

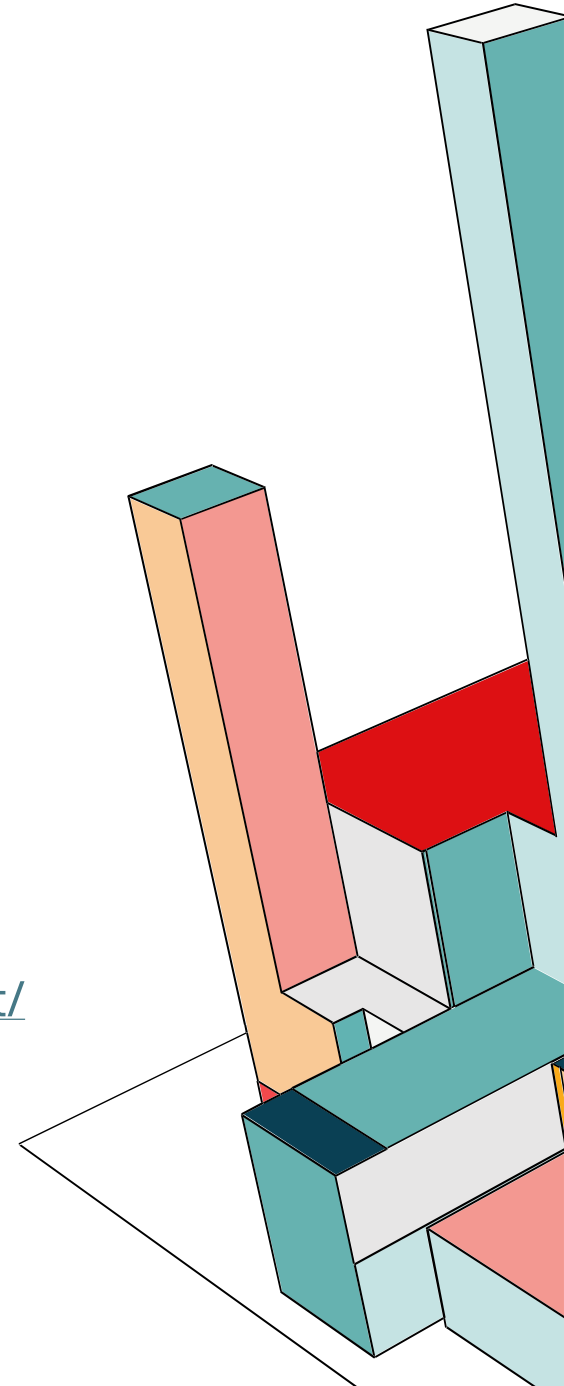
Von Fallschirmen und Impfungen: Wie funktioniert eigentlich Wissenschaft?

pascoda

- C3W, metalab Wien, entropia, KIT

Präsentationsfolien zum mitschauen

<https://pascoda.fairydust.space/2025/06/de-wie-geht-eigentlich-wissenschaft/>



LET'S DO SOME

SCIENCE!

Ablauf

! ? Forschungsfrage



Methoden-Wahl



Durchführung



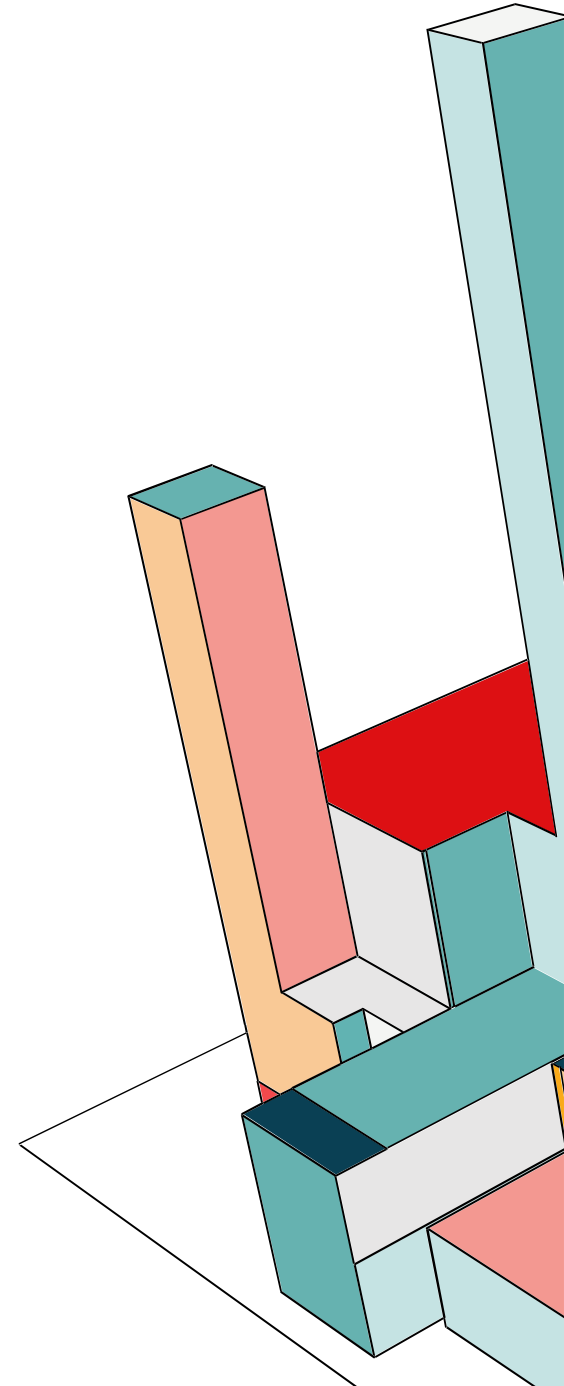
Analyse

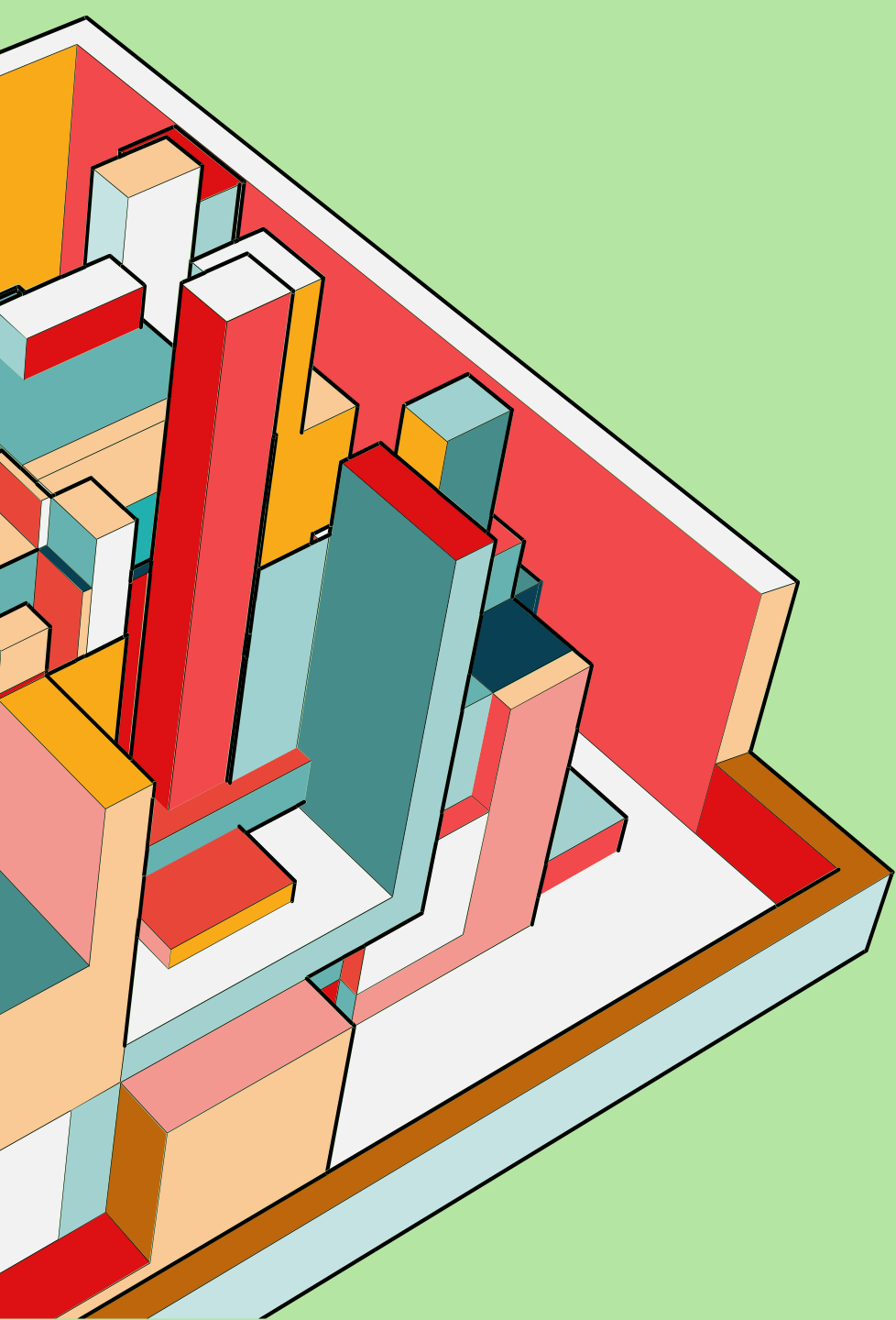


Publikation



Wissenschaft!





Forschungsfrage

Was wollen wir herausfinden?

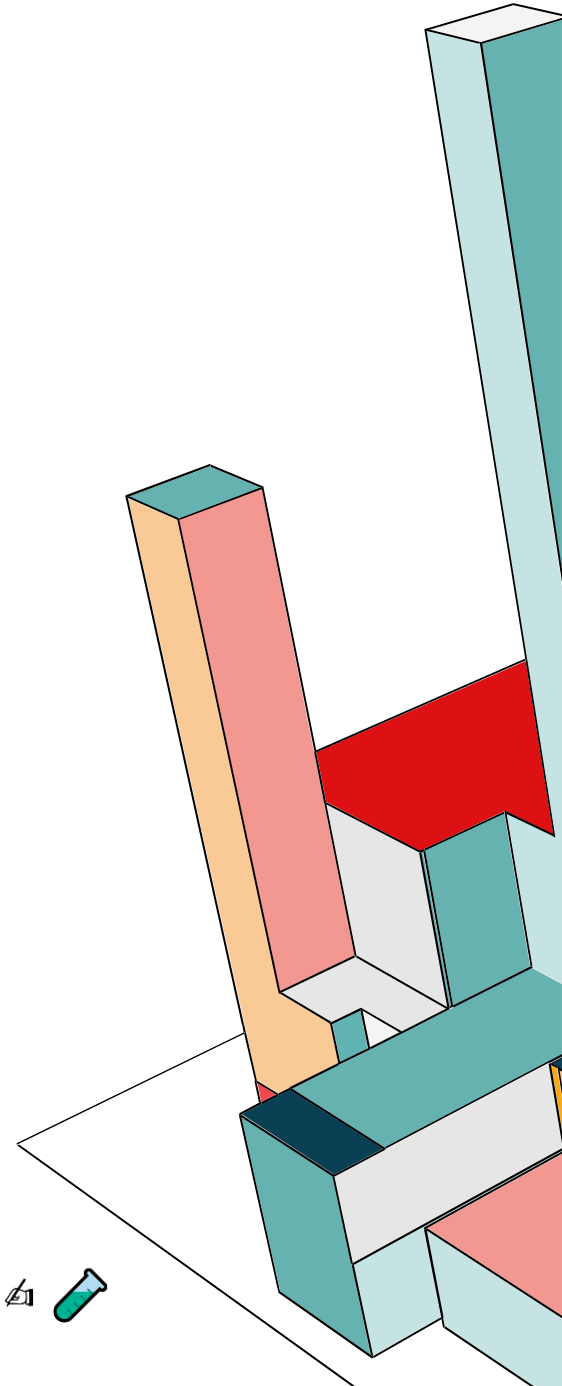
ONE DOES NOT SIMPLY

RESEARCH RANDOM STUFF

Einflussfaktoren

- Finanzierungsquelle
- Arbeitgeber_in
- Eigene Position
- Eigene Interessen: For science? For money?
- Forschungsfeld

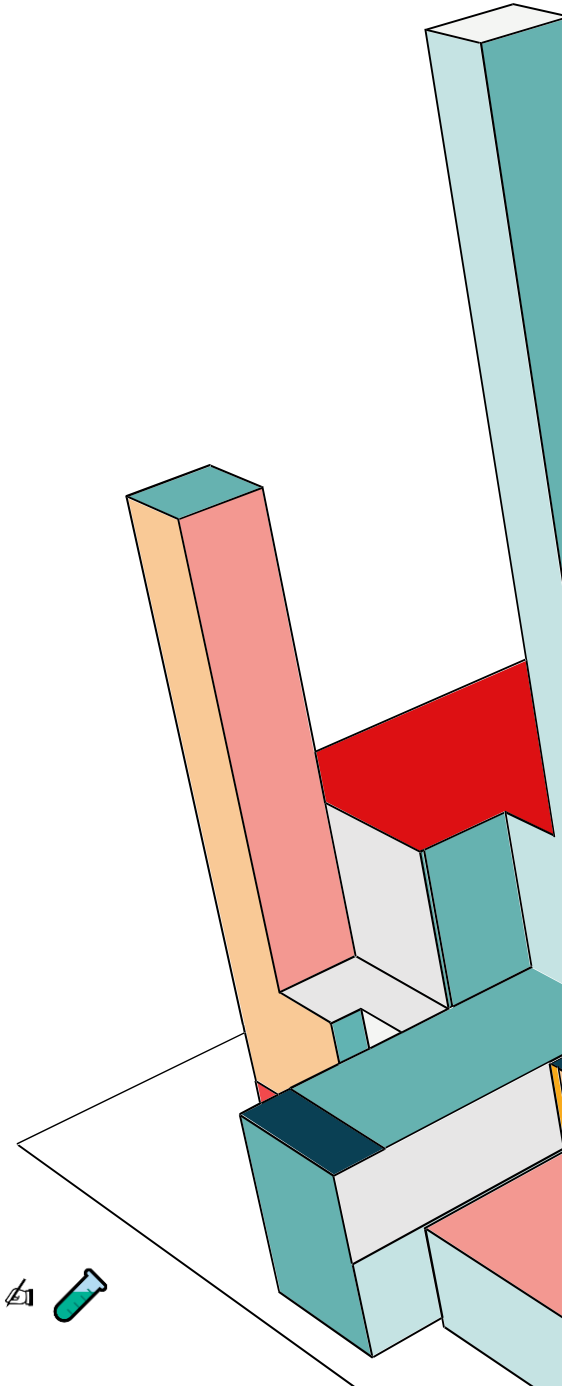
!?



Und wie fragen wir?

- Wer? Wie? Was? Warum? Wo? Wozu?
- Ja/Nein als Antwort.
 - Siehe auch: *Hypothese*.

!?



Und wie fragen wir?

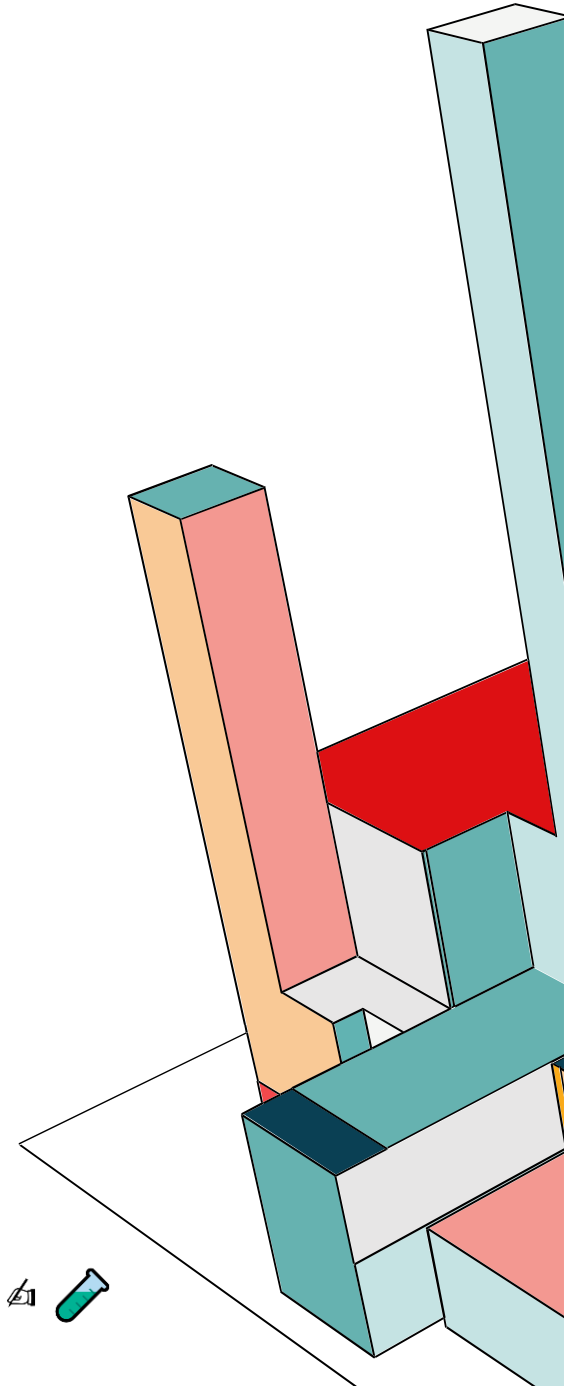
- Wer? Wie? Was? Warum? Wo? Wozu?
- Ja/Nein als Antwort.
 - Siehe auch: *Hypothese*.

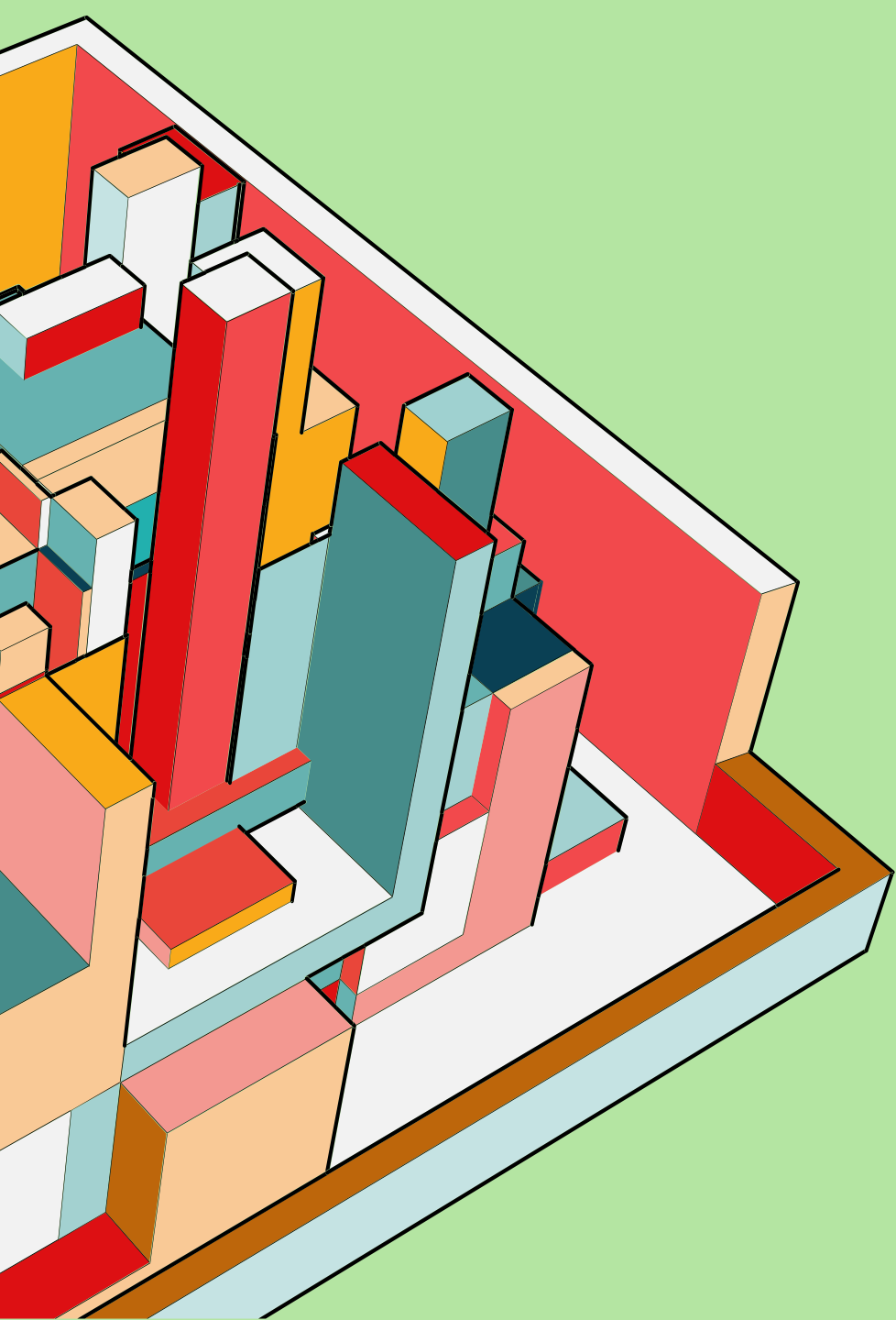
Und:

Was ist der Wissensgewinn?

Ist die Frage überhaupt beantwortbar?

!?





