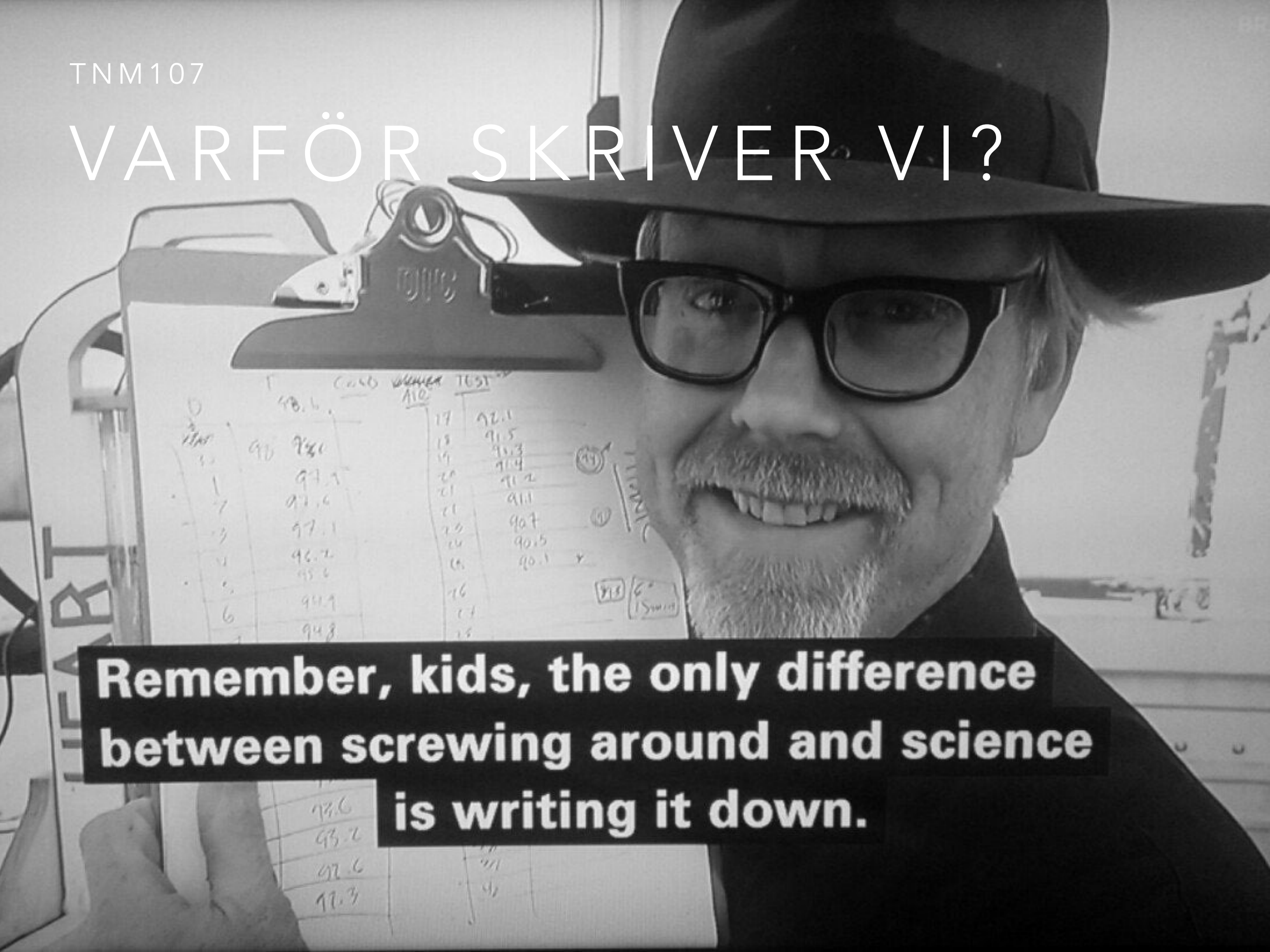


TNM107

METOD RESULTAT, DISKUSSION OCH SLUTSATS

TNM107

VARFÖR SKRIVER VI?

