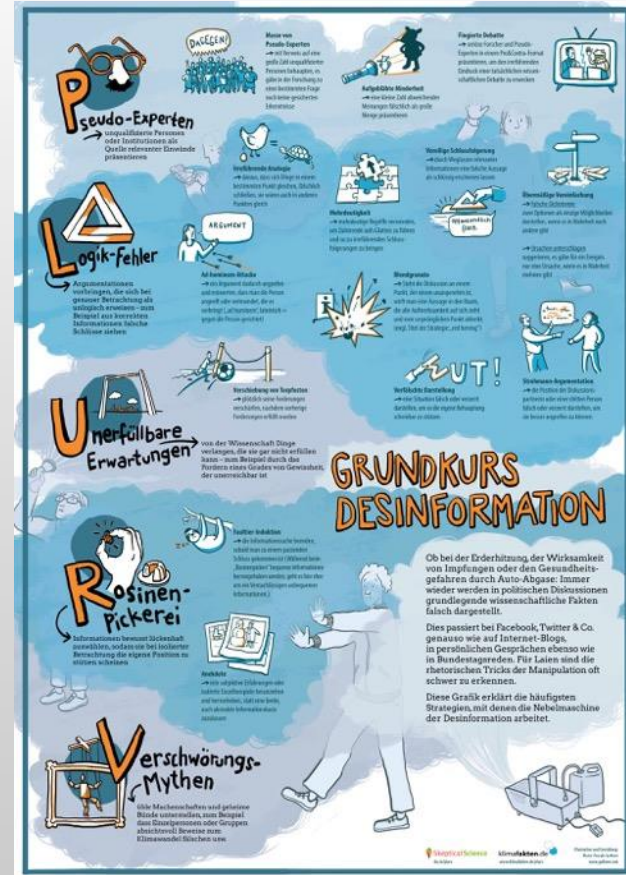
Pseudo-Experten (4)

Logik-Fehler (10)

Unerfüllbare Erwartungen (2)

Rosinen-Pickerei (3)

Verschwörungs-Mythen (1)



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Types of Disinformation: FLICC

Recurring Patterns

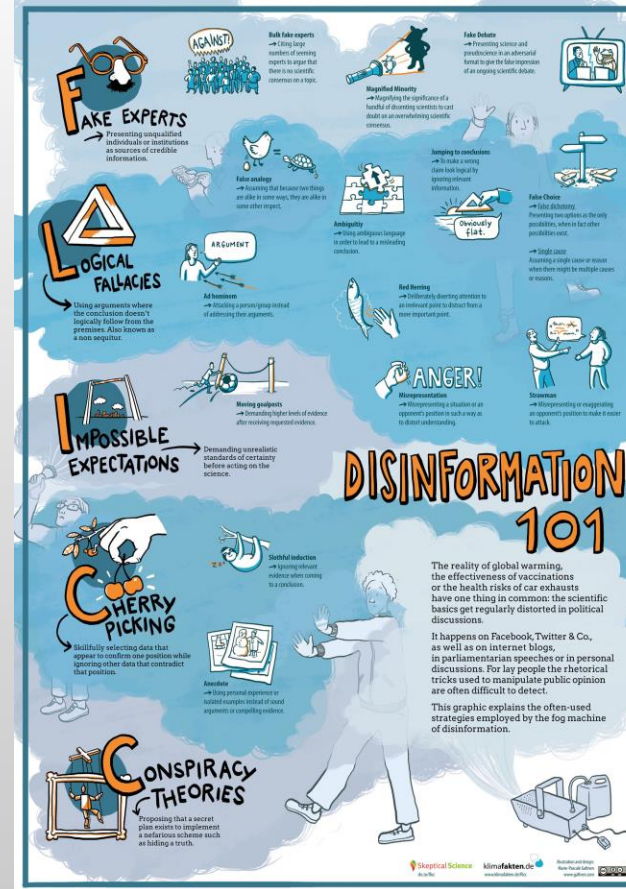
Fake experts (4)

Logic Fallacies (10)

Impossible Expectations (2)

Cherry Picking (3)

Conspiracy Theories (1)



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Typen der Desinformation: Verzögerung

Nicht ich.
Nicht jetzt.
Nicht so.
Zu spät.

Grundgedanke:

- Inzwischen ist plattes Leugnen kaum noch glaubwürdig.
- Stattdessen sind „Argumente“, Einwände und Diskurse zu erkennen, die Klimapolitik verzögern sollen.

Nicht ich **Nicht jetzt** **Nicht so** **Zu spät**



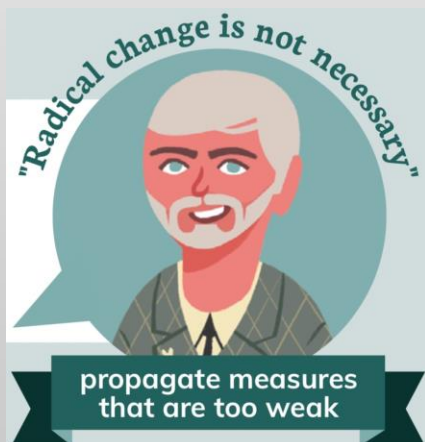
Types of Disinformation: Delay

**Not me.
Not now.
Not like this.
Too late.**

Basic principle:

- Flat denial of climate change has become unbelievable.
- In its stead there are „arguments“, objections und discourses to delay climate action.