Methoden

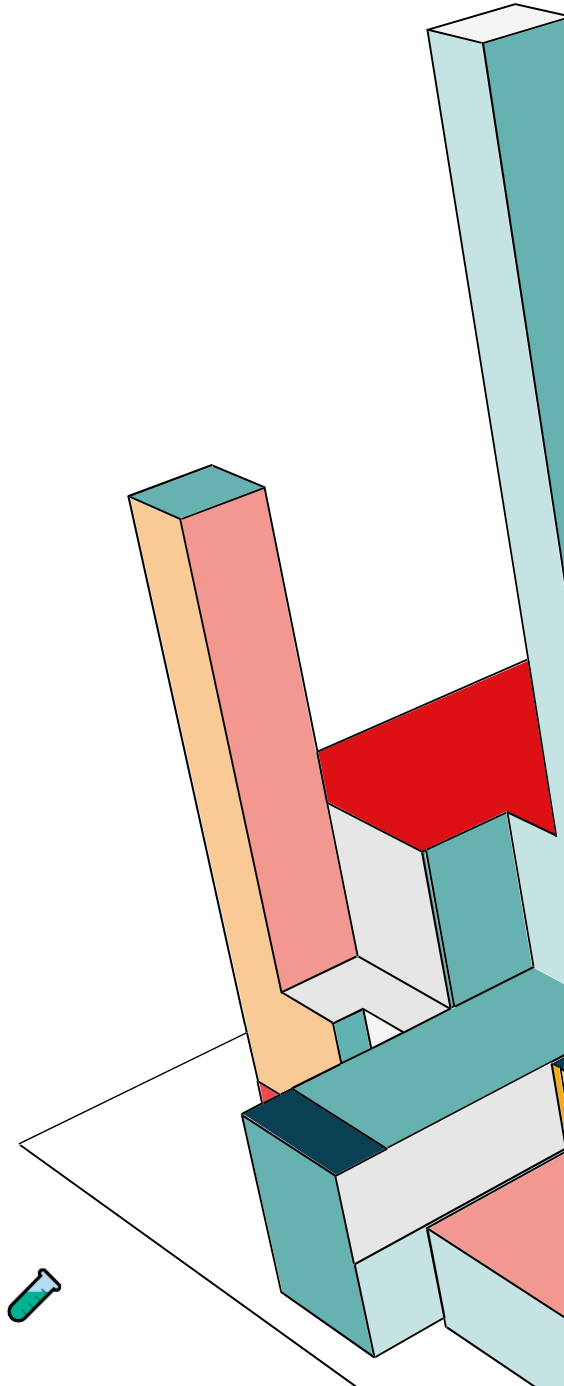
Wie wollen wir die Frage
beantworten?



Arten von Methoden

- qualitativ
- quantitativ
- experimentell/empirisch
- theoretisch

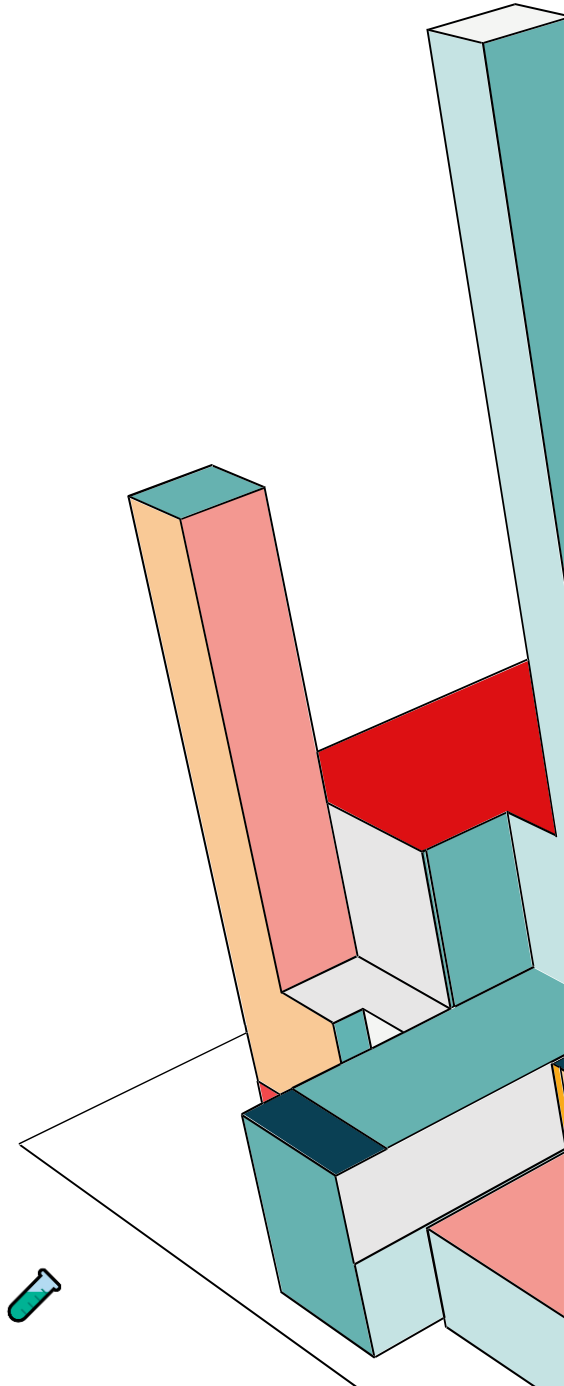
!?



Beispiel

- Warum tragen hier so viele Leute (schwarze) Hoodies?
 - qualitative Umfrage (Kurzinterviews) mit offenen Fragen.
- HT: Nerds bevorzugen schwarze Klamotten.
 - quantitativ: Verkaufs-/Reservierungszahlen auswerten, Umfrage (Fragebogen) mit geschlossenen Fragen
 - empirisch/experimentell: Verkaufs-Experiment.

Und wie beantworten wir die Frage theoretisch?



Ablauf

! ? Forschungsfrage ✓

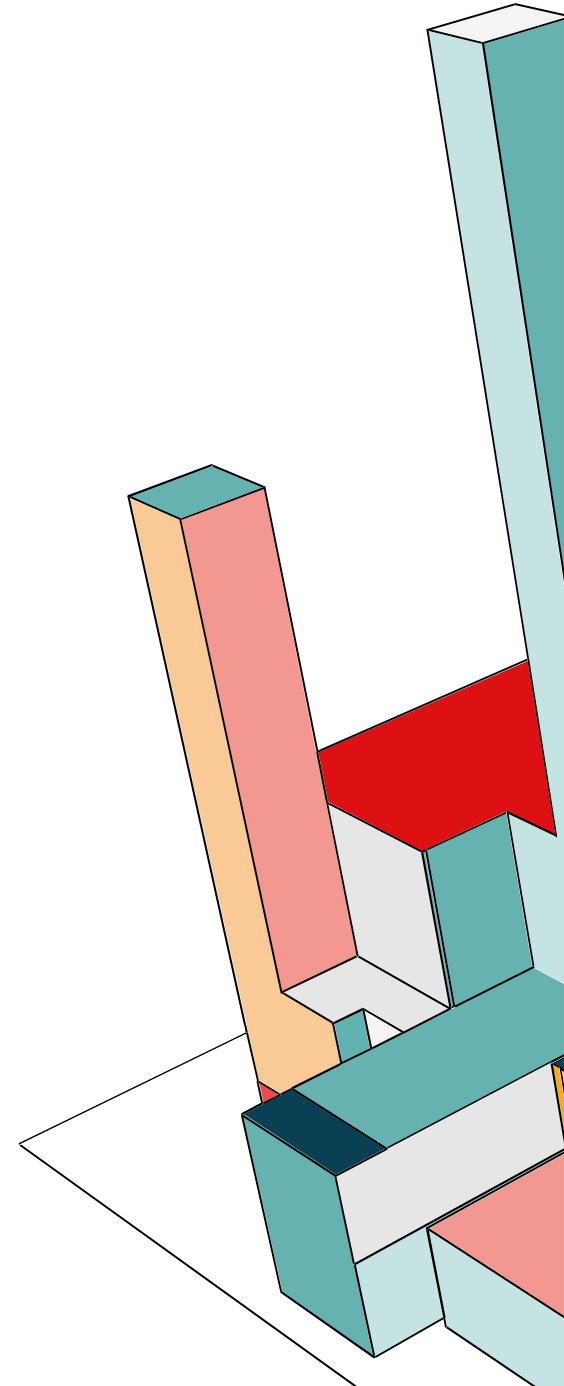
📦 Methoden-Wahl ✓

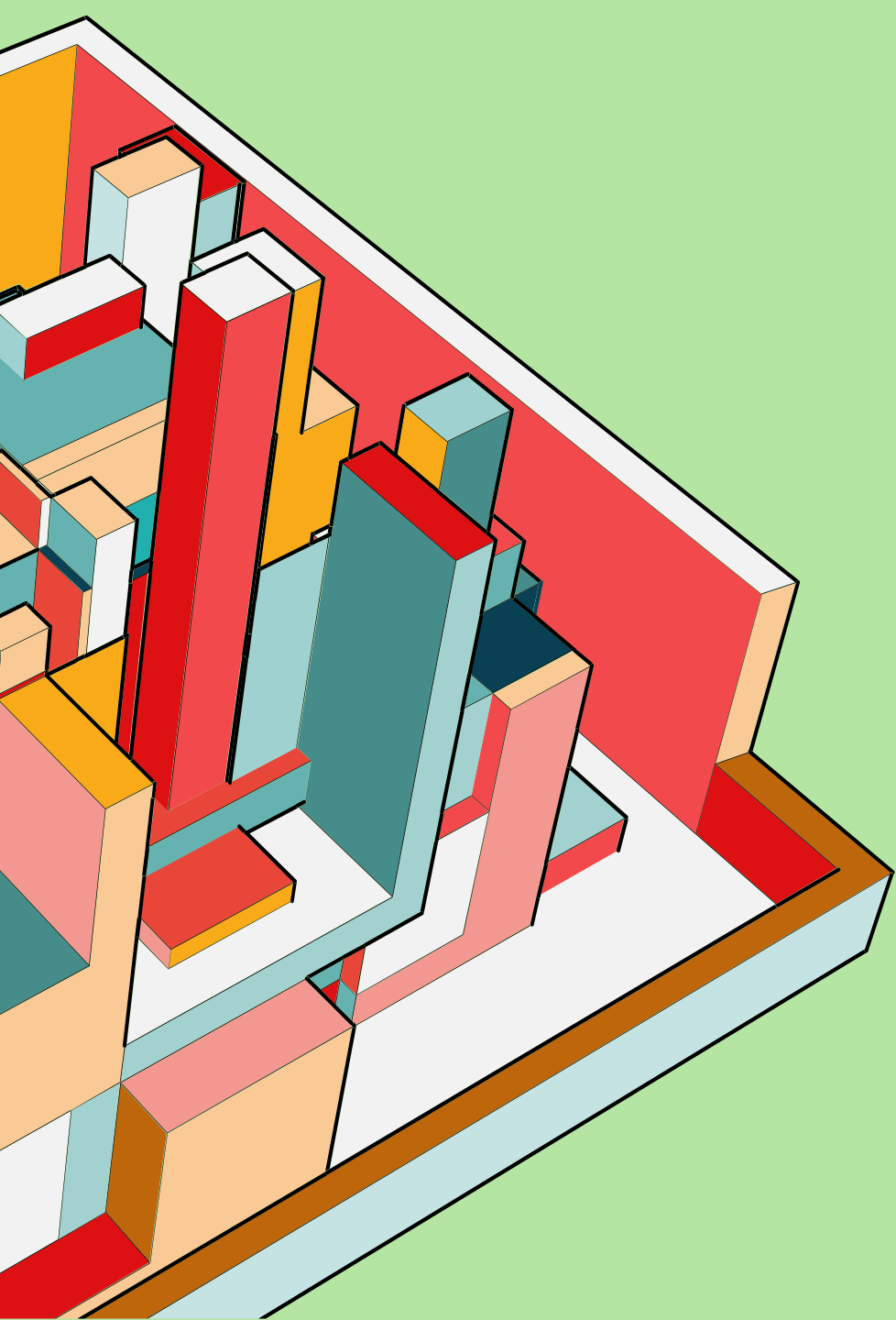
📄 **Durchführung**

🔮 Analyse

📝 Publikation

🧪 Wissenschaft!





Durchführung

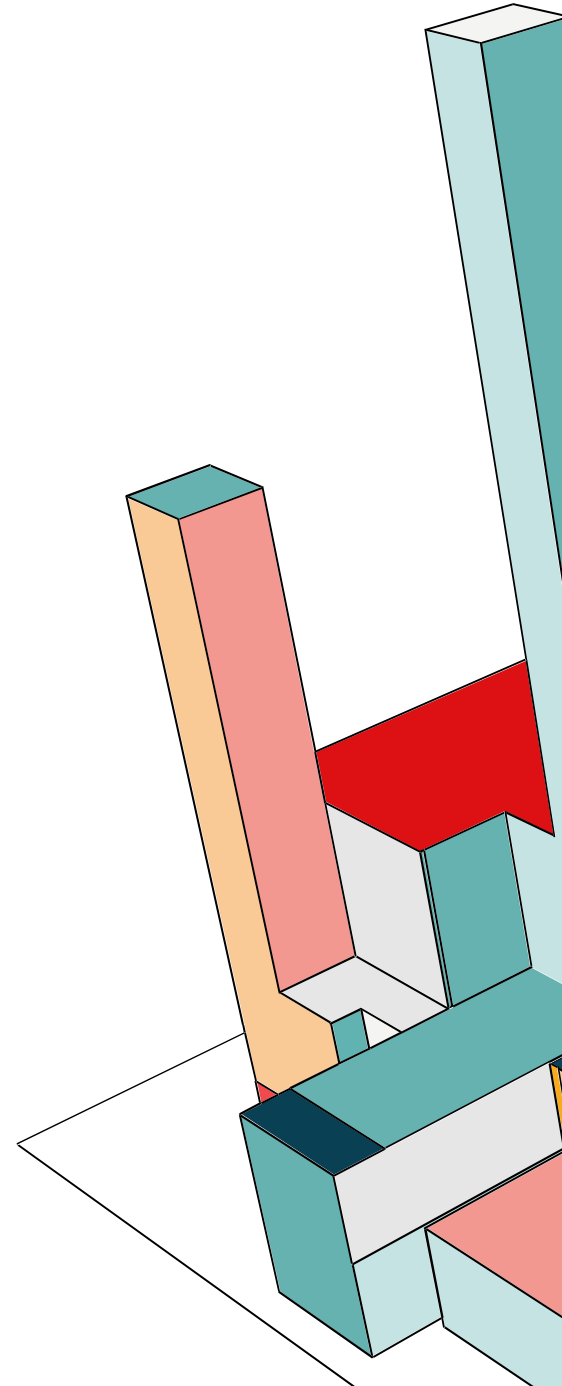
Wie wollen wir die Frage
beantworten?

ENTSCHULDIGEN SIE

**ICH MÖCHTE IHNEN KURZ
EIN PAAR FRAGEN STELLEN**

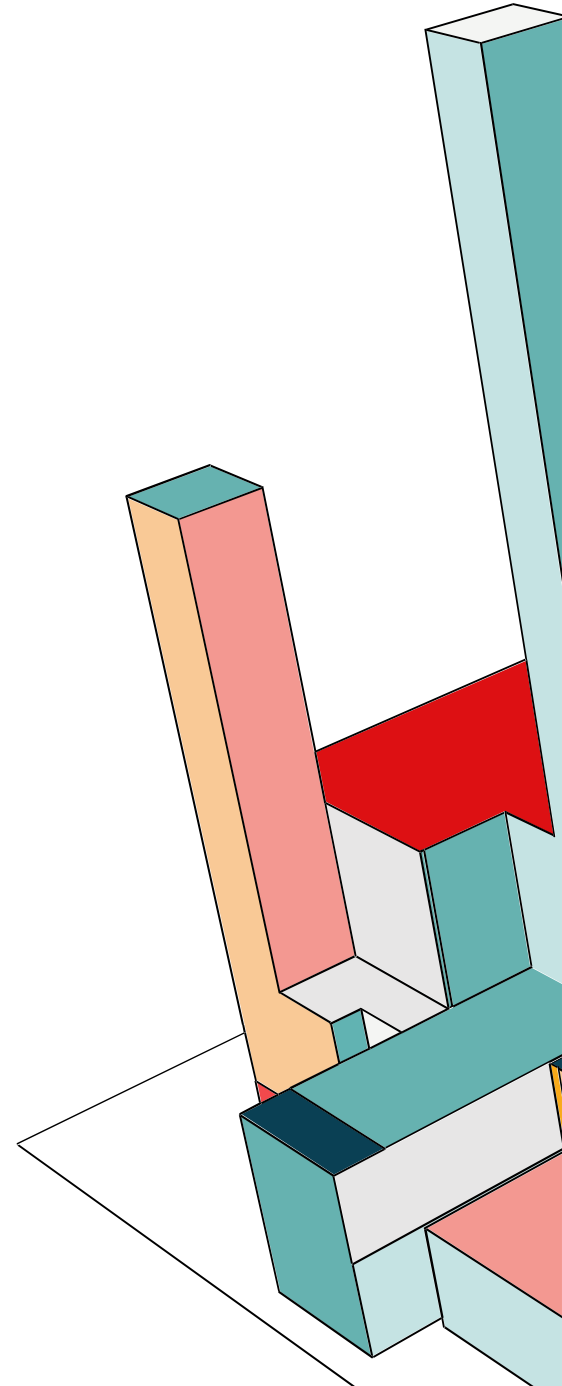
Kurzinterviews mit offenen Fragen

- Was sind die Interview-Fragen?
- Wen befragen wir?
- Wann passieren die Interviews?



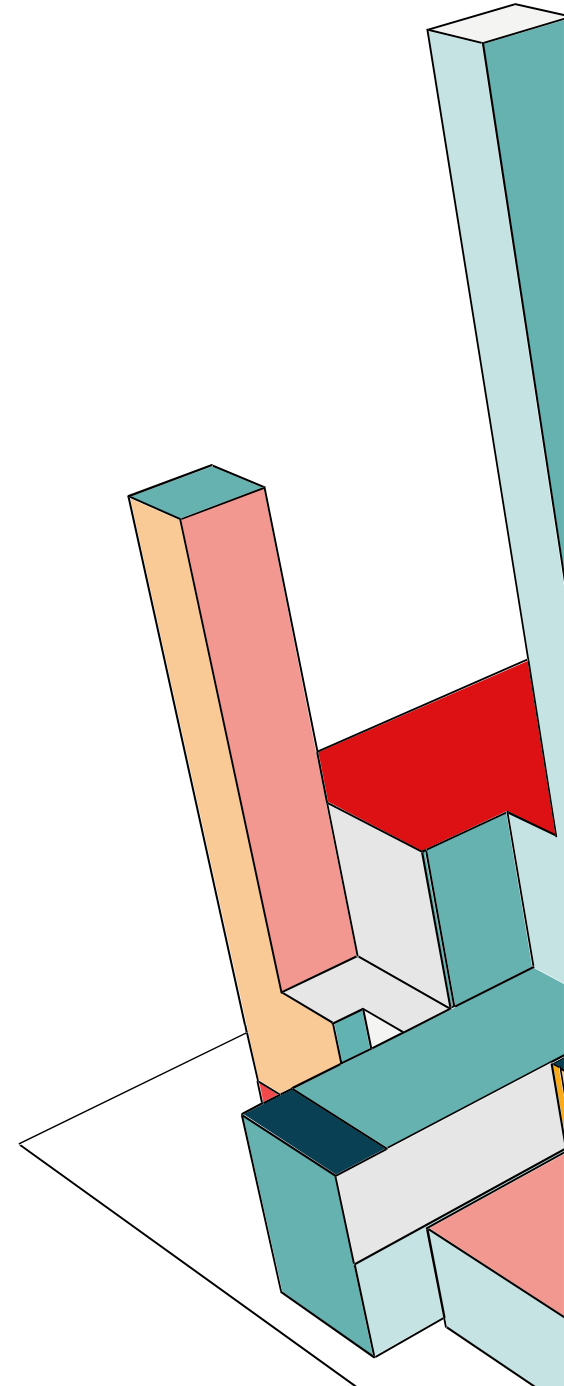
Fragebogen mit geschlossenen Fragen

- Was sind die Antworten?
 - Einfach-Auswahl, Mehrfach-Auswahl
 - Welche Optionen überhaupt?
- Auslegen oder mit Klemmbrett rumlaufen?
- Analog oder digital?
- Wie Mehrfach-Teilnahme verhindern?



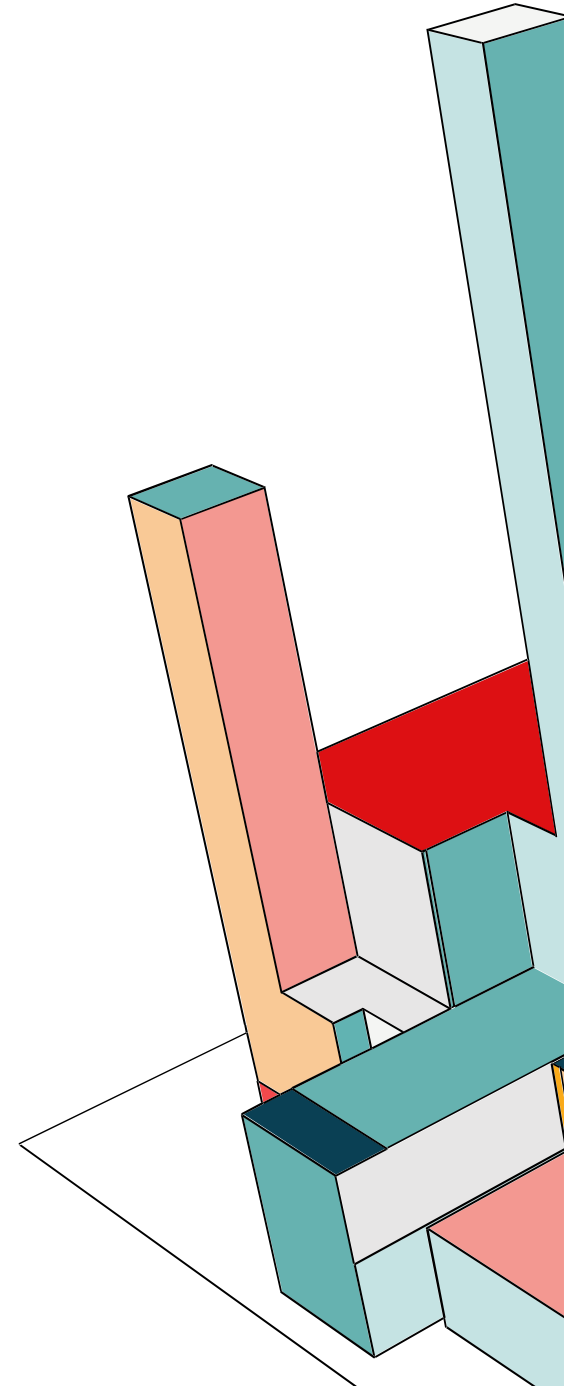
Bisherige Statistiken auswerten

- Von welchen Events?
- Von welchen Klamotten?
- Auch Helfer_innen-Shirts?
- Nur Größen für Erwachsene, oder auch Kinder?