A black and white photograph of a man with a mustache and goatee, wearing a dark hat and thick-rimmed glasses. He is smiling slightly and holding a clipboard in front of his face. The clipboard has a metal clip at the top and a piece of paper with handwritten data. The data is organized into columns and rows, with some numbers circled and some text written in the margins. The man is wearing a dark jacket or shirt.

**Remember, kids, the only difference
between screwing around and science
is writing it down.**

VIKTEN AV ATT SKRIVA

- En bra genomförd studie som rapporteras dåligt "räknas" inte...
- Det kan finnas brister i:
 - forskningsdesignen
 - beskrivningen av deltagare
 - redogörelsen för proceduren
 - analysmetoden
- Varje sådan brist
 - försvårar att replikera studien
 - (kan) bidra till att läsaren blir negativt inställd till arbetet

ATT SKRIVA

- Syftet ska alltid vara att beskriva så fullständigt som möjligt
 - Svårt då beskrivningen ofta är lång
- Kompromisser krävs ofta
 - Så kort men detaljerat som möjligt
- Kan skapa "konflikter" med granskare
 - Vad du tycker är viktigt tycker kanske inte de
 - Vad de tycker är viktigt att ha med kanske inte du tycker

ATT SKRIVA EN RAPPORT

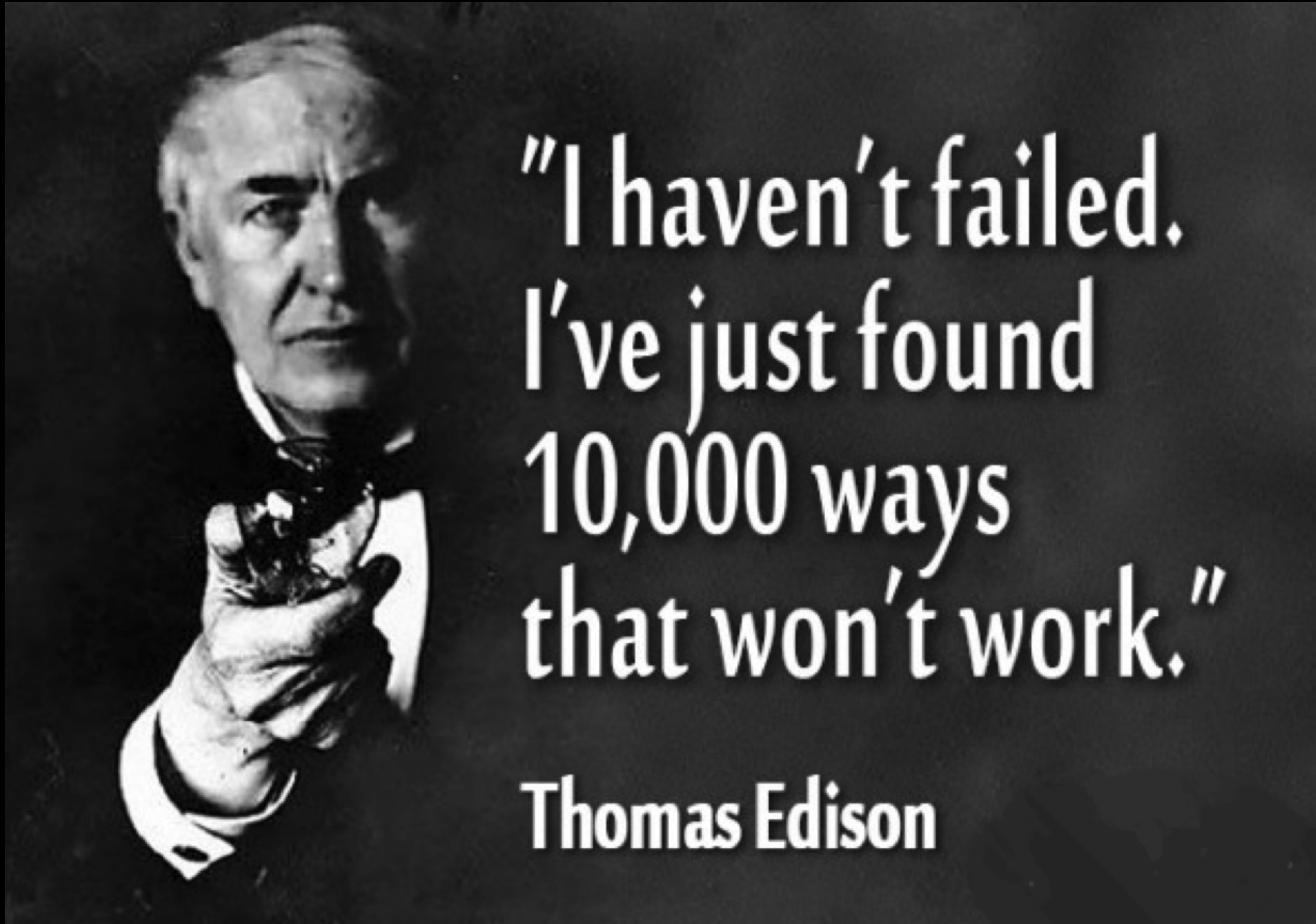
- Informationen du tillhandahåller bör presenteras på ett sätt som är vetenskapligt, objektivt, användbart, fullständigt och entydigt
- Terminologi är mycket viktig
 - tyvärr finns det ingen universell kod att tillämpa
- Definiera och var konsekvent
 - försök, uppgift, test, experiment, case...
 - Försöksperson, deltagare, experimentperson...