Not me Not now Not like this Too late



Deniers at your talk – what to do?

The deniers themselves are not your target.

It will be practically impossible to convince them.

The question is how you come across to the other people in the room.

- Stay polite
- Clearly deny false info
- Unveil the manipulation
- Don't get sidetracked
- Offer to supply facts later
- Politely return your attention to others
- When in doubt cite the overwhelming consensus of science on basic findings on climate change.

All of this is a little more difficult with discourses of delay. They contain a nucleus of truth. But the dimensions, relations, implications and conclusions are wrong.



Denial – Consensus of Climate Science

*Ten Words in English
(Tony Leiserowitz/Yale)*

*Twenty Words in German
(Deutsches Klimakonsortium)*



1. It's real

2. It's us

3. It's bad

4. Experts agree

5. There's hope!

1. Er ist real

2. Wir sind die Ursache

3. Er ist gefährlich

4. Die Fachleute sind sich
einig

5. Wir können noch etwas
tun

latest version: Six Truths with: **Others care**



Widerlegen: Das Debunking-Sandwich



FAKT

Beginnen Sie mit dem Fakt, wenn er klar, knapp und einprägsam ist – machen Sie ihn einfach, konkret und plausibel. Er muss zur Geschichte "passen".

WARNUNG VOR DEM IRRGLAUBEN

Warnen Sie vorab, dass eine Falschinformation folgt... erwähnen Sie sie nur einmal.

TRUGSCHLUSS ERKLÄREN

Erklären Sie, wie die Falschinformation in die Irre führt.

FAKT

Bestätigen Sie am Ende den Fakt – wenn möglich mehrfach. Stellen Sie sicher, dass er eine alternative ursächliche Erklärung liefert.

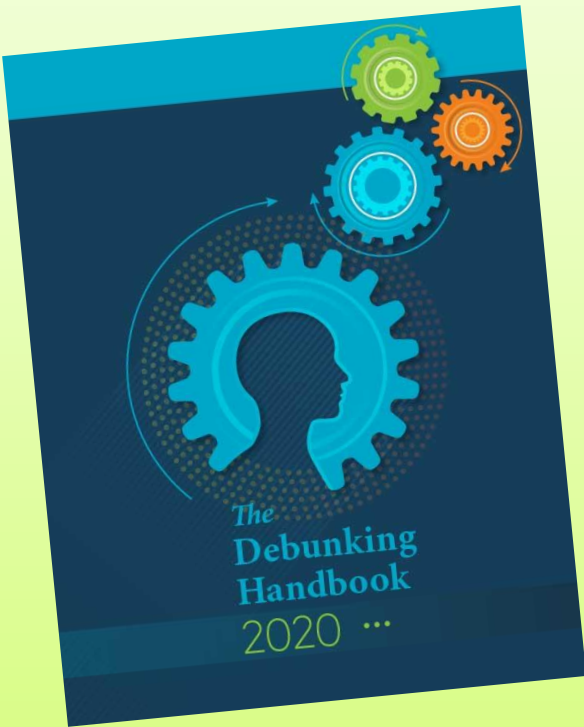
https://www.climatechangecommunication.org/wp-content/uploads/2020/12/Debunking_Handbook_2020_German.pdf

Christopher Schrader

28.7.25 47



The Debunking-Sandwich



FACT

Lead with the fact if it's clear, pithy, and sticky—make it simple, concrete, and plausible. It must “fit” with the story.

WARN ABOUT THE MYTH

Warn beforehand that a myth is coming... mention it once only.

EXPLAIN FALLACY

Explain how the myth misleads.

FACT

Finish by reinforcing the fact—multiple times if possible. Make sure it provides an alternative causal explanation.

<https://climatecommunication.gmu.edu/all/the-debunking-handbook-2020/>

Self efficacy



Bob the Builder:

Can we fix it?

Yes we can!

We've done it before!

No worries, we'll get it together.

Afterwards it will work just fine.

© BBC



What? – Handprint und Footprint



Handprint

Idea of an Indian NGO

Footprint

Popularized by BP

*(today's
applications
mostly okay)*

**Measures your contribution to
other people avoiding CO₂**

**Measure own
contribution to CO₂**



Finally – REAL TALK

Respect your conversational partner and find common ground

Enjoy the conversation

Ask questions

Listen and show you've heard

*British NGO:
Climate Outreach*

Tell your story

Action makes it easier (but doesn't fix it)

Learn from the conversation

Keep going and keep connected



Thank you for your attention



Christopher Schrader
csc@cschrader.eu
<https://cschrader.eu>
<https://klimakommunikation.klimafakten.de>