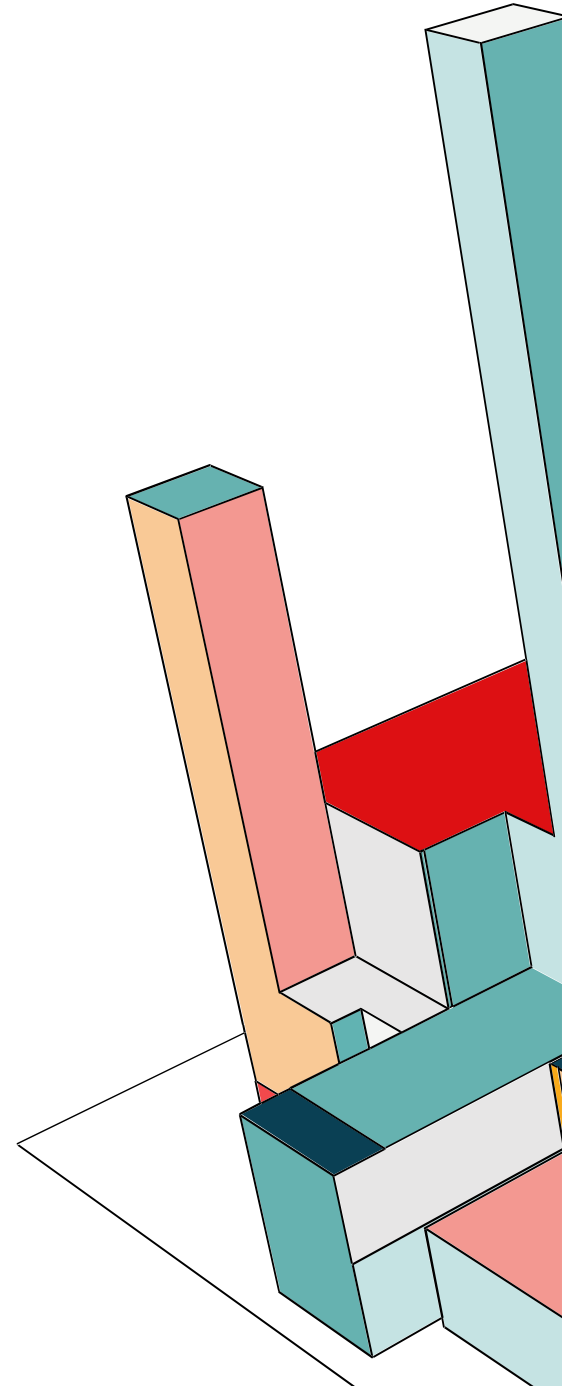
Experiment durchführen

- Labor oder „in echt“?
- Wie viele Versuche (Personen)?
- Kontrollgruppe(n)?
- Was für ein Aufbau?
- Welche Klamotten?



Daten sammeln != Daten aufzeichnen

- Fragebogen (automagisch)
- Notizen
- Audio
- Video



Ablauf

! ? Forschungsfrage ✓

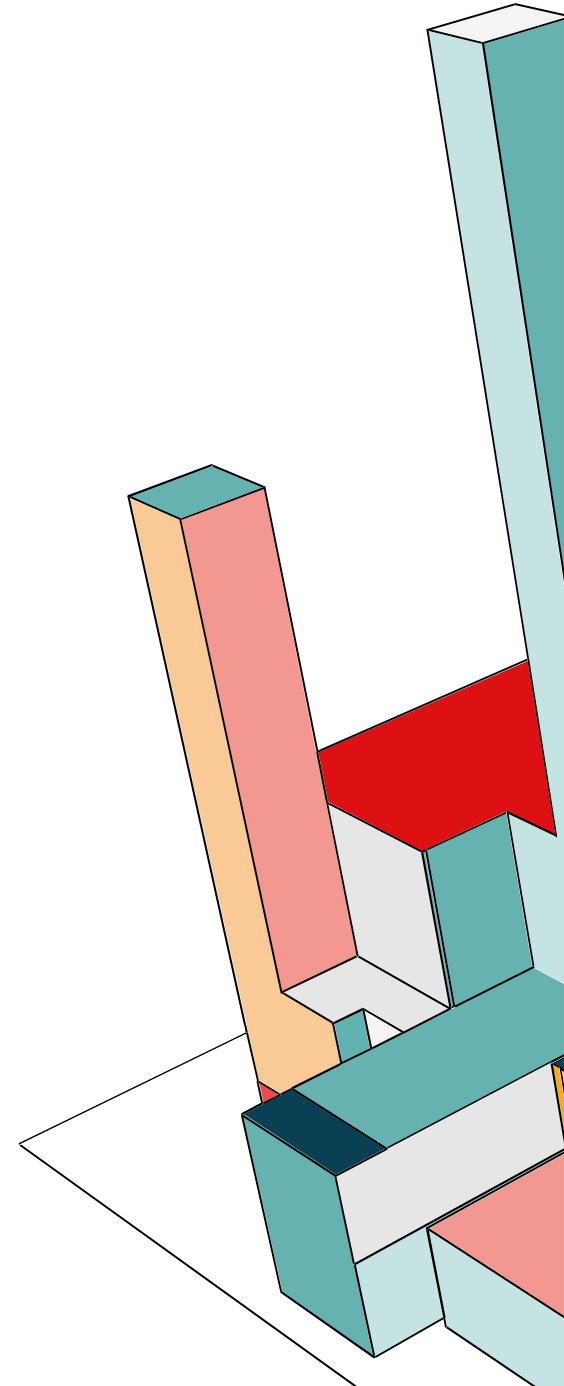
📦 Methoden-Wahl ✓

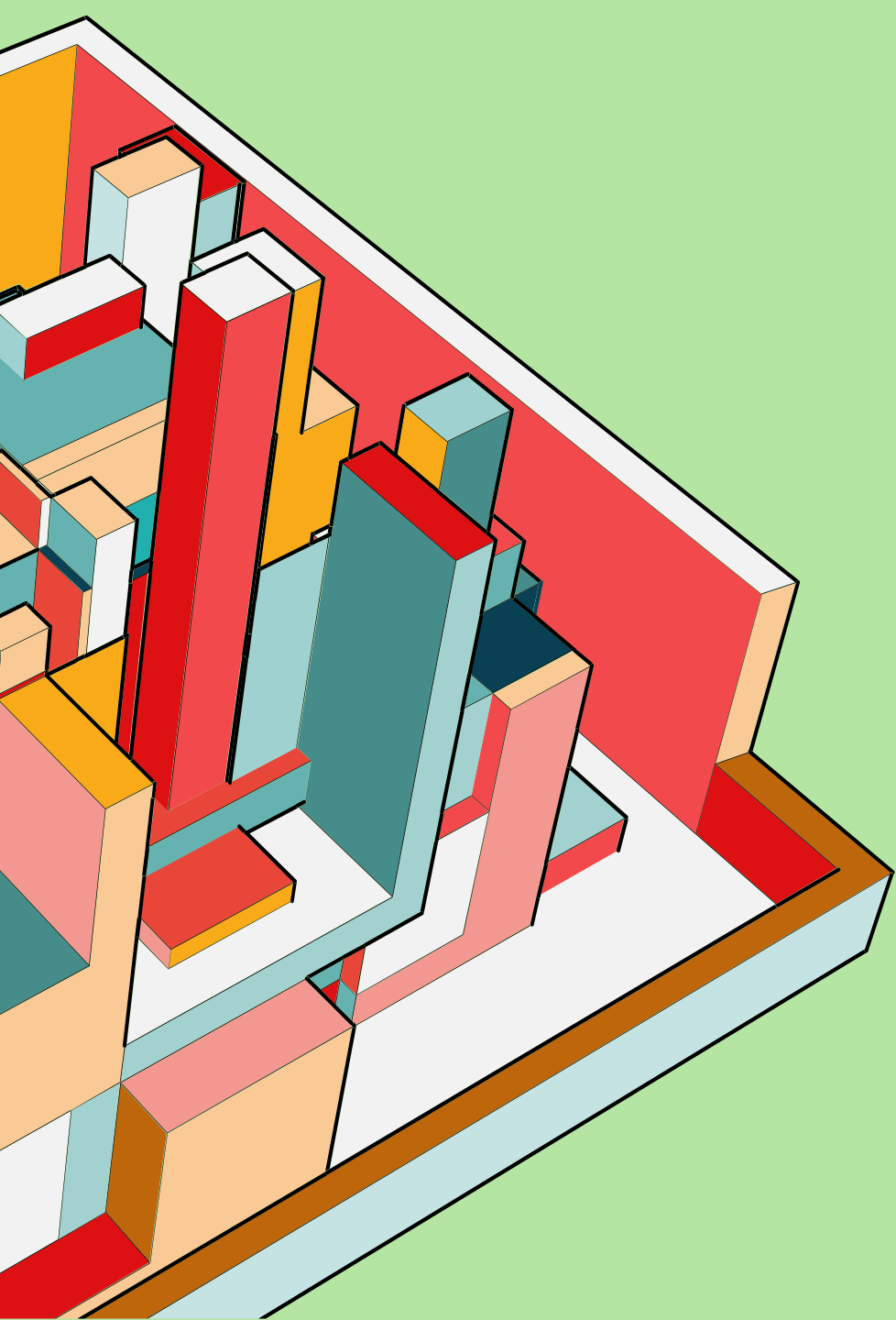
📄 Durchführung ✓

🔮 **Analyse**

✍️ Publikation

🧪 Wissenschaft!





Daten-Analyse

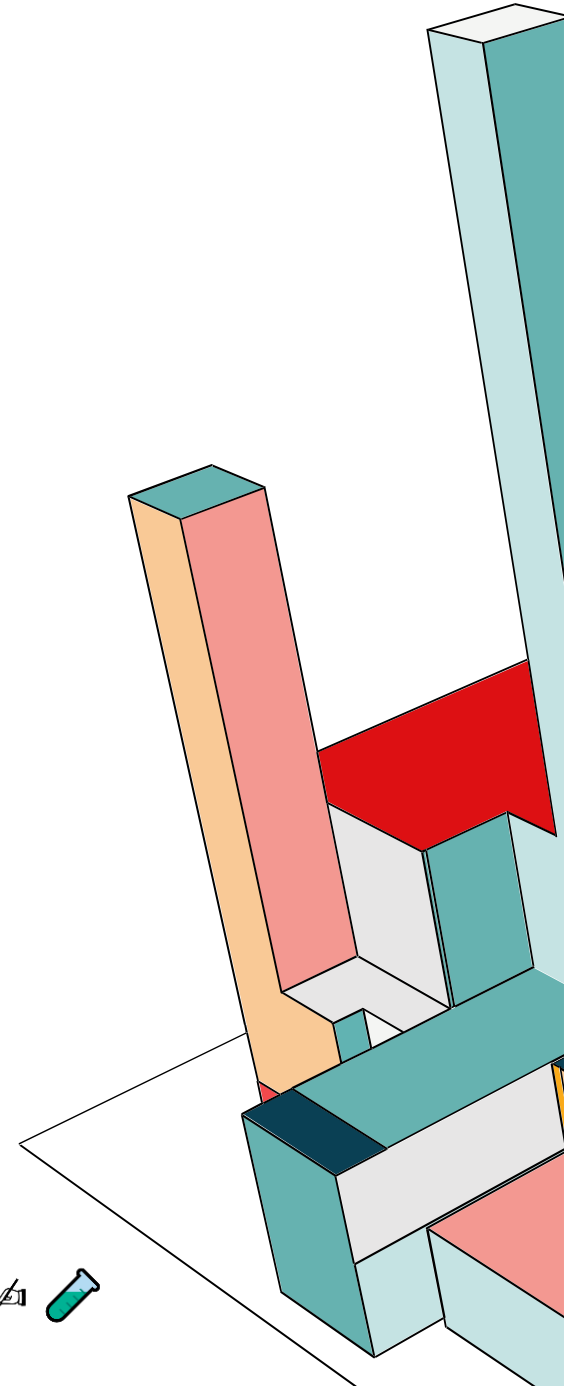
Was sagen unsere Daten?



Quelle: Volksverpetzer

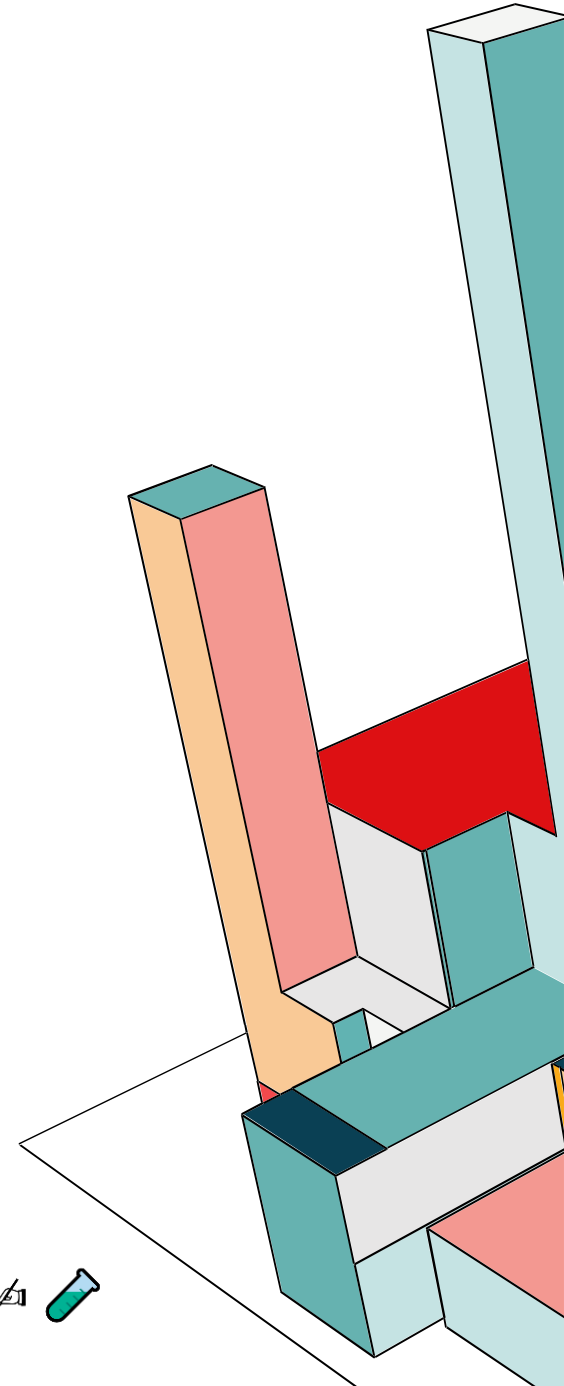
Analyse

- Qualitative Daten
 - „Texte“ – Texte, Bilder, Videos, Artefakte
- Quantitative Daten
 - Dinge, mit denen gerechnet werden kann



Analyse

- Qualitative Daten
 - „Texte“ – Texte, Bilder, Videos, Artefakte
- Quantitative Daten
 - Dinge, mit denen gerechnet werden kann
 - Zahlen. Sind. Nicht. Neutral.



Ablauf

! ? Forschungsfrage ✓

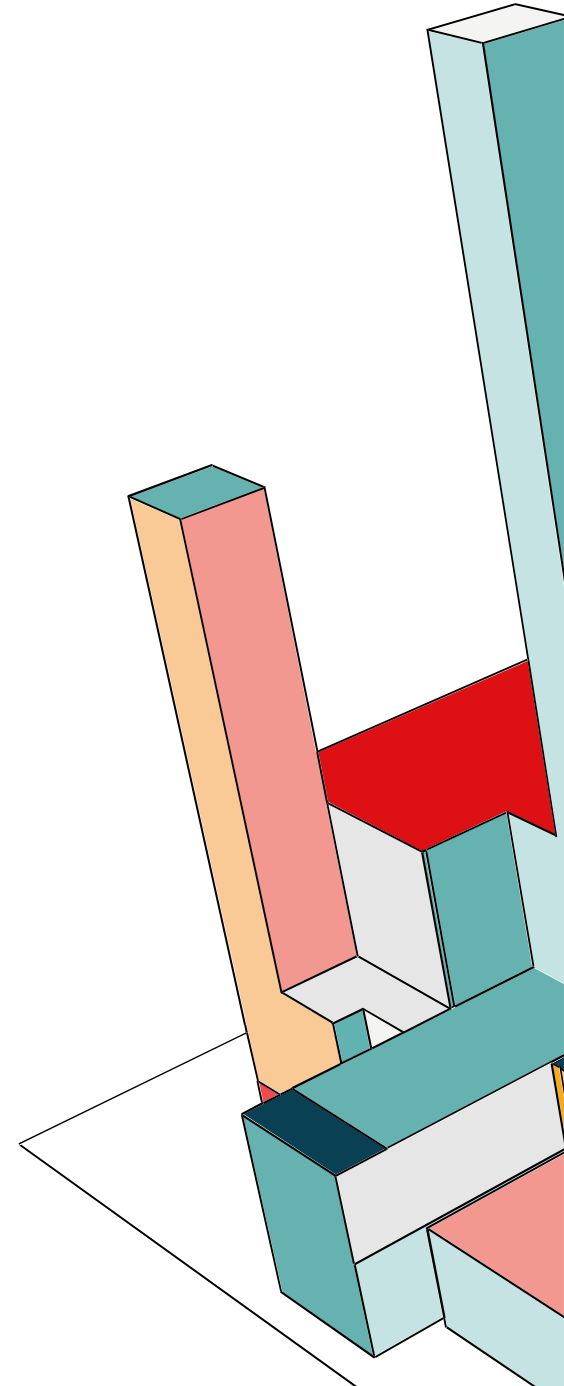
📦 Methoden-Wahl ✓

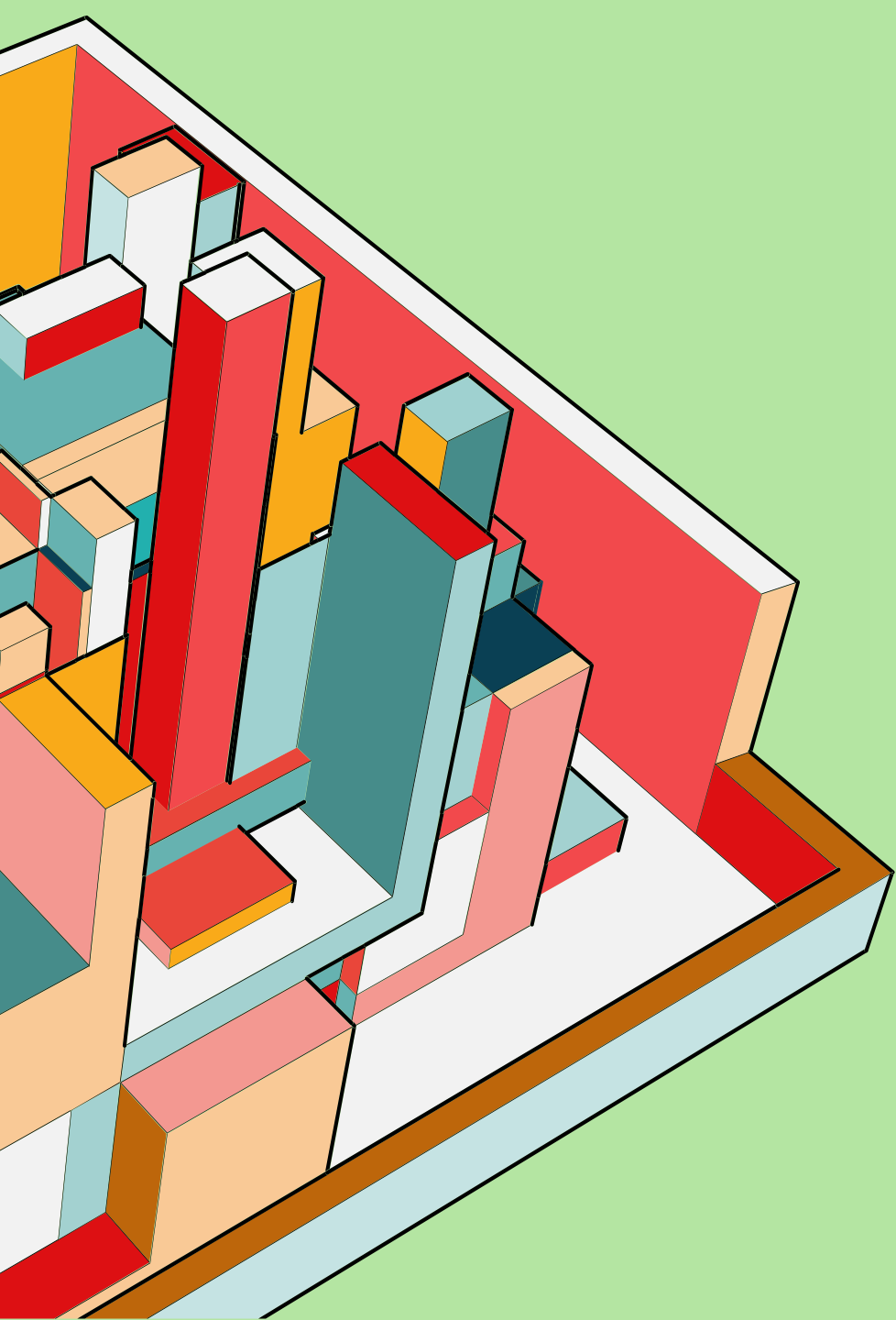
📄 Durchführung ✓

🔮 Analyse ✓

📝 **Publikation**

🧪 Wissenschaft!