ATT SKRIVA EN RAPPORT

- Utelämna all överflödigt eller onödigt komplicerad information.
- Referera till (kompakta) figurer/tabeller
- Tidig allmän beskrivning av experiment, återkoppla tillbaka till detta senare, med fokus på vad som är nytt:
 - ...med samma grundläggande paradigm som i experiment 1...
 - ...I alla andra avseenden var den metod som användes identisk med den som användes i föregående experiment.

TNM107

ATT SKRIVA METOD



"I haven't failed.
I've just found
10,000 ways
that won't work."

Thomas Edison

ATT SKRIVA METODEN

- Ska beskriva alla relevanta delar
- Väl detaljerat
- Beskriv ett recept
 - Ingredienser
 - Handlingar, steg för steg
 - Förväntat resultat för varje steg

ATT SKRIVA METODEN

- Metoden kan innehålla
 - Forskningsdesign
 - Stimuli
 - Experiment och typ av data
 - Utrustning och miljö
 - Deltagare
 - Testprocedur
 - Beskrivning av dataanalysmetod



METODEN, FORSKNINGSDESIGN

The study was designed as a five factor mixed factorial design with three within-subject factors: visualization method (color map vs surface glyph), target glyph (top vs saddle) and block of trials. The between-subject factors were two, order of presentation of visualization method and order of presentation of target glyph. The experiment was performed over four separate sessions, each consisting of three blocks of three trials. In order to prevent effects of any use of search strategies, these blocks were counterbalanced with respect to target placement. The presentation order of the four separate sessions was counterbalanced using a Latin-square procedure. Half of the observers started with one of the two surface glyph conditions while the other half started with one of the two color map conditions. The main purpose of this was to minimize any systematic effects of the ordering, but it also provides an opportunity to statistically test if there were any effects of the different orderings. The design yielded a total of 36 trials per observer.

Forsell, Seipel and Lind.(2006). Surface glyphs for efficient visualization of spatial multivariate data. Information Visualization, (5) 112–124

ATT SKRIVA METODEN

- Metoden kan innehålla
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METODEN, STIMULI

As described above, each stimulus display was comprised of a 12×12 matrix of grid cells creating a total of 144 grid positions with a square size of $0.8 \times 0.8\text{m}$ subtending a visual angle of approximately 36×36 degrees. The matrix was divided into nine main areas, each with 16 grid positions. Each grid position was assigned a set of values that defined its shape and color. In one of the nine areas four grid cells contained a target surface patch. All other grid cells contained randomly sampled surface patches from the 27 possible combinations ($3 \times 3 \times 3$). There was one parameter controlling the random sampling; no other main area, of the eight target areas, could contain more than three target surface patches.

Forsell, Seipel and Lind.(2006). Surface glyphs for efficient visualization of spatial multivariate data. Information Visualization, (5) 2 112–124.