Publikation

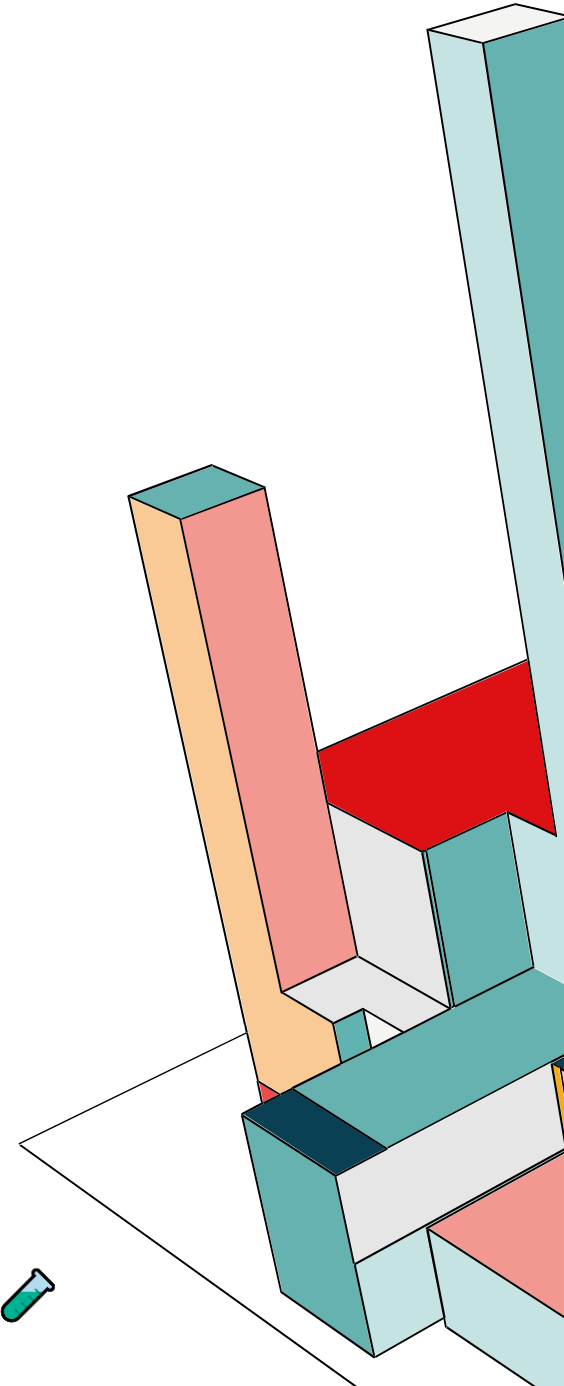
Wo und wie können wir
veröffentlichen?

**6 MONATE ARBEIT
- NOTIZEN, AUDIO, VIDEO**

EINREICHFRIST: GESTERN.

Warum überhaupt?

- „Wissenschaftliche Methode“: Diskussion!
- Finanzierung
- Karriere (h-index)
- Werbung für Projekt



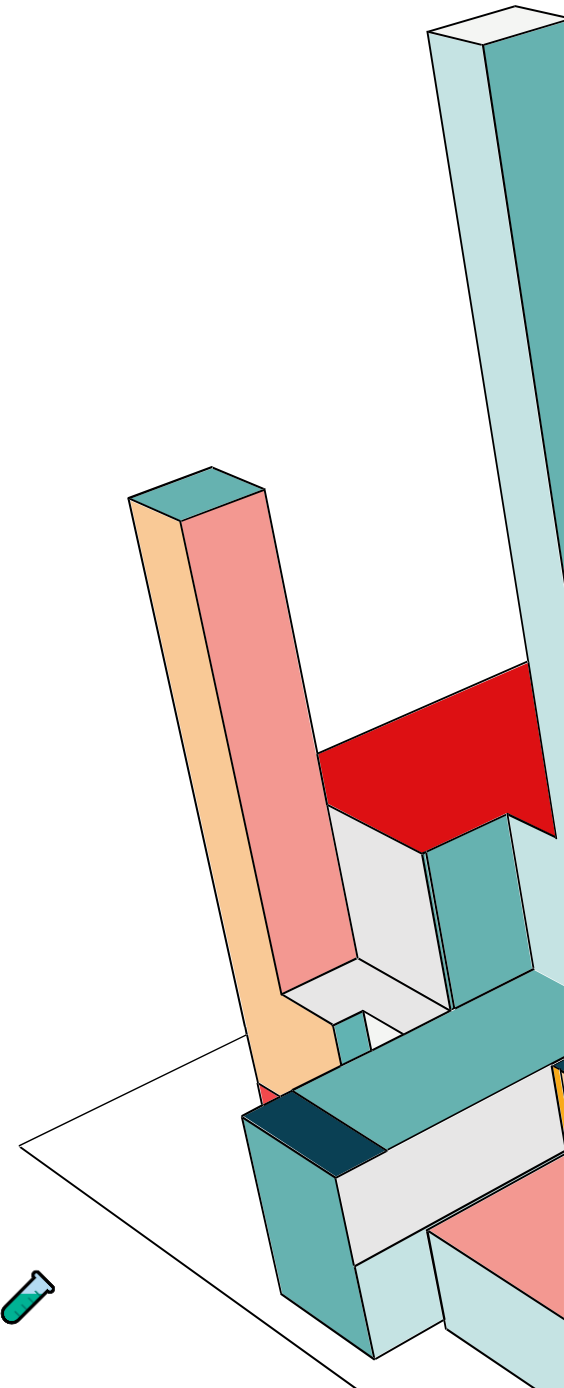
Wo publizieren?

Je nach Forschungsfeld verschieden gewichtet.

Informatik:

Konferenzen oder Journals

Jeweils von ACM oder IEEE gesponsert



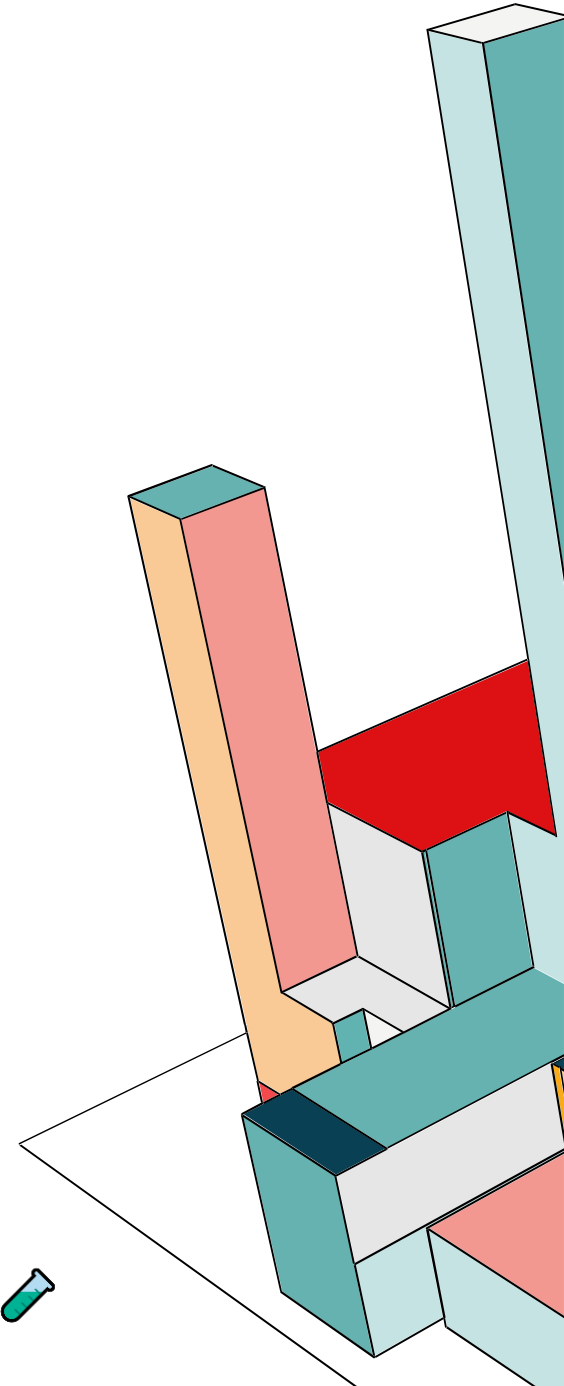
Welches Format?

Ebenfalls je nach Forschungsfeld.

Informatik:

- Full Paper
- Short Paper („Late Breaking Work“, „Poster“)
- Demo

Jeweils verschiedene Formen von Präsentation



Ablauf

! ? Forschungsfrage ✓

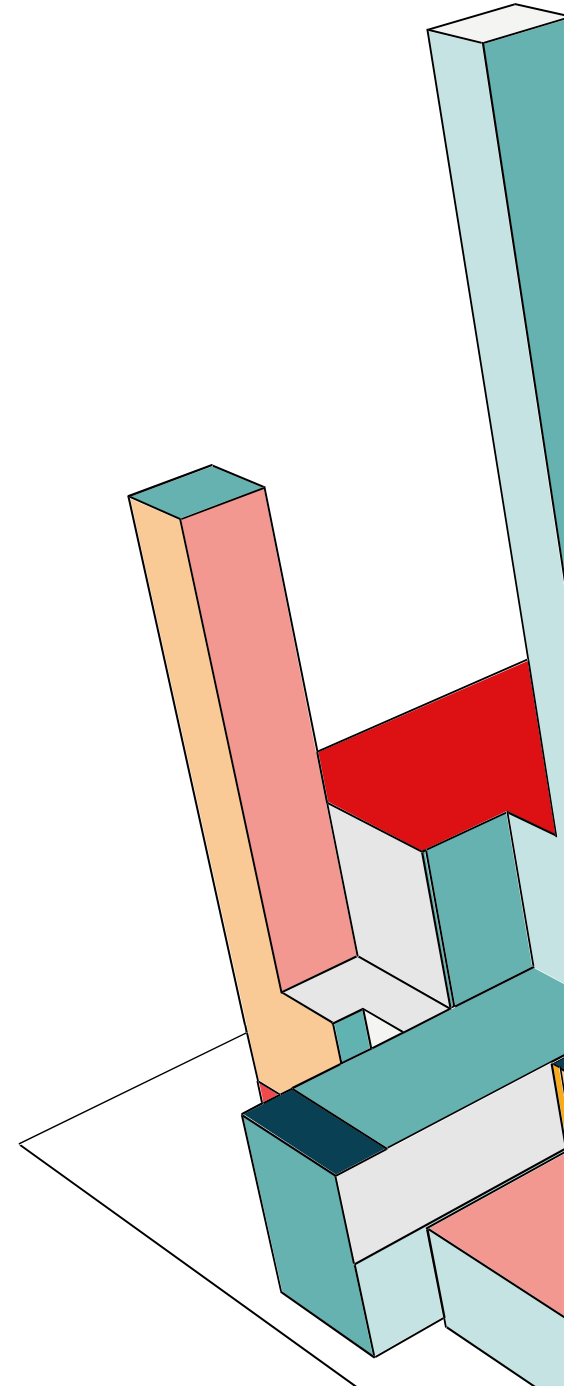
📦 Methoden-Wahl ✓

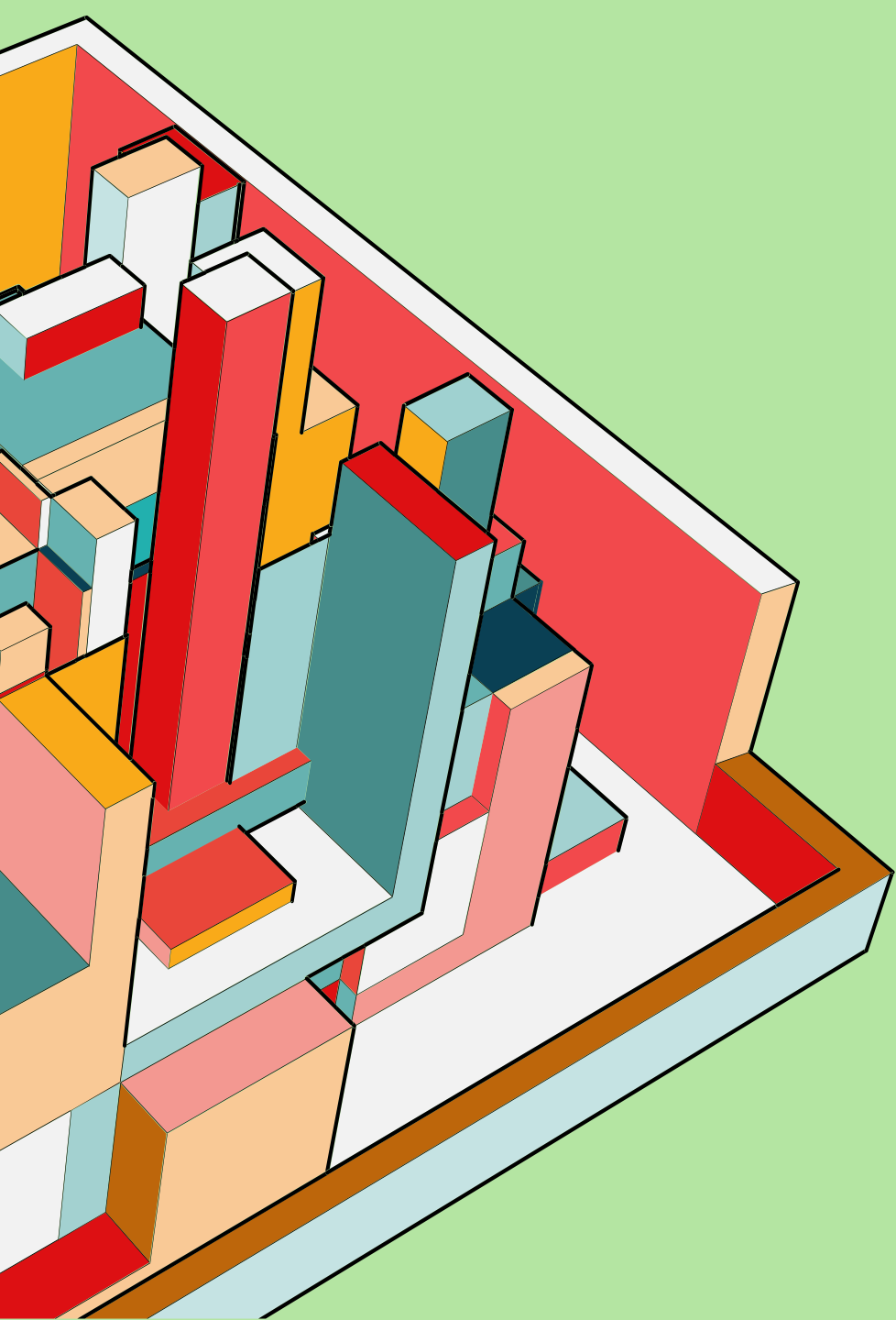
📄 Durchführung ✓

🔮 Analyse ✓

📝 Publikation ✓

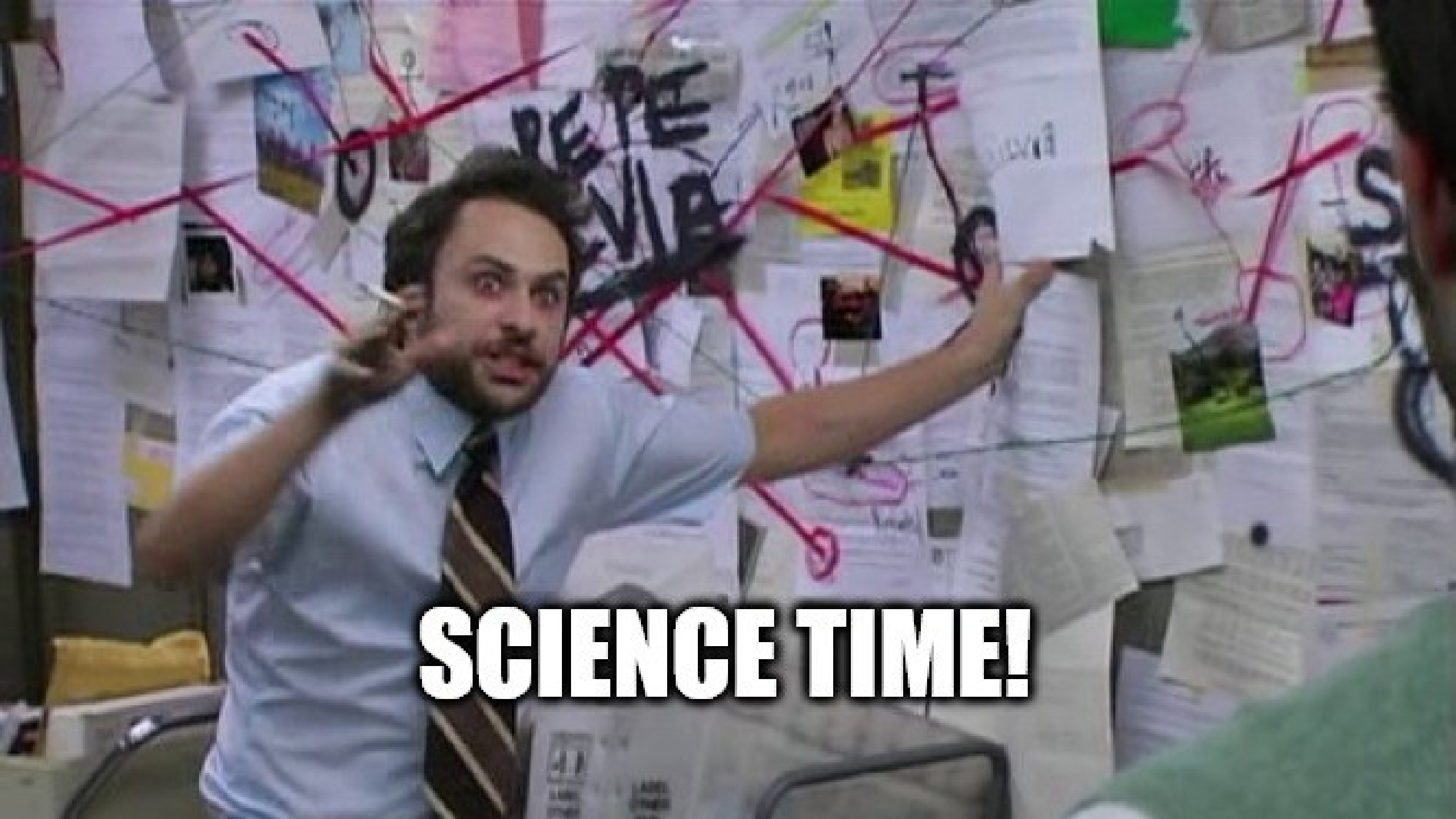
🧪 Wissenschaft!





Let's Get Them!

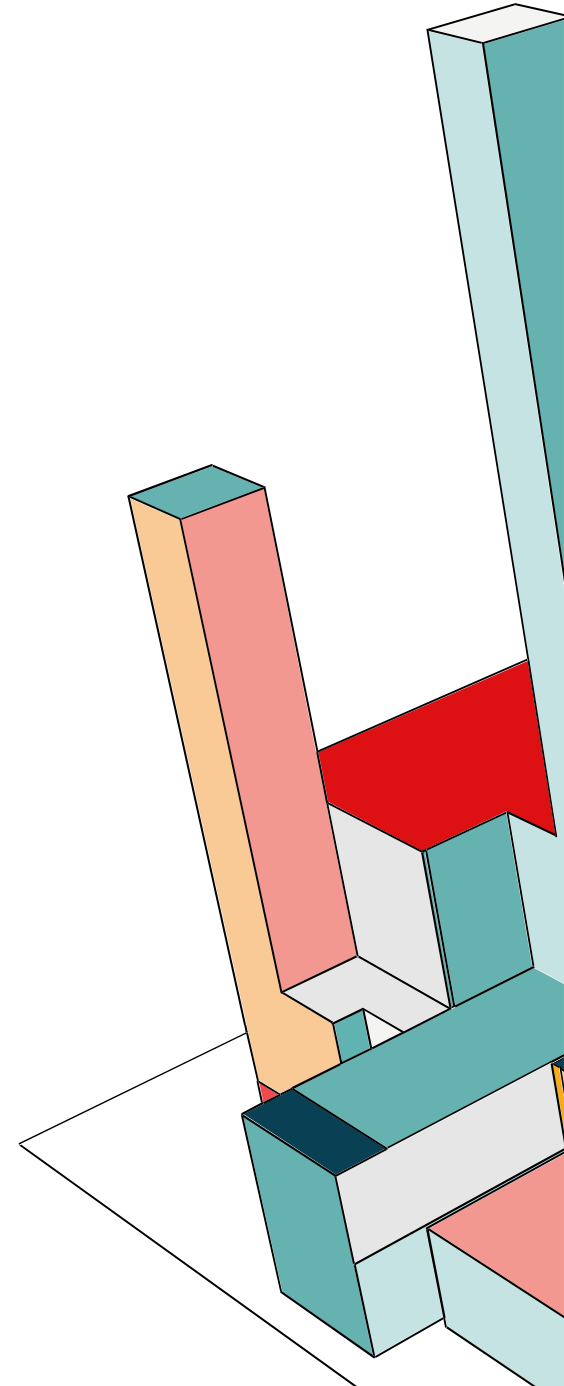
Wissen anwenden, oh yeah!