ATT SKRIVA METODEN

- Metoden kan innehålla
 - Forskningsdesign
 - Stimuli
 - Experiment och typ av data
 - Utrustning och miljö
 - Deltagare
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 - Beskrivning av dataanalysmetod



ATT SKRIVA METODEN

- Metoden kan innehålla
 - Forskningsdesign
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METODEN, UTRUSTNING

The experiment was carried out using a Windows workstation with a Pentium 4-based computer and a 21" LCD monitor set with a resolution of 1280×1024 pixels. The participants were seated in front of the monitor at a standard viewing distance of approximately 60 cm. A simplified version of the application with reduced functionality was implemented to present the stimuli using the full screen and allow interaction with the program using a mouse and a keyboard. To prevent visual disorientation in the 3D representation, rotation was restricted to be around the y-axis only (as described in the section 'Experiment' and shown in Figure 3).

Vrotsou, Forsell and Cooper (2006). 2D and 3D Representations for Feature Recognition in Time Geographical Diary Data. Information Visualization, 9(4), 263-276,

ATT SKRIVA METODEN

- Metoden kan innehålla
 - Forskningsdesign
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 - Deltagare
 - Testprocedur
 - Beskrivning av dataanalysmetod



METODEN, DELTAGARE

Twelve male observers, aged between 24 and 43 years, took part in the experiment. All but one were students or staff of the Swedish National Defense College (SNDC). They had no prior knowledge of the purpose of the experiment or the specific hypotheses tested. All observers had normal or corrected to normal vision. They received a small compensation for taking part in the experiment.

Forsell, Seipel and Lind.(2006). Surface glyphs for efficient visualization of spatial multivariate data. Information Visualization, (5) 112–124.

ATT SKRIVA METODEN

- Metoden kan innehålla
 - Forskningsdesign
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 - Experiment och typ av data
 - Utrustning och miljö
 - Deltagare
 - Testprocedur
 - Beskrivning av dataanalysmetod



METODEN, TESTPROCEDUR

First, background information was obtained from each participant concerning their age, sex, occupation and experience with information visualizations. Participants then reviewed written instruction material and completed a block of practice trials to learn the concepts and usage of the visualization and the two types of task to be performed. The administrator helped participants when needed during the training session to resolve any confusion about how to operate the software and carry out the tasks before the timed trials began. Participants were instructed that, although being timed they should try to be as accurate as possible in solving each task. Also, feedback was given on practice trials to ensure they would know the correct answers when identifying the stimuli patterns. The participants' task in any individual trial was to search the visualization and find the correct pattern (task A) or patterns (task B) as specified. The sequence of trials was self-paced.

Each trial was composed of a stimulus display and a response display. To switch from the stimulus display to the response display, the space key was pressed. Response times were measured from onset of the stimulus display until pressing space, thus not including the time to record the response. The display used for response in task B had five buttons numbered from 1–5. Each number corresponded to one of the five stimuli patterns creating a logical mapping between the images on the instruction material and the response display. As described earlier, the correct response in this task was [...] To initiate a new trial after giving a response, the participant clicked another button on the response display labelled "Continue" which was followed by a new button labeled "Start". A new visualization was then presented and the experiment continued. This procedure was used to ensure that the participants would not start a new timed trial until ready. This was of great importance in the task A session where the participants had each target for search presented on a separate target-card. These were numbered and arranged upside-down in a pile of 40 cards. Participants were instructed to turn the next card before clicking the "Start" button to initiate a new trial. Errors and reaction times for each trial were recorded. No feedback was provided.

After finishing all trials the participants then completed a subjective satisfaction questionnaire concerning the visualization. They responded to 16 statements and rated their satisfaction with the visualization using a Likert- scale ranging from 1 (strongly disagree) to 5 (strongly agree). To summarize, each participant completed 10 practice trials (five in each task type) and 55 experimental trials. A full experimental session lasted seventy minutes (including the introductory part).