SCIENCE TIME!

Übersicht

- Publikation 1:
 - Veröffentlicht 1998 in The Lancet
- Publikation 2:
 - Veröffentlicht 2018 in The BMJ
- Beide ähnlich kurze Papers (ca. 6 Seiten)
- Eventuell außerhalb unserer Komfortzone



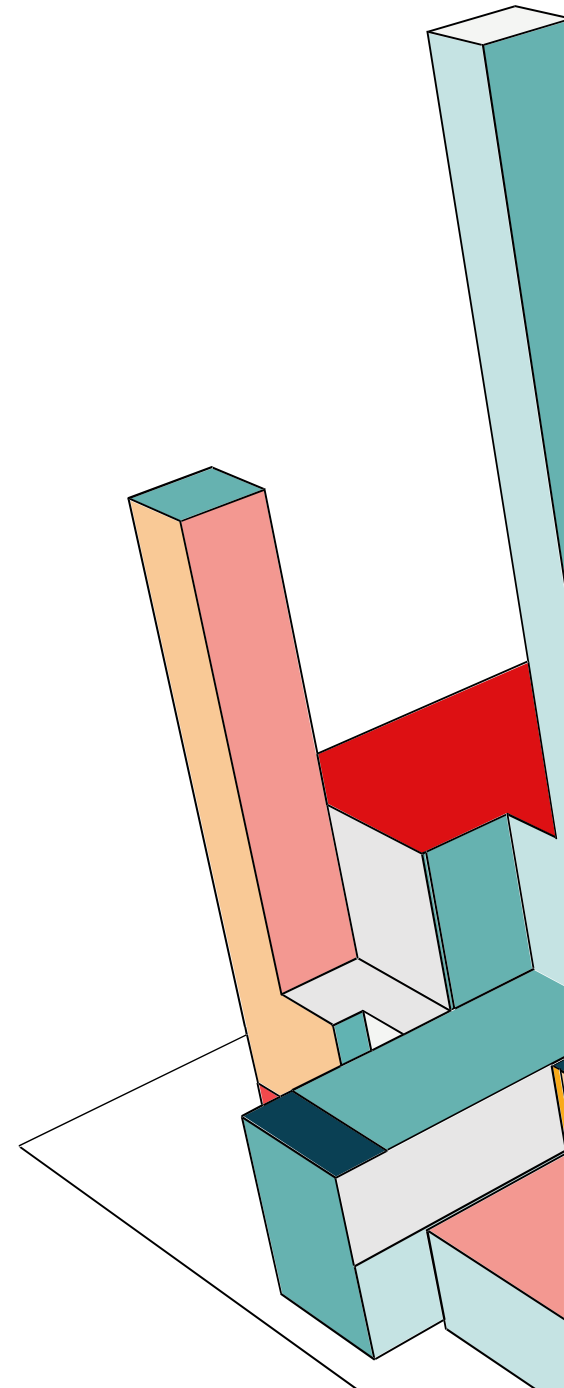
Publikation 1: Wakefield et al.

EARLY REPORT

Early report

Ileal-lymphoid-nodular hyperplasia, non-specific colitis, and pervasive developmental disorder in children

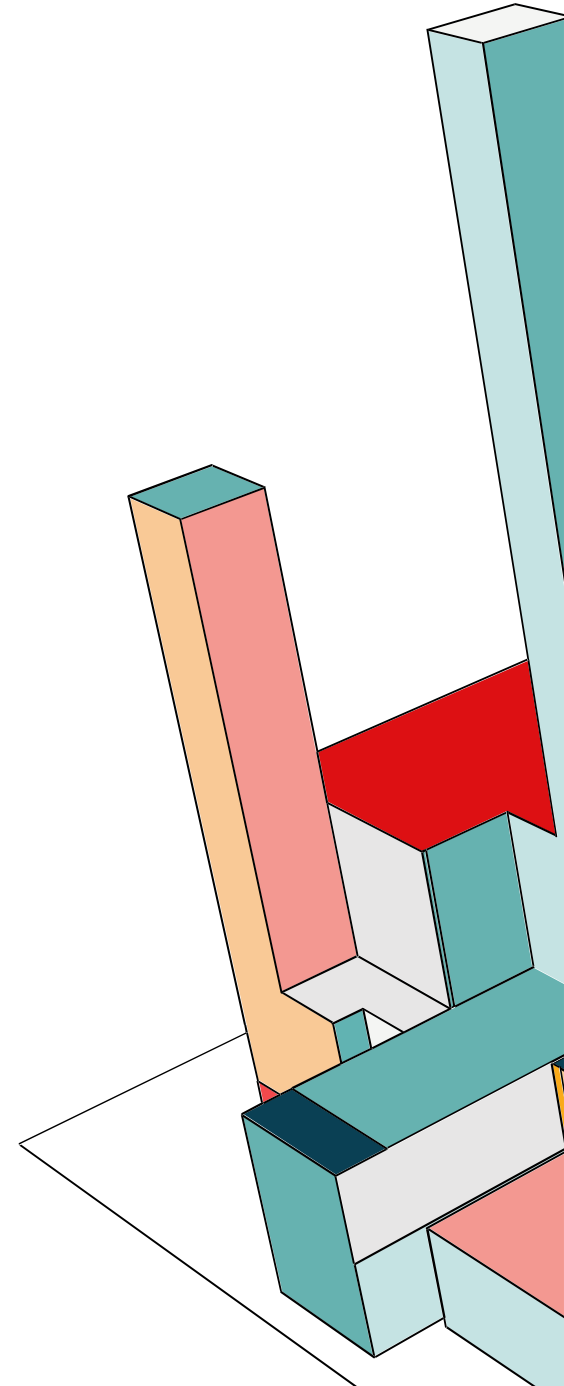
A J Wakefield, S H Murch, A Anthony, J Linnell, D M Casson, M Malik, M Berelowitz, A P Dhillon, M A Thomson, P Harvey, A Valentine, S E Davies, J A Walker-Smith



Ablauf Wakefield et al.

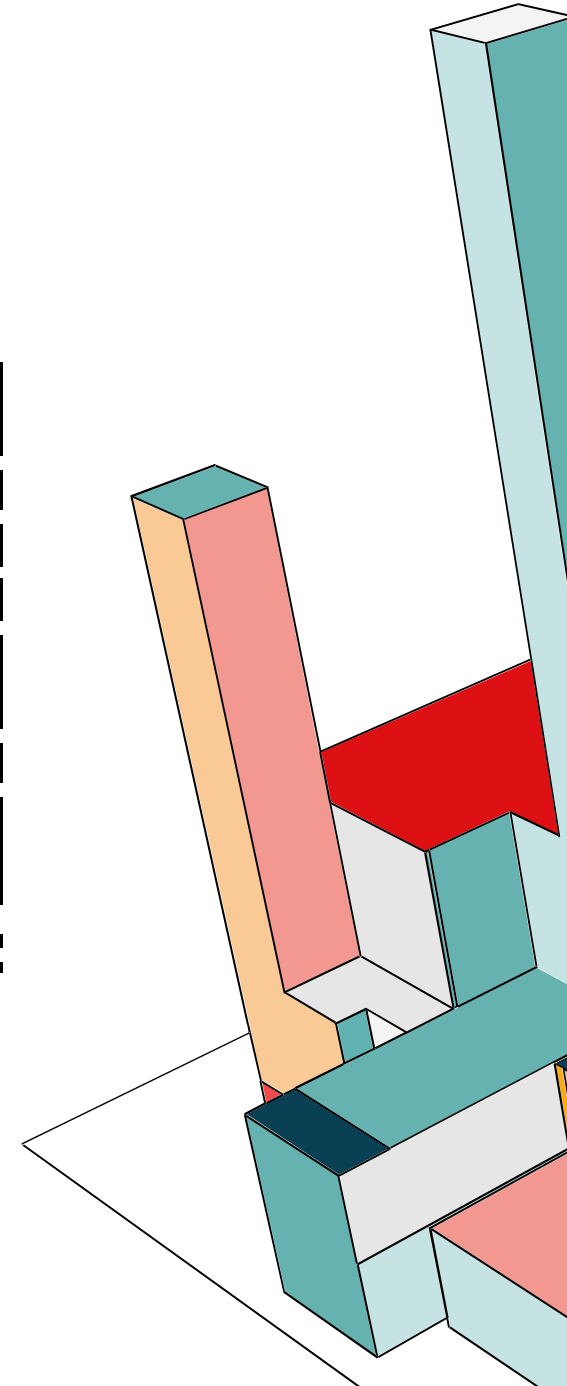
- Forschungsfrage
- Methode
- Durchführung
- Analyse
- Publikation / Ergebnisse

Zitate alle von mir übersetzt.



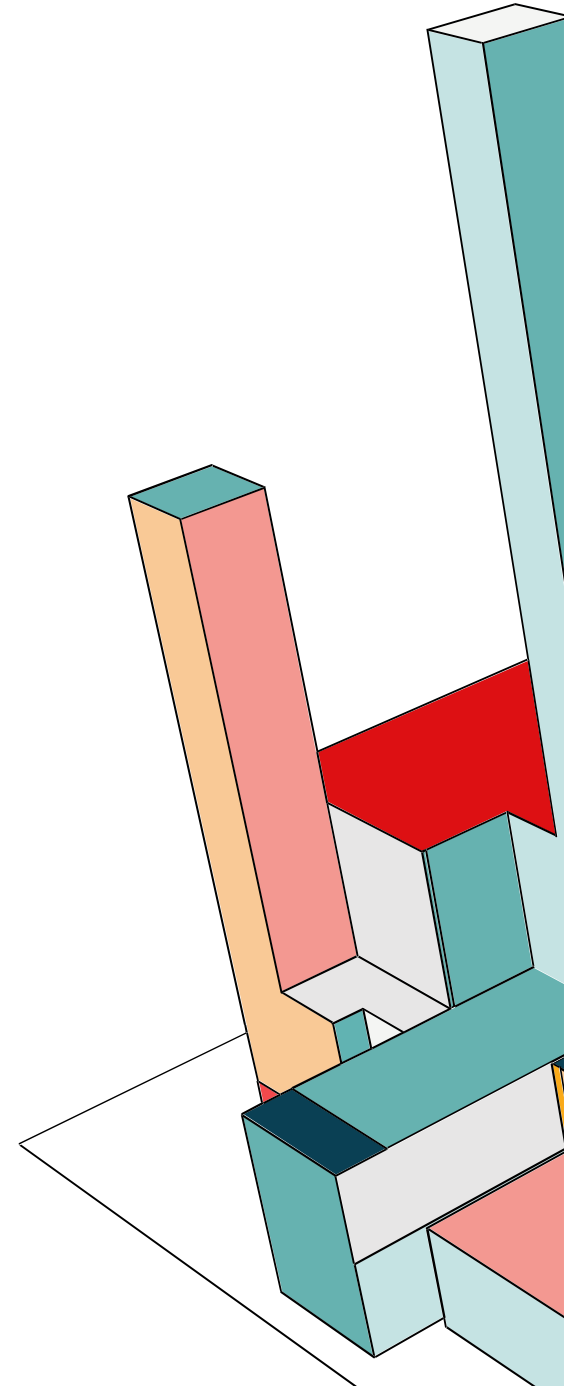
Kurzversion Wakefield et al.

Kurzversion in Englisch und
Deutsch als PDF auf meiner
website:



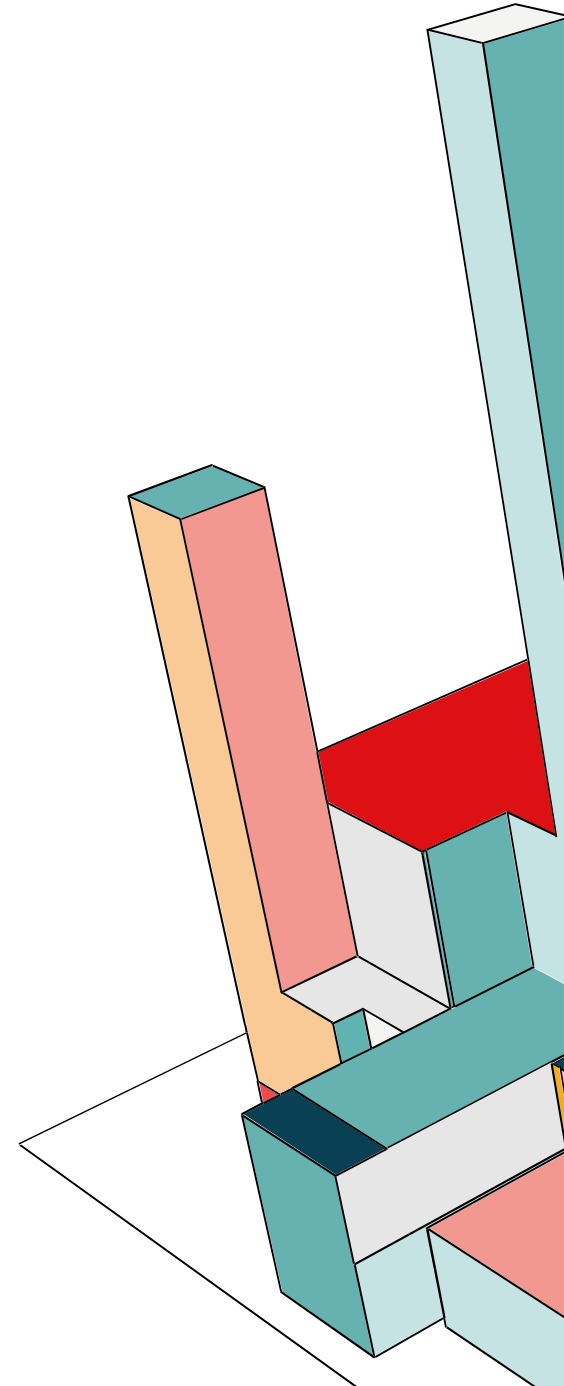
Forschungsfrage Wakefield et al.

- Nirgends explizit
- „Wir haben eine Korrelation beobachtet und wollten eine Kausalität feststellen“
→ Hypothese?
- HT auch nirgends explizit



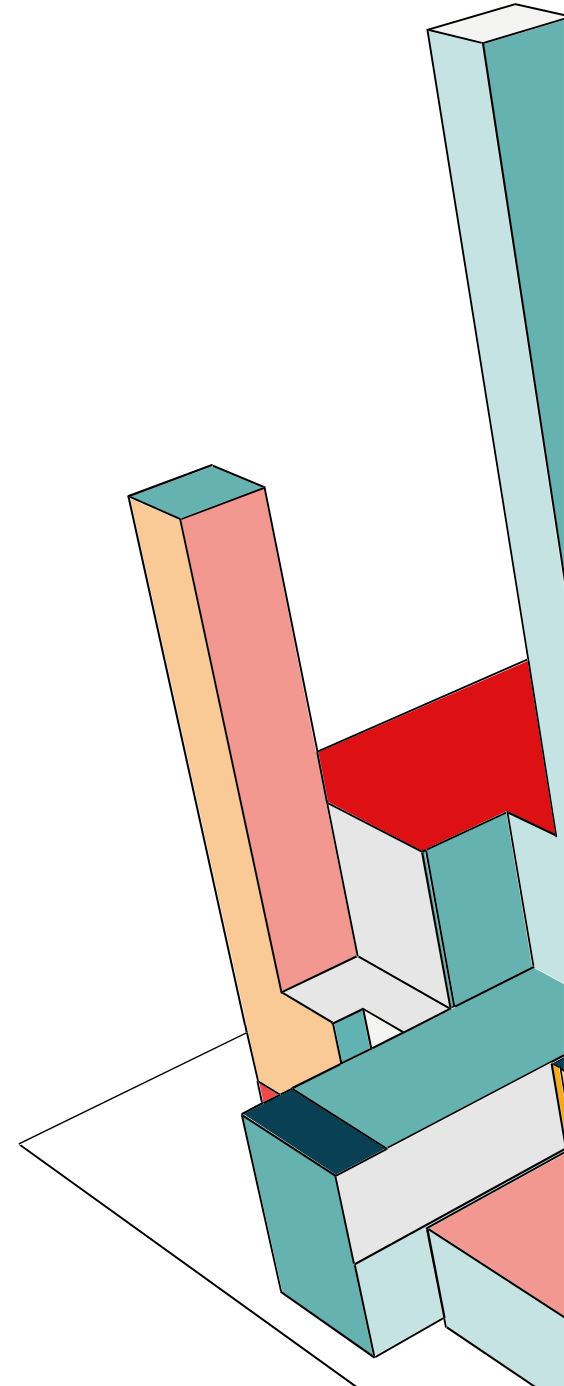
Methode Wakefield et al.

- Kleine Stichprobe: 12 Kinder/Eltern
- Offene Interviews: Krankengeschichte
- Labor-Untersuchungen



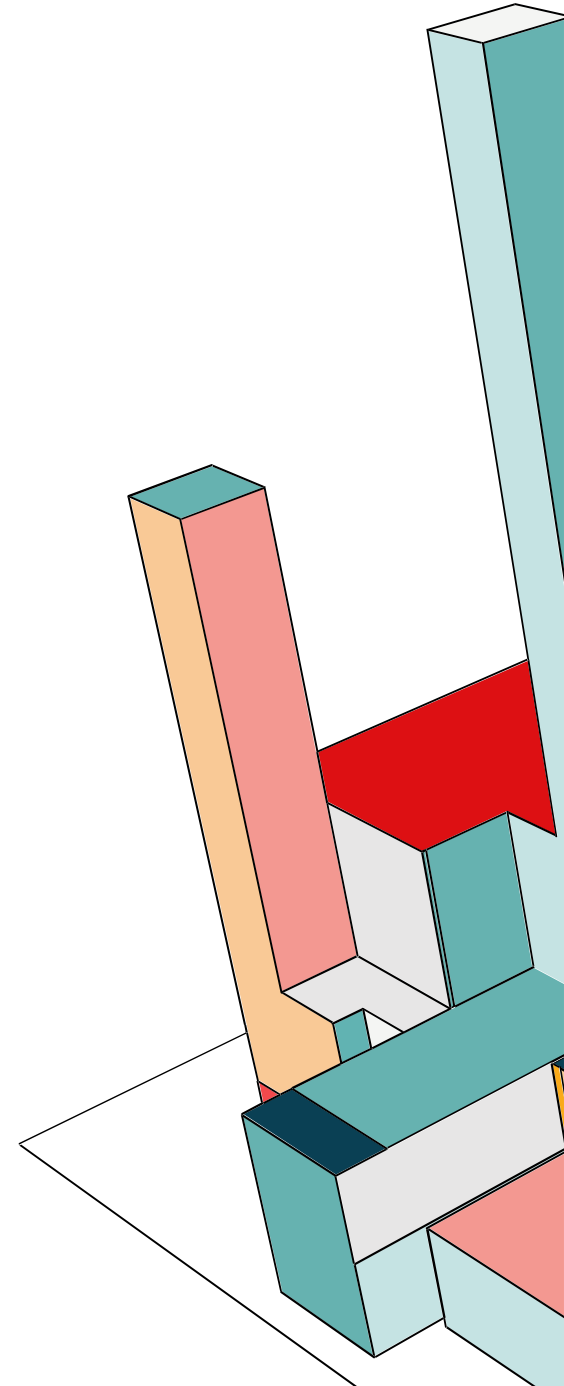
Durchführung Wakefield et al.

- 12 Kinder 1 Woche stationär
- Diverse Labor-Untersuchungen
- Beobachtungen der Eltern für erste “autistische Verhaltensweisen”
- Keine Kontrollgruppe



Analyse Wakefield et al.

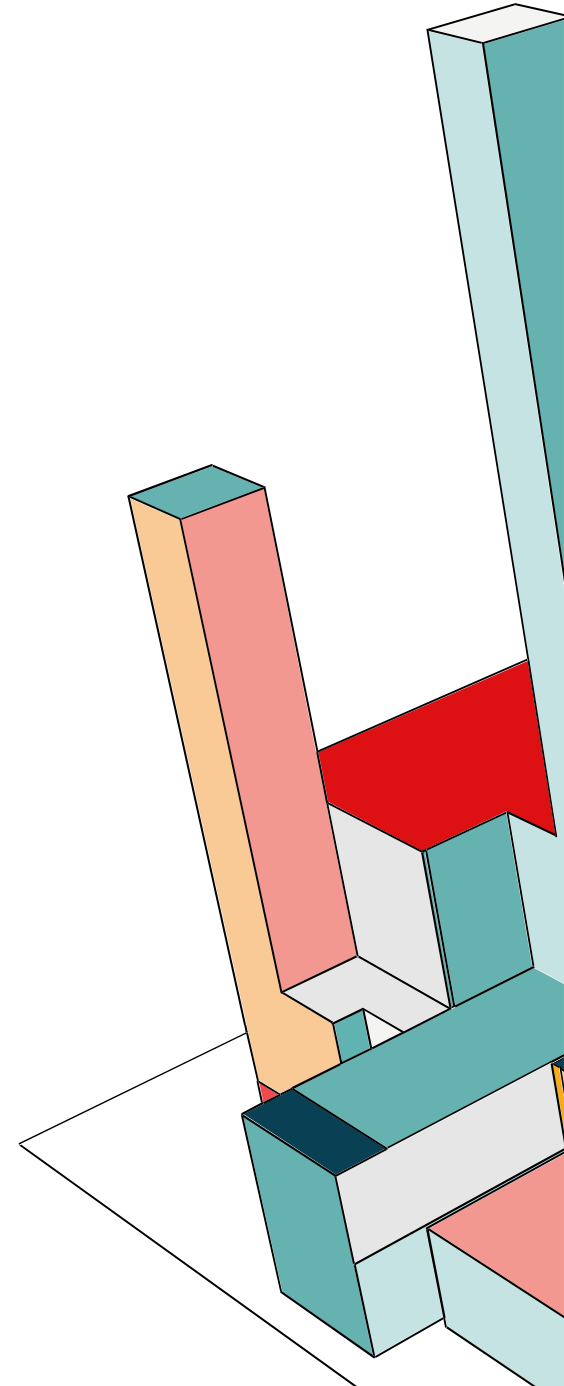
- Labor-Werte: IANAD (I am not a medical Doctor)
- Aussagen der Eltern: keine Information zu Analyse



Publikation / Ergebnisse

Wakefield et al.