ATT SKRIVA METODEN

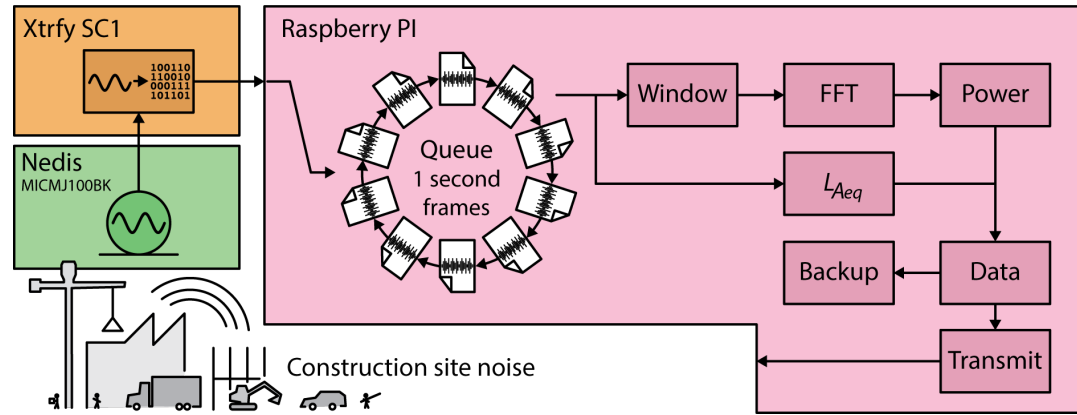
- Metoden kan innehålla
 - Forskningsdesign
 - Stimuli
 - Experiment och typ av data
 - Utrustning och miljö
 - Deltagare
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METODEN, ANALYSEMETOD

Data for 24 participants was analyzed. Due to equipment failure data from two of the participants were discarded. Descriptive statistics are presented in table 3. The response time data deviated significantly from the normal (Kolmogorov–Smirnov and Shapiro–Wilk). A logarithmic transformation was applied to the data, followed by another normality test, which then showed that no deviation was present. All the following statistical tests were performed on the transformed data.

“A t-test was performed. The response times for the 3Dm visualization were significantly faster than for the 2Dm visualization ($T = 2.4891$, $n = 10$, $p < 0.05$). The group mean value for the search times with 3Dm was 23.9 seconds with a standard deviation of 1.35 while in the 2Dm condition it was 37.2 seconds with a standard deviation of 1.61”.

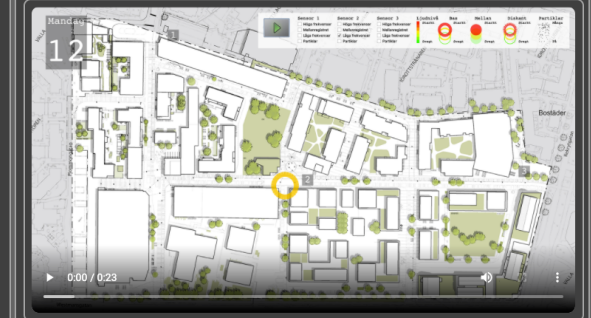


Sonification and visualization of data

Low frequencies

The video show sound measurements at sensor 2 and low frequencies. Low frequencies might come from vehicles or heavy equipment. These frequencies can be extra interrupting as they are more widely spread and harder to absorb compared to higher frequencies.

The louder the sounds are in the low frequencies, the broader the ring. The color of the ring depends on how loud all sounds are around the sensor. The pitch of the sound in the video depends on the frequency of the sounds at the sensor and the loudness of the sonification depends on the sound level around the sensor.



Please watch the video, and then rate your experience to the left.

You can watch the video multiple times before you answer.

Drag the slider towards the word that corresponds to your experience.

Understanding what the sonification represented was

hard easy

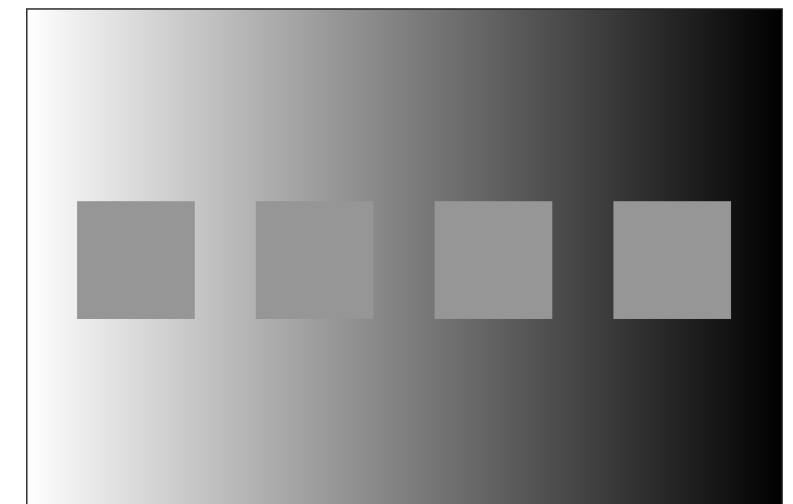
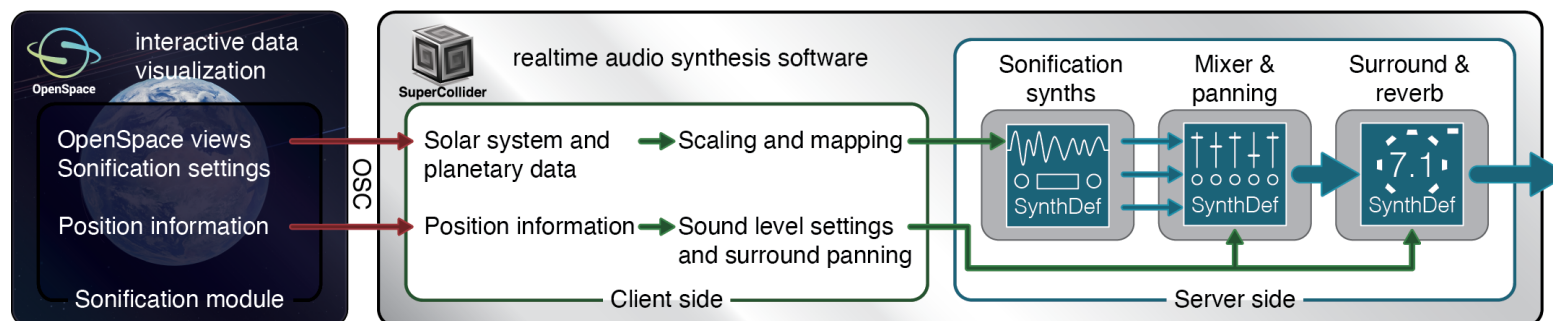