Ergebnisse: „erste verhaltens-bezogene Symptome wurden von 8 der 12 Eltern(paare) mit der MMR-Impfung in Verbindung gesetzt (...)“

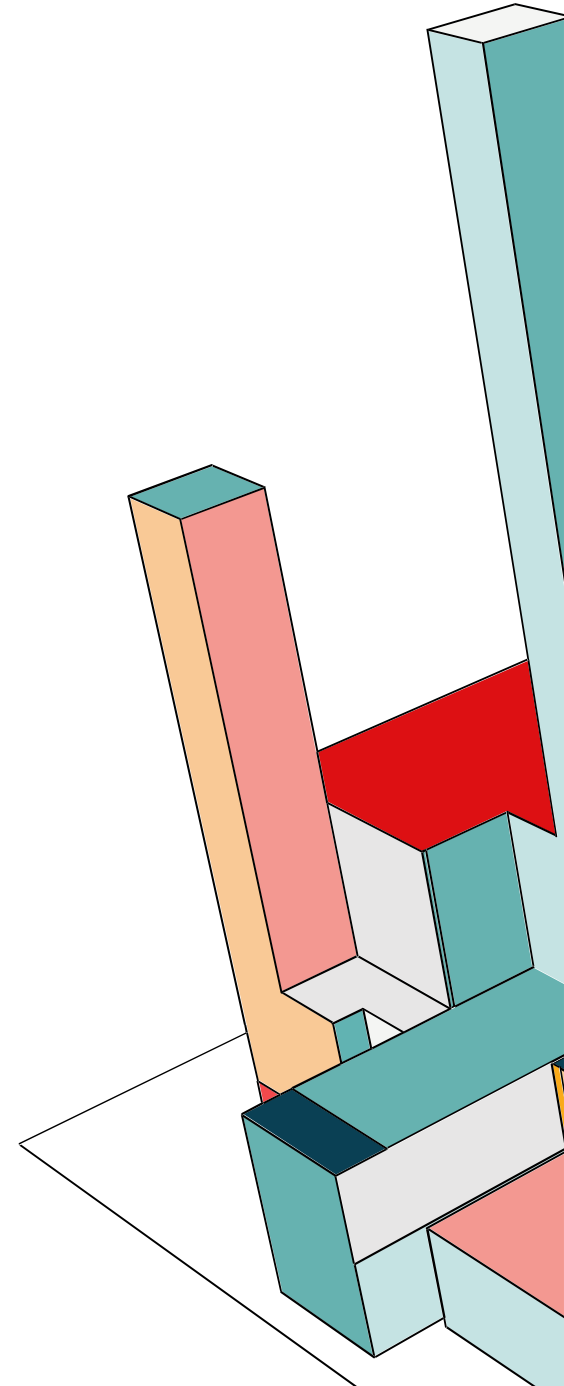


Publikation / Ergebnisse Wakefield et al.

(meine Hervorhebung)

Diskussion: “Wir haben **keinen
Zusammenhang (...) bewiesen.** (...)

Verfügbare Evidenz ist unzureichend, um zu zeigen, ob es eine Veränderung in der Häufigkeit oder einen Zusammenhang mit der MMR-Impfung gibt.”



Zusammenfassung Wakefield et al.

- ♥ Forschungsfrage
- ♥ Methode
- ♥ Durchführung
- ♥ Analyse
- ♥ Ergebnisse / Publikation

EARLY REPORT

Early report

Ileal-lymphoid-nodular hyperplasia, non-specific colitis, and pervasive developmental disorder in children

A J Wakefield, S H Murch, A Anthony, J Linnell, D M Casson, M Malik, M Berelowitz, A P Dillon, M A Thomson, P Hanvey, A Valentine, S E Davies, J A Walker-Smith

Summary

Background We investigated a consecutive series of children with chronic enterocolitis and regressive developmental disorder.

Methods 12 children (mean age 6 years [range 3-10], 11 boys) were referred to a paediatric gastroenterology unit with a history of normal development followed by loss of acquired skills, including language, together with diarrhoea and abdominal pain. Children underwent gastroenterological, neurological, and developmental assessment and review of developmental records. Ileocolonoscopy and biopsy sampling, magnetic-resonance imaging (MRI), electroencephalography (EEG), and lumbar puncture were done under sedation. Barium follow-through radiography was done where possible. Biochemical, haematological, and immunological profiles were examined.

Findings Onset of behavioural symptoms was associated by the parents, with measles, mumps, and rubella vaccination in eight of the 12 children, with measles infection in one child, and otitis media in another. All 12 children had intestinal abnormalities, ranging from lymphoid nodular hyperplasia to granuloid ulceration. Histology showed patchy chronic inflammation in seven of 11 children and reactive ileal lymphoid hyperplasia in seven, but no granulomas. Behavioural disorders included autism (nine), disintegrative psychosis (one), and possible postviral or vaccinal encephalitis (two). There were no focal neurological abnormalities and EEG and EEG tests were normal. Abnormal laboratory results were significantly raised urinary methylmalonic acid compared with age-matched controls ($p=0.03$), low haemoglobin in four children, and low serum IgA in four children.

Interpretation We identify associated gastrointestinal disease and developmental regression in a group of previously normal children, which was generally associated in time to possible environmental triggers.

Lancet 1998; 351: 637-41
See Commentary page

Inflammatory Bowel Disease Study Group, University Departments of Medicine and Histopathology (A J Wakefield *msc*, A Anthony *msc*, J Linnell *msc*, A P Dillon *msc*, S E Davies *msc*) and the **University Departments of Paediatric Gastroenterology** (S H Murch *msc*, D M Casson *msc*, M Malik *msc*), **Paediatric Psychiatry** (M Berelowitz *msc*), **Neurology** (P Hanvey *msc*), and **Radiology** (A Valentine *msc*), **Royal Free Hospital and School of Medicine, London NW3 2QG, UK**

Correspondence to: Dr A J Wakefield

Introduction

We saw several children who, after a period of apparent normality, lost acquired skills, including communication. They all had gastrointestinal symptoms, including abdominal pain, diarrhoea, and vomiting and, in some cases, food intolerance. We describe the clinical findings, and gastrointestinal features, of these children.

Patients and methods

12 children, consecutively referred to the department of paediatric gastroenterology with a history of a pervasive developmental disorder with loss of acquired skills and minimal symptoms (diarrhoea, abdominal pain, bloating and food intolerance), were investigated. All children were admitted to the ward for 1 week, accompanied by their parents.

Clinical investigations

We took histories, including details of immunisations and exposure to infectious disease, and assessed the children. In 11 cases the history was obtained by the senior clinician (JW-S). Neurological and psychiatric assessments were done by consultant paediatric (PH, MB) and child psychiatrists (JW-S). Developmental assessments included a review of prospective developmental records from parents, health visitors, and general practitioners. Four children did not undergo psychiatric assessment in hospital; all had been assessed professionally elsewhere, so these assessments were used as the basis for their behavioural diagnosis.

After bowel preparation, ileocolonoscopy was performed by SHM or MAT under sedation with midazolam and pethidine. Paired frozen and formalin-fixed mucosal biopsy samples were taken from the terminal ileum; ascending, transverse, descending, and sigmoid colons, and from the rectum. The procedure was recorded by video or still images, and was compared with images of the previous seven consecutive paediatric colonoscopies (four normal colonoscopies and three on children with ulcerative colitis), in which the physician reported normal appearance in the terminal ileum. Barium follow-through radiography was possible in some cases.

Also under sedation, cranial magnetic-resonance imaging (MRI), electroencephalography (EEG) including visual, brain stem auditory, and sensory evoked potentials (where compliance made these possible), and lumbar puncture were done.

Laboratory investigations

Thyroid function, serum long-chain fatty acids, and cerebrospinal-fluid lactate were measured to exclude known causes of childhood neurodegenerative disease. Urinary methylmalonic acid was measured in random urine samples from eight of the 12 children and 14 age-matched and sex-matched normal controls, by a modification of a technique described previously.² Chromatograms were scanned digitally on computer, to analyse the methylmalonic-acid zones from cases and controls. Urinary methylmalonic-acid concentrations in patients and controls were compared by a two-sample *t* test. Urinary creatinine was estimated by routine spectrophotometric assay.

Children were screened for anticondysplastic antibodies and boys were screened for fragile-X if this had not been done

Publikation 2: Yeh et al.

thebmj

Research ▾

Education ▾

News & Views ▾

Campaigns ▾

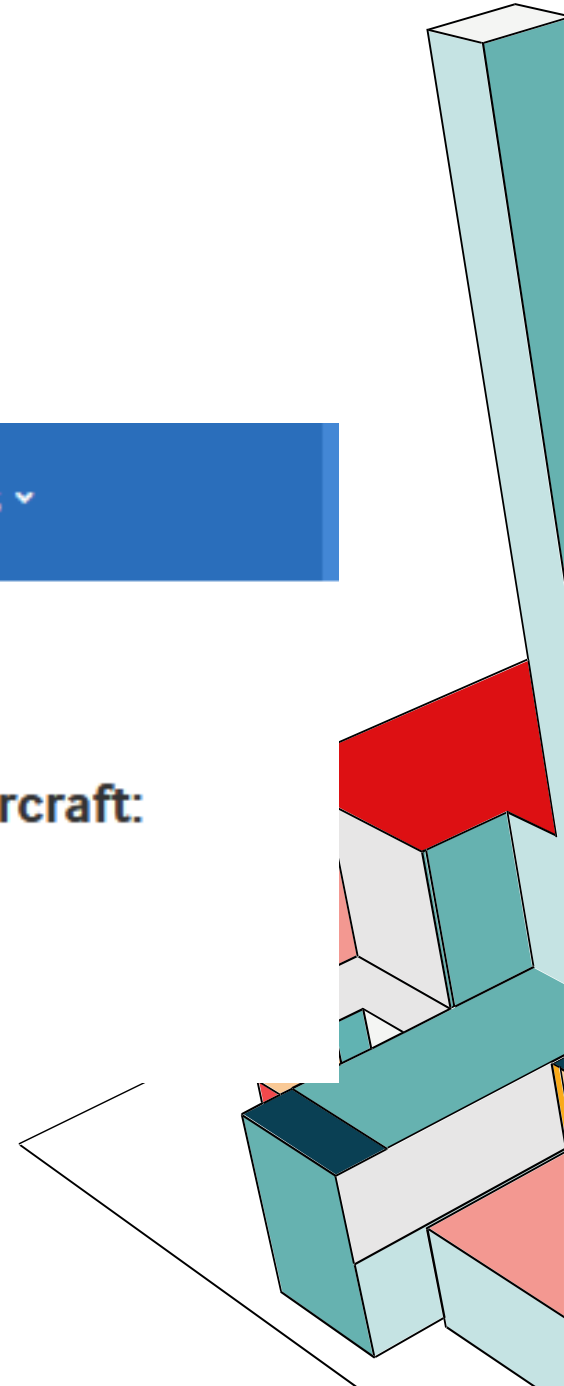
Jobs ▾

Research » Christmas 2018: Look Before You Leap

Parachute use to prevent death and major trauma when jumping from aircraft: randomized controlled trial

BMJ 2018 ; 363 doi: <https://doi.org/10.1136/bmj.k5094> (Published 13 December 2018)

Cite this as: *BMJ* 2018;363:k5094



Ablauf Yeh et al.

- Forschungsfrage
- Methode
- Durchführung
- Analyse
- Ergebnisse / Publikation

Zitate alle von mir übersetzt.

RESEARCH

 OPEN ACCESS



Parachute use to prevent death and major trauma when jumping from aircraft: randomized controlled trial

Robert W Yeh,¹ Linda R Valsdottir,¹ Michael W Yeh,² Changyu Shen,¹ Daniel B Kramer,¹ Jordan B Strom,¹ Eric A Secemsky,¹ Joanne L Healy,¹ Robert M Domeier,³ Dhruv S Kazi,¹ Brahmajee K Nallamothu⁴ On behalf of the PARACHUTE Investigators

ABSTRACT
OBJECTIVE
To determine if using a parachute prevents death or major traumatic injury when jumping from an aircraft.
DESIGN
Randomized controlled trial.
SETTING
Private or commercial aircraft between September 2017 and August 2018.
PARTICIPANTS
92 aircraft passengers aged 18 and over were screened for participation. 23 agreed to be enrolled and were randomized.
INTERVENTION
Jumping from an aircraft (airplane or helicopter) with a parachute versus an empty backpack (unblinded).
MAIN OUTCOME MEASURES
Composite of death or major traumatic injury (defined by an Injury Severity Score over 15) upon impact with the ground measured immediately after landing.
RESULTS
Parachute use did not significantly reduce death or major injury (0% for parachute v 0% for control; P=0.9). This finding was consistent across multiple subgroups. Compared with individuals screened but not enrolled, participants included in the study were on aircraft at significantly lower altitude (mean of 0.6 m for participants v mean of 9146 m for non-participants; P<0.001) and lower velocity (mean of 0 km/h v mean of 800 km/h; P<0.001).
CONCLUSIONS
Parachute use did not reduce death or major traumatic injury when jumping from aircraft in the first randomized evaluation of this intervention. However, the trial was only able to enroll participants on small stationary aircraft on the ground, suggesting cautious extrapolation to high altitude jumps. When beliefs

regarding the effectiveness of an intervention exist in the community, randomized trials might selectively enroll individuals with a lower perceived likelihood of benefit, thus diminishing the applicability of the results to clinical practice.

Introduction
Parachutes are routinely used to prevent death or major traumatic injury among individuals jumping from aircraft. However, evidence supporting the efficacy of parachutes is weak and guideline recommendations for their use are principally based on biological plausibility and expert opinion.^{1,2} Despite this widely held yet unsubstantiated belief of efficacy, many studies of parachutes have suggested injuries related to their use in both military and recreational settings,^{3,4} and parachutist injuries are formally recognized in the World Health Organization's ICD-10 (international classification of diseases, 10th revision).⁵ This could raise concerns for supporters of evidence-based medicine, because numerous medical interventions believed to be useful have ultimately failed to show efficacy when subjected to properly executed randomized clinical trials.^{6,7}

Previous attempts to evaluate parachute use in a randomized setting have not been undertaken owing to both ethical and practical concerns. Lack of equipoise could inhibit recruitment of participants in such a trial. However, whether pre-existing beliefs about the efficacy of parachutes would, in fact, impair the enrolment of participants in a clinical trial has not been formally evaluated. To address these important gaps in evidence, we conducted the first randomized clinical trial of the efficacy of parachutes in reducing death and major injury when jumping from an aircraft.

Methods
Study protocol
Between September 2017 and August 2018, individuals were screened for inclusion in the Participation in Randomized trials Compromised by widely Held beliefs about lack of Treatment Equipoise (PARACHUTE) trial. Prospective participants were approached and screened by study investigators on commercial or private aircraft.

For the commercial aircraft, travel was related to trips the investigators were scheduled to take for business or personal reasons unrelated to the present study. Typically, passengers seated close to the study investigator (typically not known acquaintances) would be approached mid-flight, between the time of initial seating and time of exiting the aircraft. The

¹Richard A and Susan F Smith Center for Outcomes Research in Cardiology, Beth Israel Deaconess Medical Center, Harvard Medical School, 375 Longwood Avenue, Boston, MA 02215, USA

²David Geffen School of Medicine, University of California, Los Angeles, CA, USA

³Department of Emergency Medicine, University of Michigan and Saint Joseph Hospital, Ann Arbor, MI, USA

⁴Michigan Integrated Center for Health Analytics and Medical Prediction, Department of Internal Medicine and Institute for Healthcare Policy and Innovation, University of Michigan, Ann Arbor, MI, USA

Correspondence to: RW Yeh ryeh@bidmc.harvard.edu (or @weyeh on Twitter)

Additional material is published online only. To view please visit the journal online.

Cite this as: *BMJ* 2018;363:k5094 <http://dx.doi.org/10.1136/bmj.k5094>

Accepted: 22 November 2018

WHAT IS ALREADY KNOWN ON THIS TOPIC

Parachutes are routinely used to prevent death or major traumatic injury among individuals jumping from aircraft, but their efficacy is based primarily on biological plausibility and expert opinion

No randomized controlled trials of parachute use have yet been attempted, presumably owing to a lack of equipoise

WHAT THIS STUDY ADDS

This randomized trial of parachute use found no reduction in death or major injury compared with individuals jumping from aircraft with an empty backpack

Lack of enrolment of individuals at high risk could have influenced the results of the trial

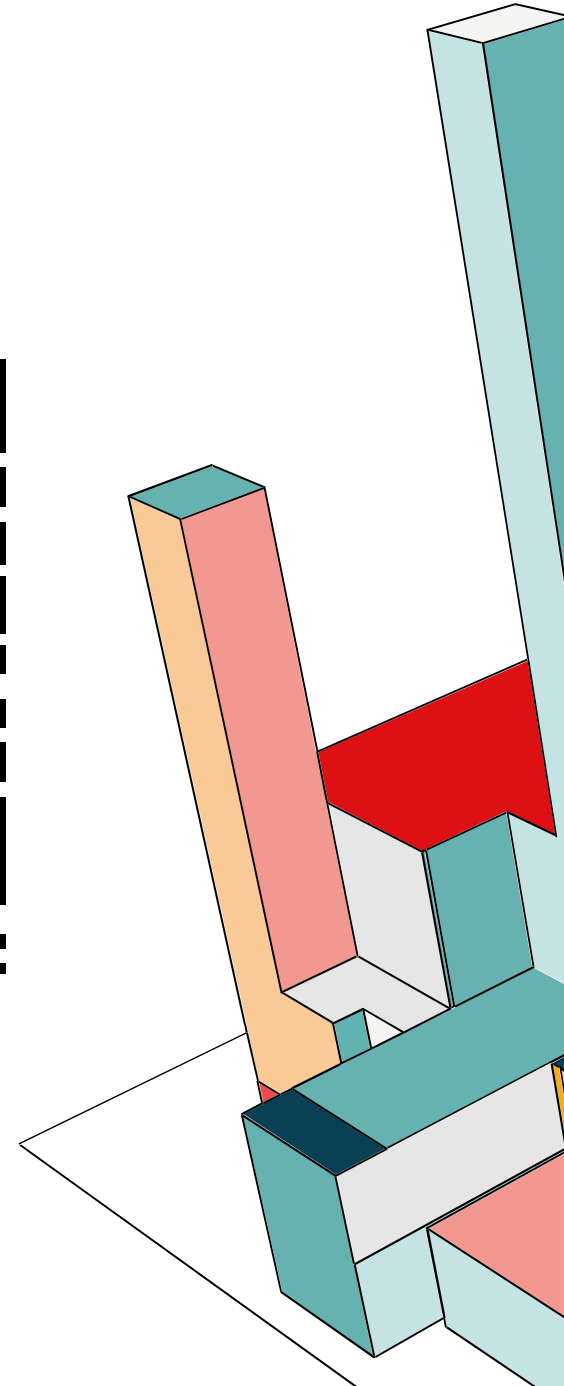
thebmj | *BMJ* 2018;363:k5094 | doi:10.1136/bmj.k5094

BMJ: first published as 10.1136/bmj.k5094 on 13 December 2018. Downloaded from <https://www.bmj.com/> on 31 May 2025 by guest. Protected by copyright, including for uses related to text and data mining, AI training, and similar technologies.

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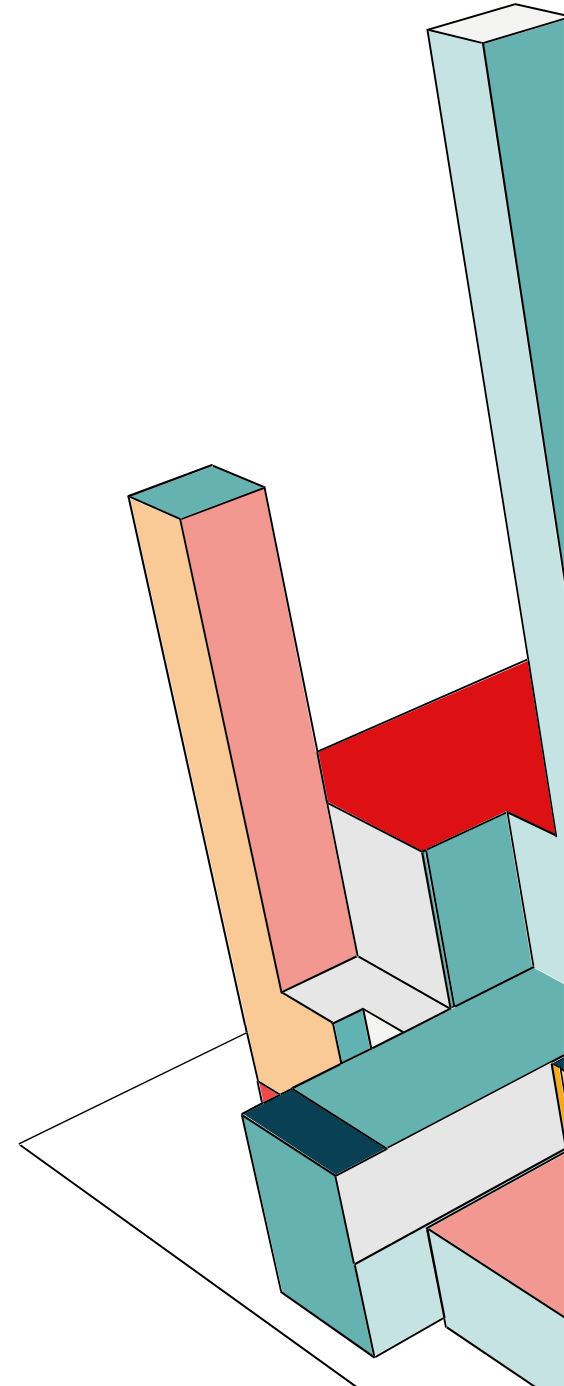
Kurzversion Yeh et al.

Kurzversion in Englisch und
Deutsch als PDF auf meiner
website:



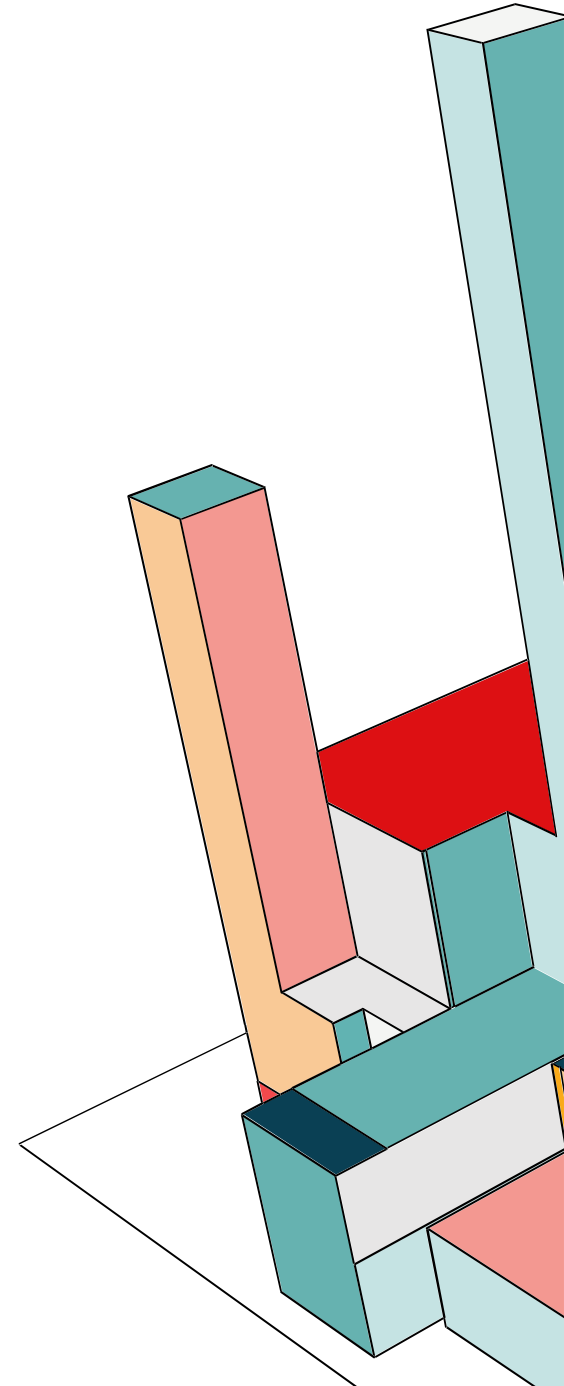
Forschungsfrage Yeh et al.

„Festzustellen, ob die Verwendung eines Fallschirms beim Sprung aus einem Luftfahrzeug (*aircraft*) Tod oder schwere Verletzungen verhindert“



Methode Yeh et al.

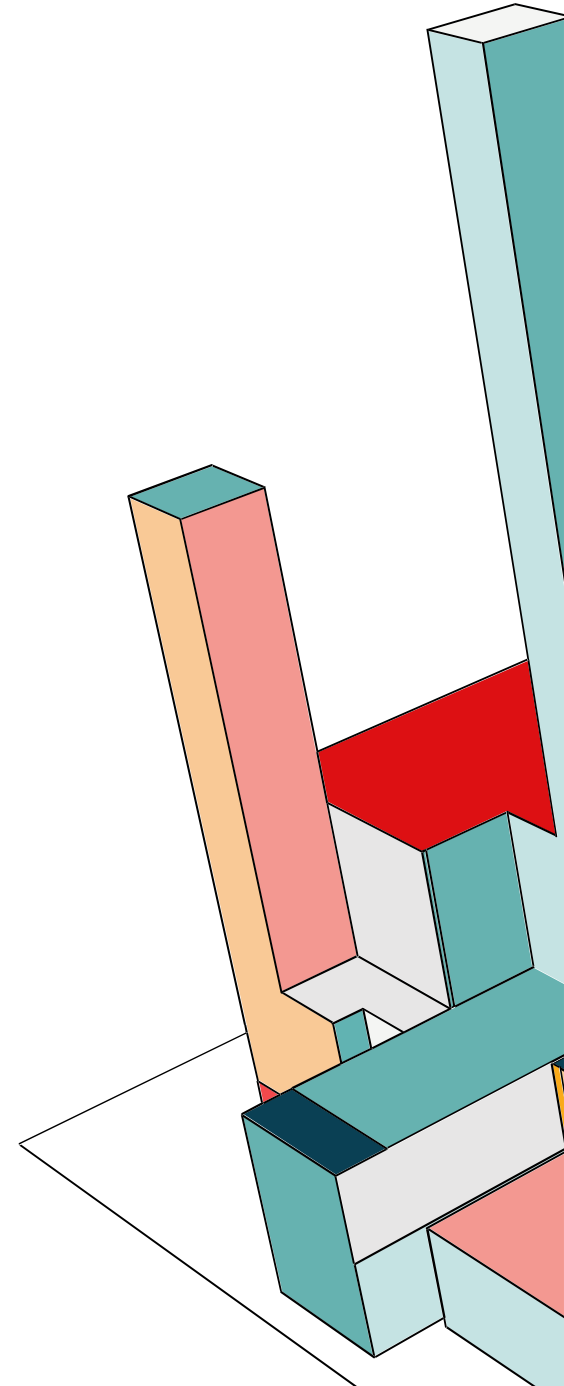
Kontrolliertes Zufalls-Experiment
(*randomized controlled trial*)



Durchführung Yeh et al.

Rekrutierung Teilnehmende:

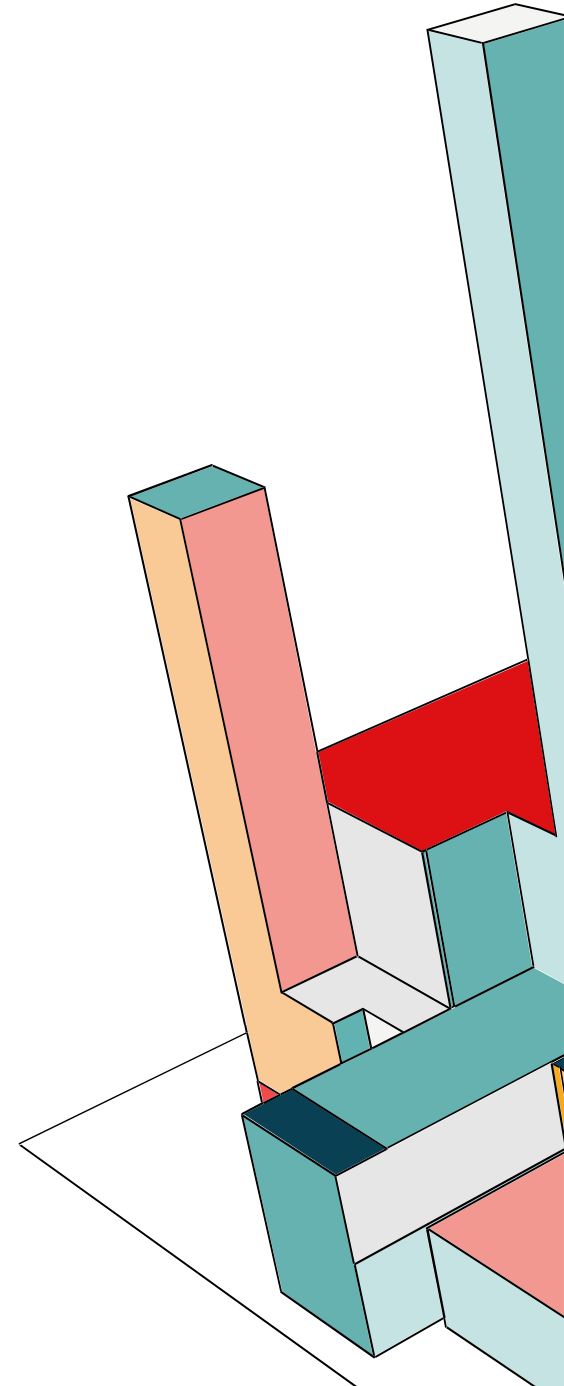
- LFZ-Passagier*innen, 18+ Jahre
- „eingeschätzt als rationale Entscheider*innen“
- „bereit, zufälliger Gruppe zugelost zu werden“



Durchführung Yeh et al. (2)

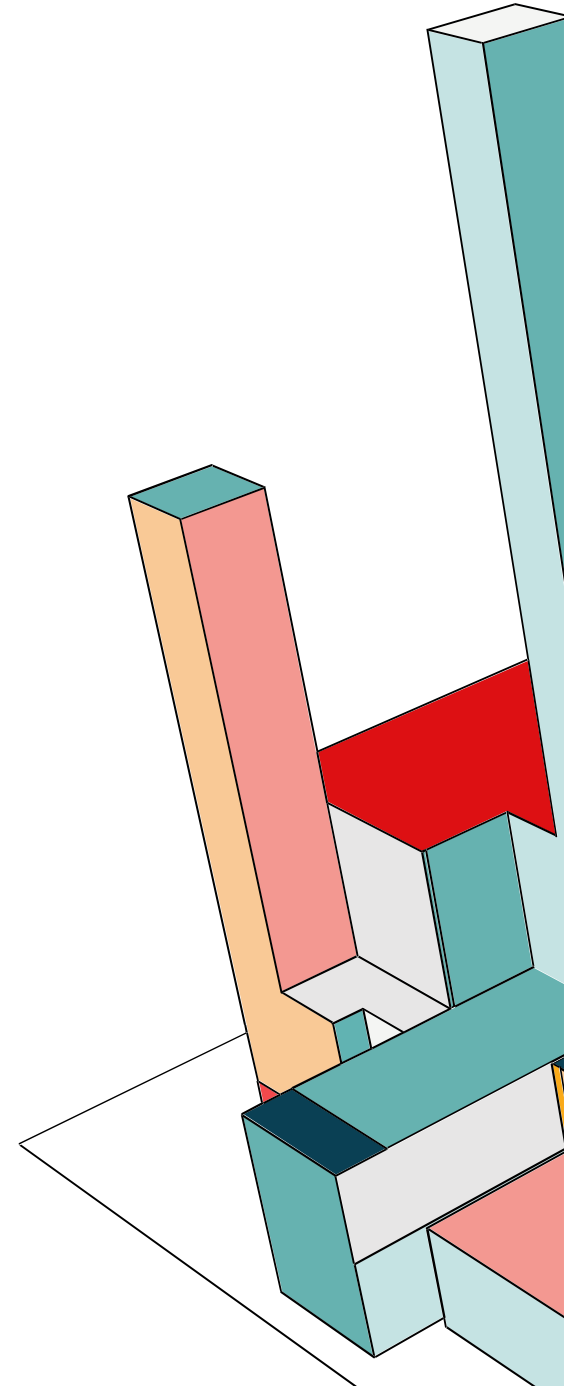
Rekrutierung Teilnehmende:

- LFZ-Passagier*innen, 18+ Jahre
- „eingeschätzt als rationale Entscheider*innen“
- „bereit, zufälliger Gruppe zugelost zu werden“
- **„die meisten Teilnehmenden waren an der Durchführung der Studie beteiligt“**



Durchführung Yeh et al. (3)

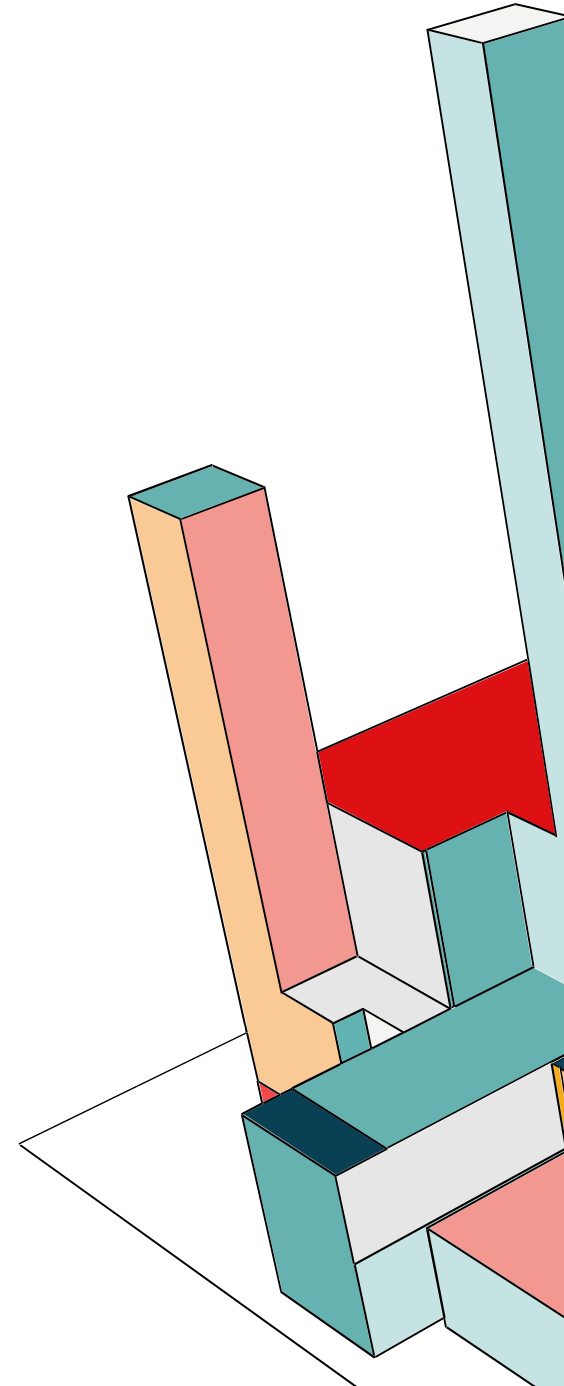
- Interventions-Gruppe: Fallschirm; Kontroll-Gruppe: leerer Rucksack.
- „beim Sprung wurden (...) Flughöhe und -geschwindigkeit erfasst“
- „Folge-Interview mit jede_r Teilnehmer_in zur Feststellung des Vital-Status und Verletzungen innerhalb 5 Minuten sowie 30 Tage nach Aufprall“



Analyse Yeh et al.

Statistische Auswertungen über

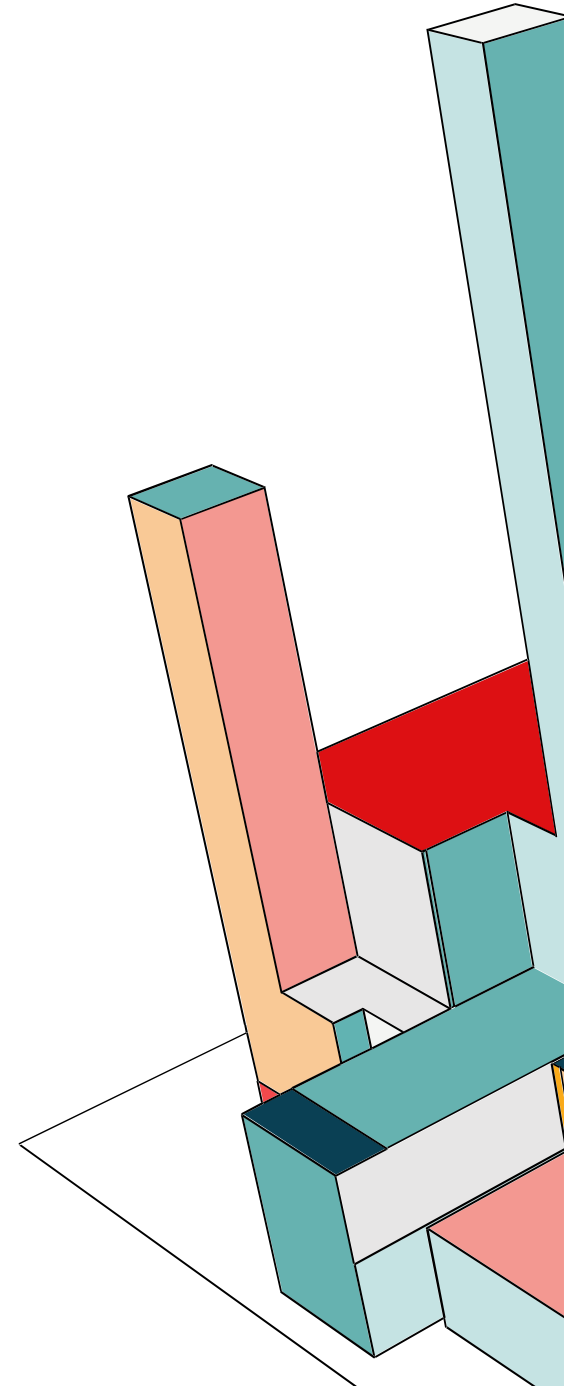
- Alter, Geschlecht, Ethnie, Größe, Gewicht
- Medizinische Vorgeschichte – Höhenangst, (familiäre) Erfahrung mit Fallschirmen, regelmäßige Flüge
- Internationaler vs. Inlandsflug, Typ LFZ, Geschwindigkeit, Höhe



Publikation / Ergebnisse

Yeh et al.

Hypothese: Fallschirme „sind der Kontroll-Bedingung (*Sprung ohne Fallschirm, Anm.*) bezüglich Verhinderung von Tod und Verletzungen überlegen“

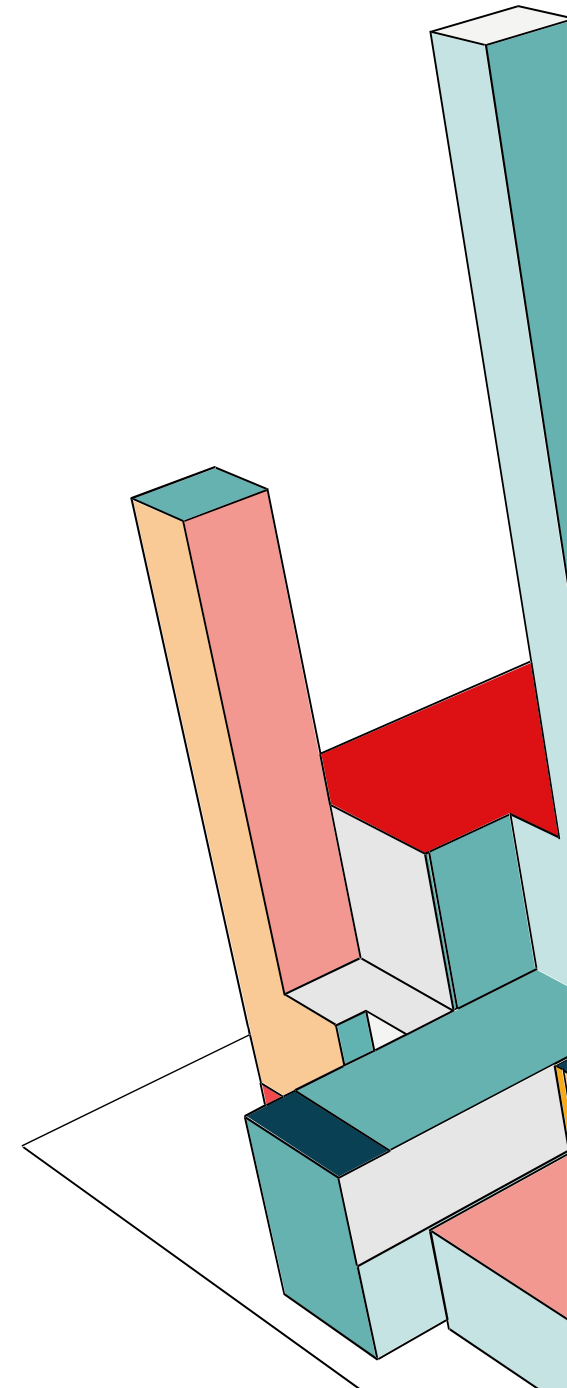


Publikation / Ergebnisse

Yeh et al. (2)

Hypothese: Fallschirme „sind der Kontroll-Bedingung (*Sprung ohne Fallschirm, Anm.*) bezüglich Verhinderung von Tod und Verletzungen überlegen“

„kein signifikanter Unterschied in den Ergebnissen der Gruppen 5 Minuten (0% für Fallschirm v 0% für Kontrolle; $P > 0.9$) bzw. 30 Tage nach Aufprall (0% für Fallschirm v 0% für Kontrolle; $P > 0.9$)“

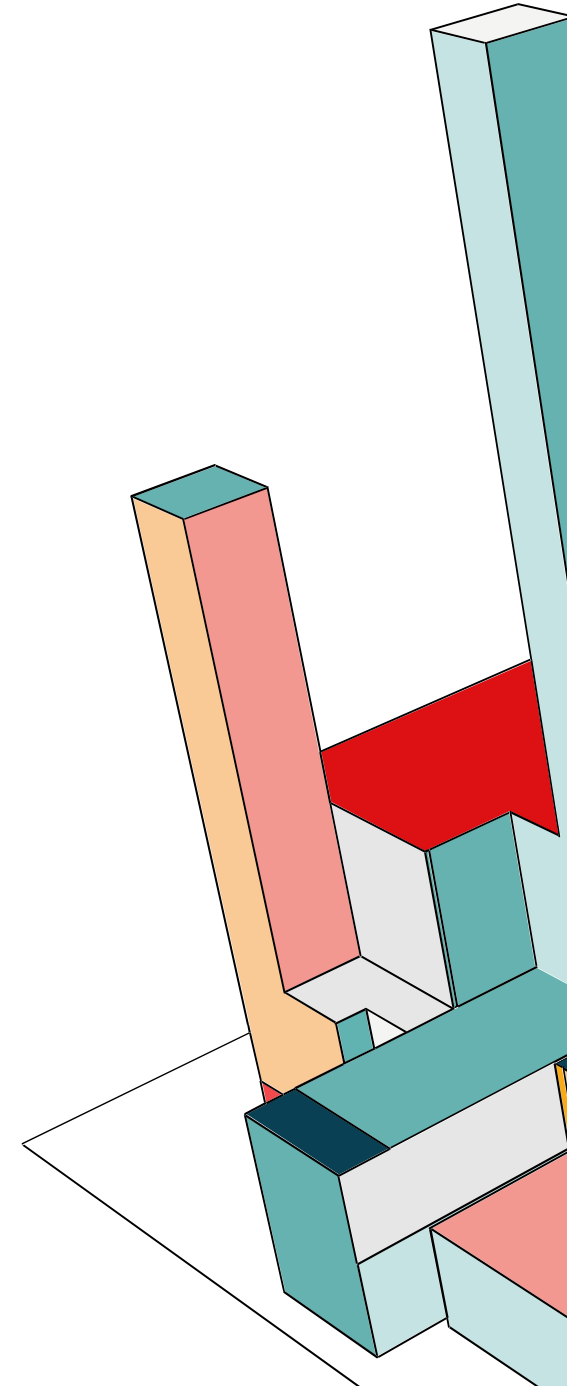


Yeh et al.

„Die Teilnehmer_innen, die sich schlussendlich angemeldet haben, haben unter dem Wissen zugestimmt, dass sie **aus einem ruhenden, am Boden stehenden LFZ** springen würden.“



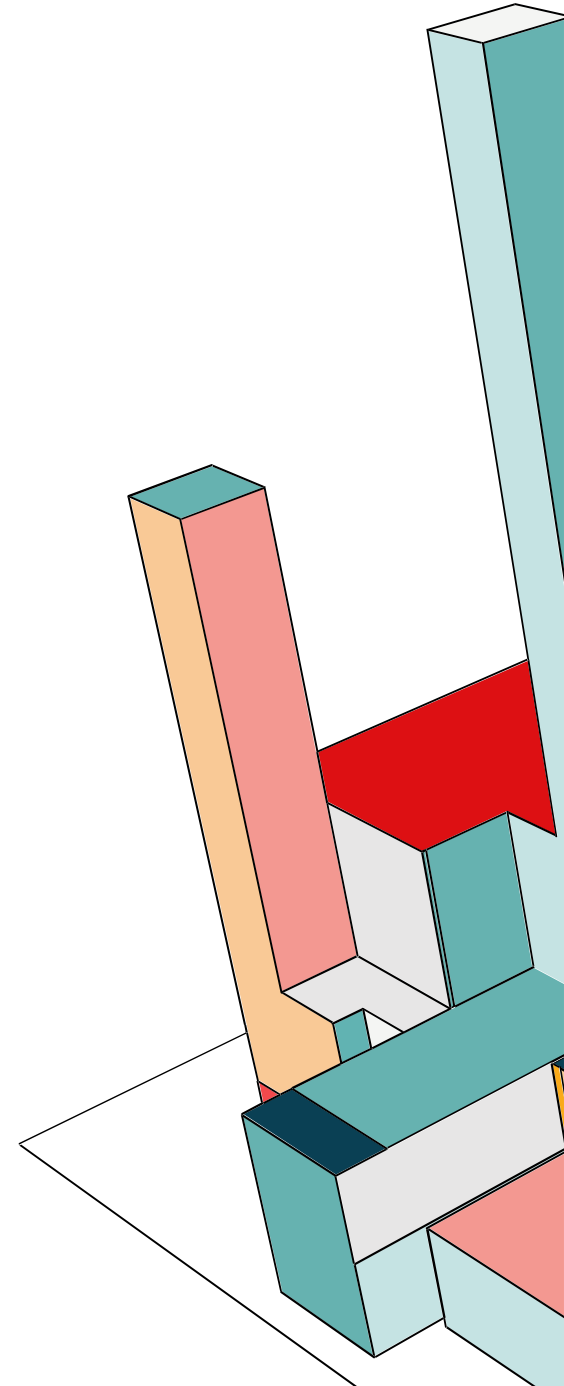
Fig 2 | Representative study participant jumping from aircraft with an empty backpack. This individual did not incur death or major injury upon impact with the ground



Publikation / Ergebnisse

Yeh et al. (3)

Die Studie „(...) zeigt, dass eine korrekte Interpretation eines kontrollierten Zufalls-Experiments erfordert, mehr als nur kurz über den Abstract zu lesen.“



Ergebnis Yeh et al.

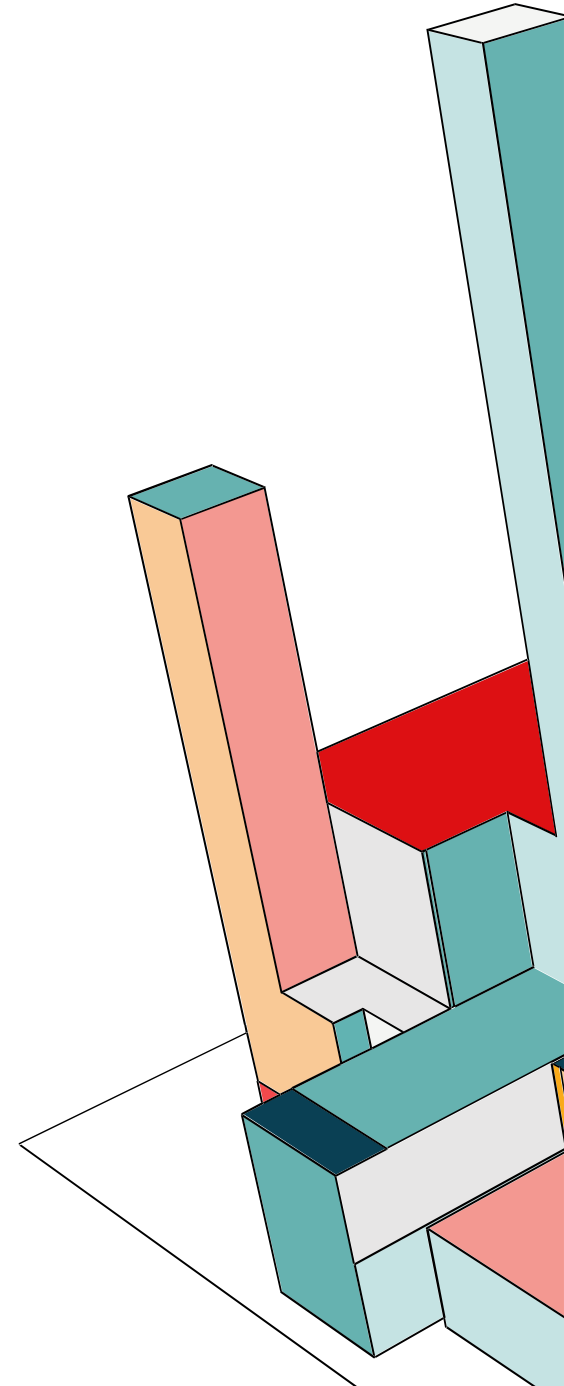
👍 Forschungsfrage

👍 Methode

👍 Durchführung

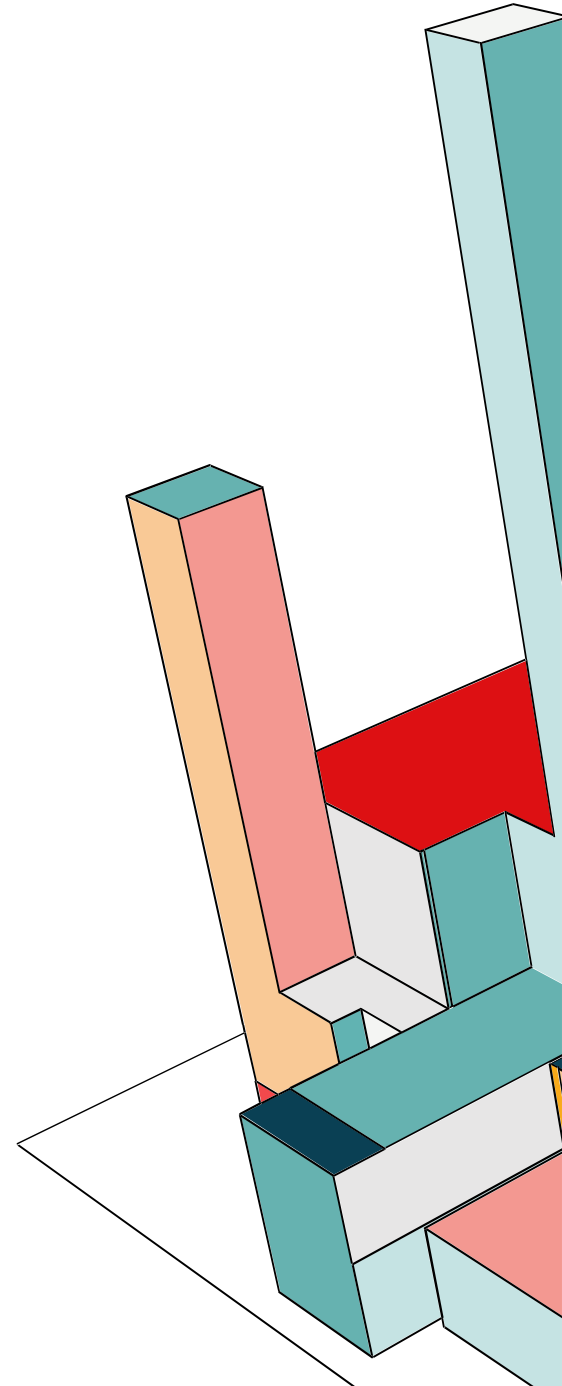
👍 Analyse

👍 Publikation



Zusammenfassung: Wie funktioniert denn jetzt Wissenschaft?

Es kommt drauf an.

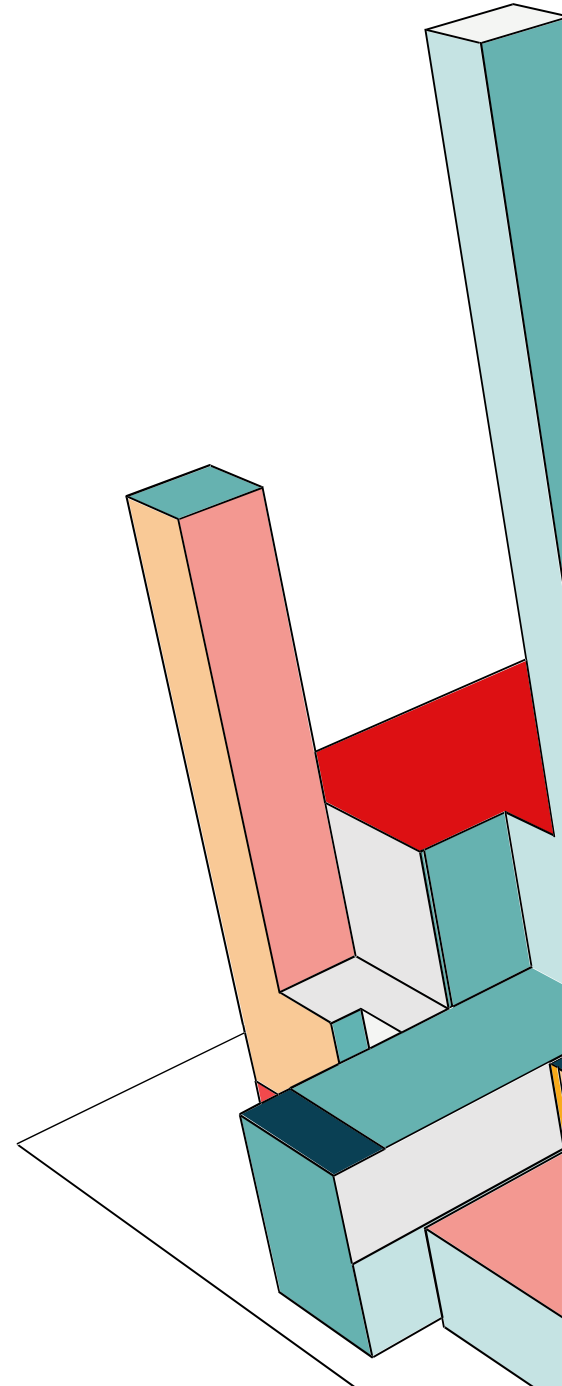


Zusammenfassung: Wie funktioniert denn jetzt Wissenschaft?

Es kommt drauf an.

Auf:

- Dokumentation.

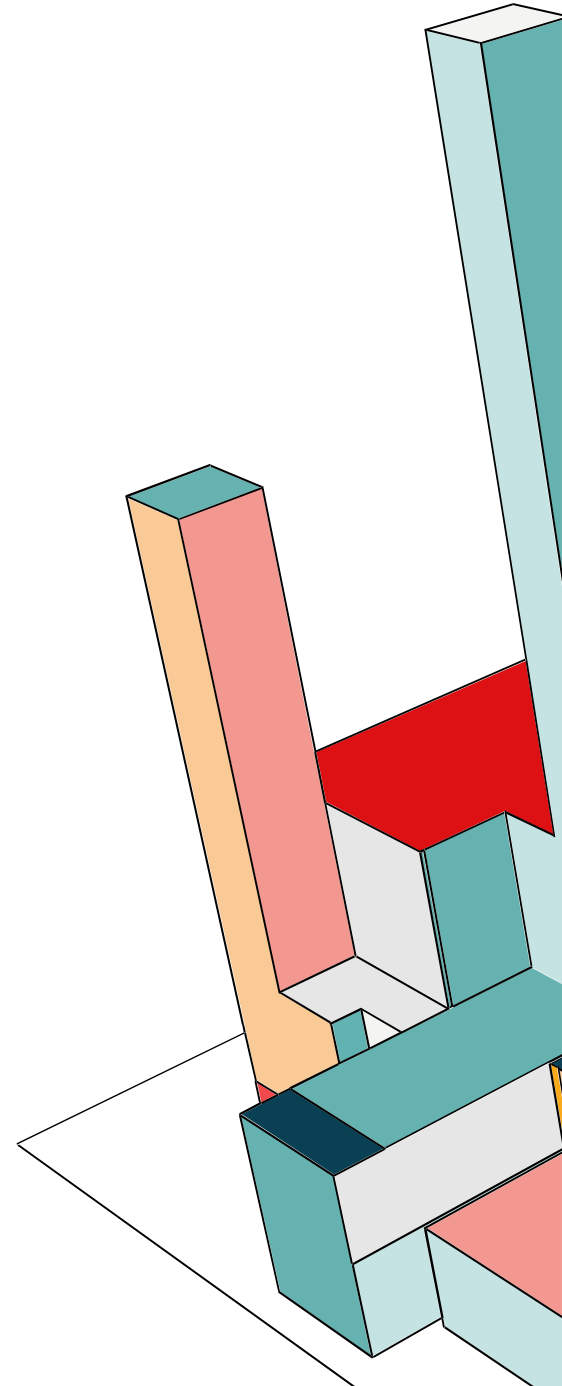


Zusammenfassung: Wie funktioniert denn jetzt Wissenschaft?

Es kommt drauf an.

Auf:

- Dokumentation.
- Dokumentation!

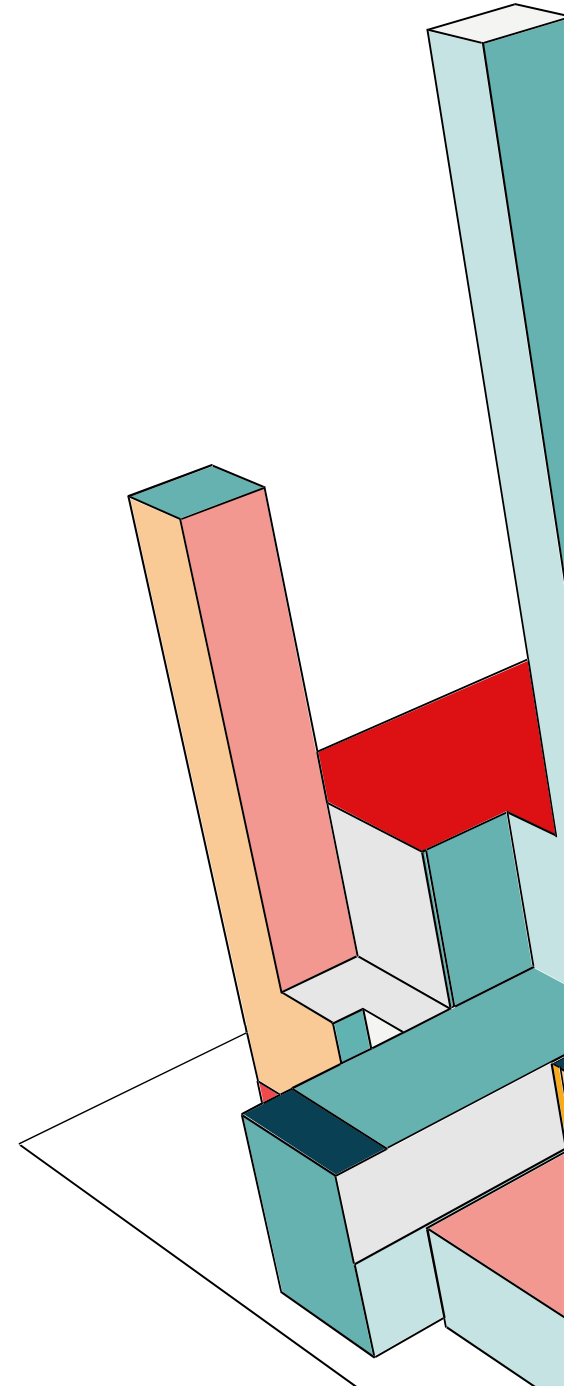


Zusammenfassung: Wie funktioniert denn jetzt Wissenschaft?

Es kommt drauf an.

Auf:

- Dokumentation.
- Dokumentation!
- Dokumentation!!



Noch Fragen?

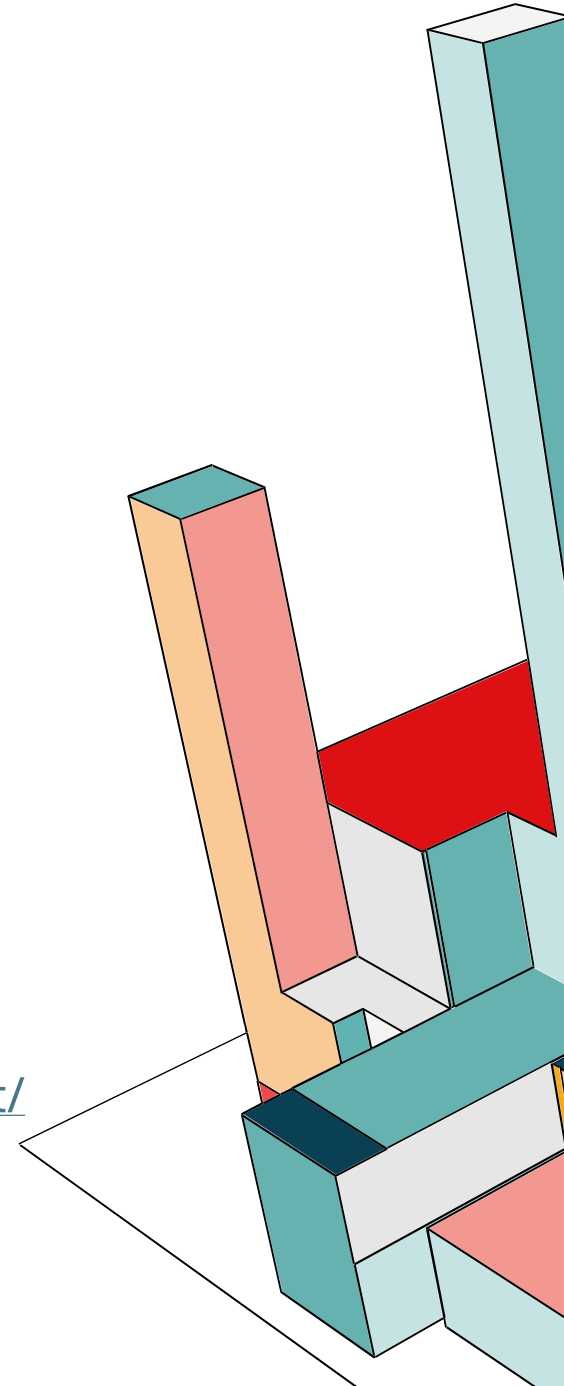
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<https://pascoda.fairydust.space>

Slides hier:

<https://pascoda.fairydust.space/2025/06/de-wie-geht-eigentlich-wissenschaft/>



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