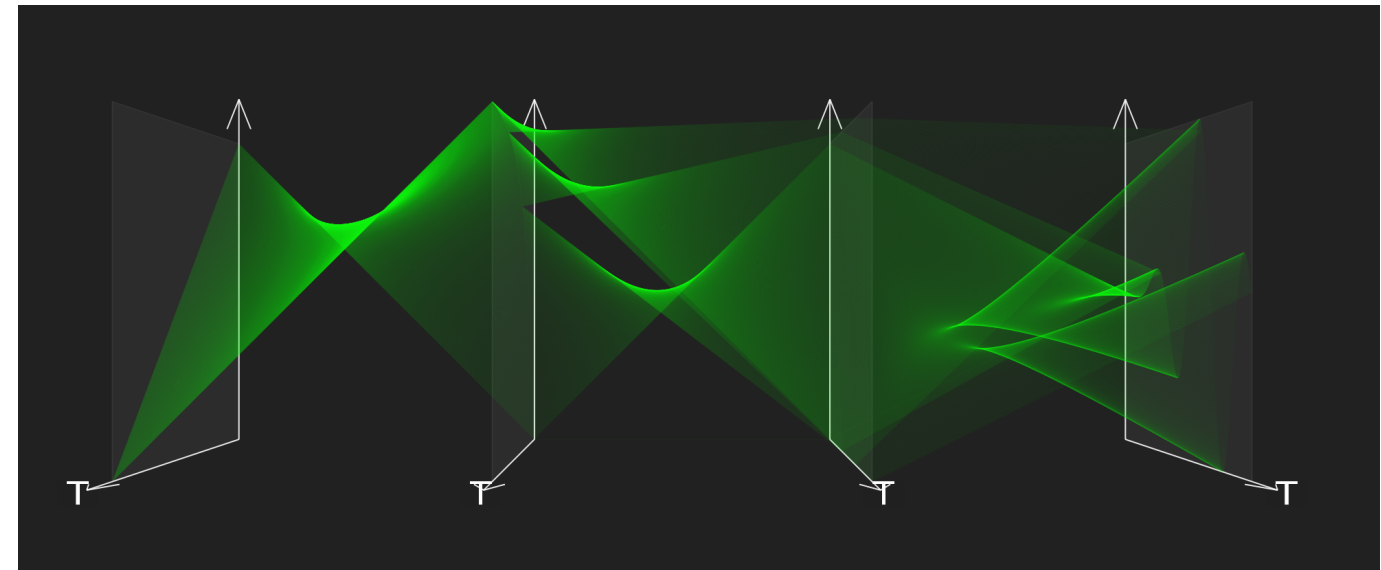
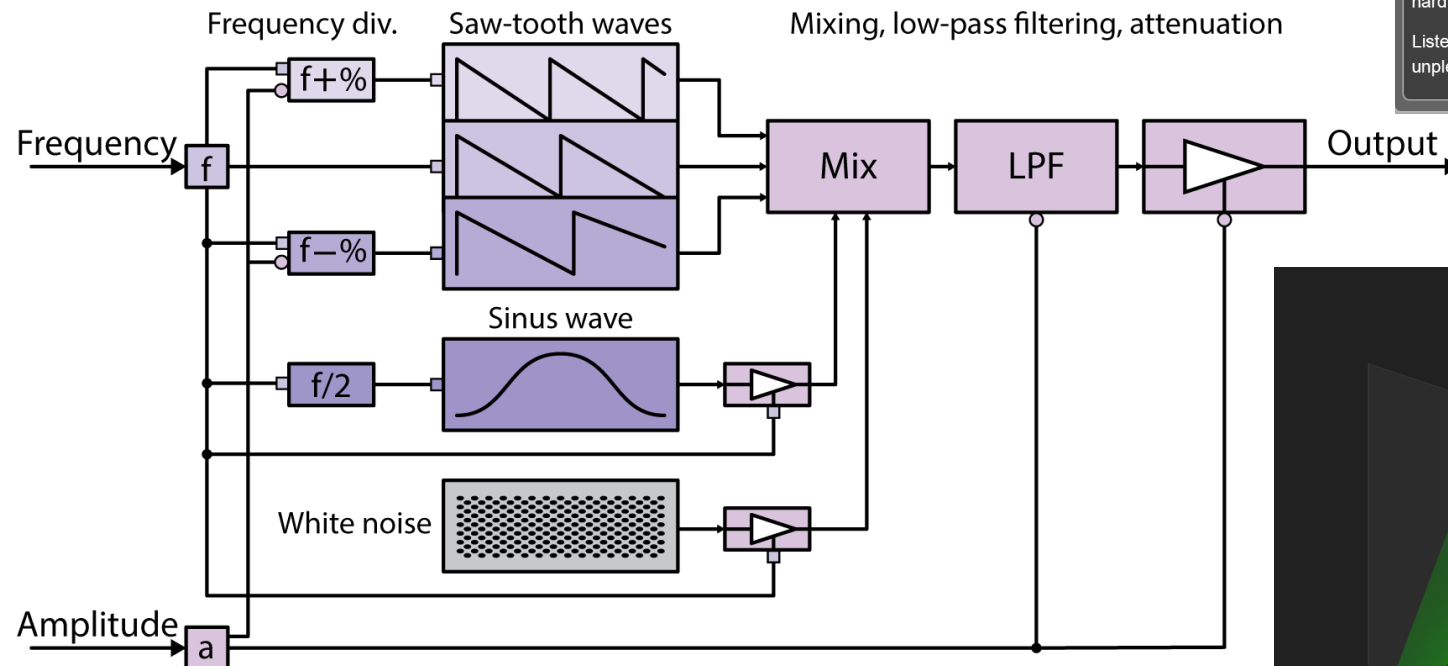
Understanding how the sounds changed according to the data was

hard easy

Listening to the sounds was

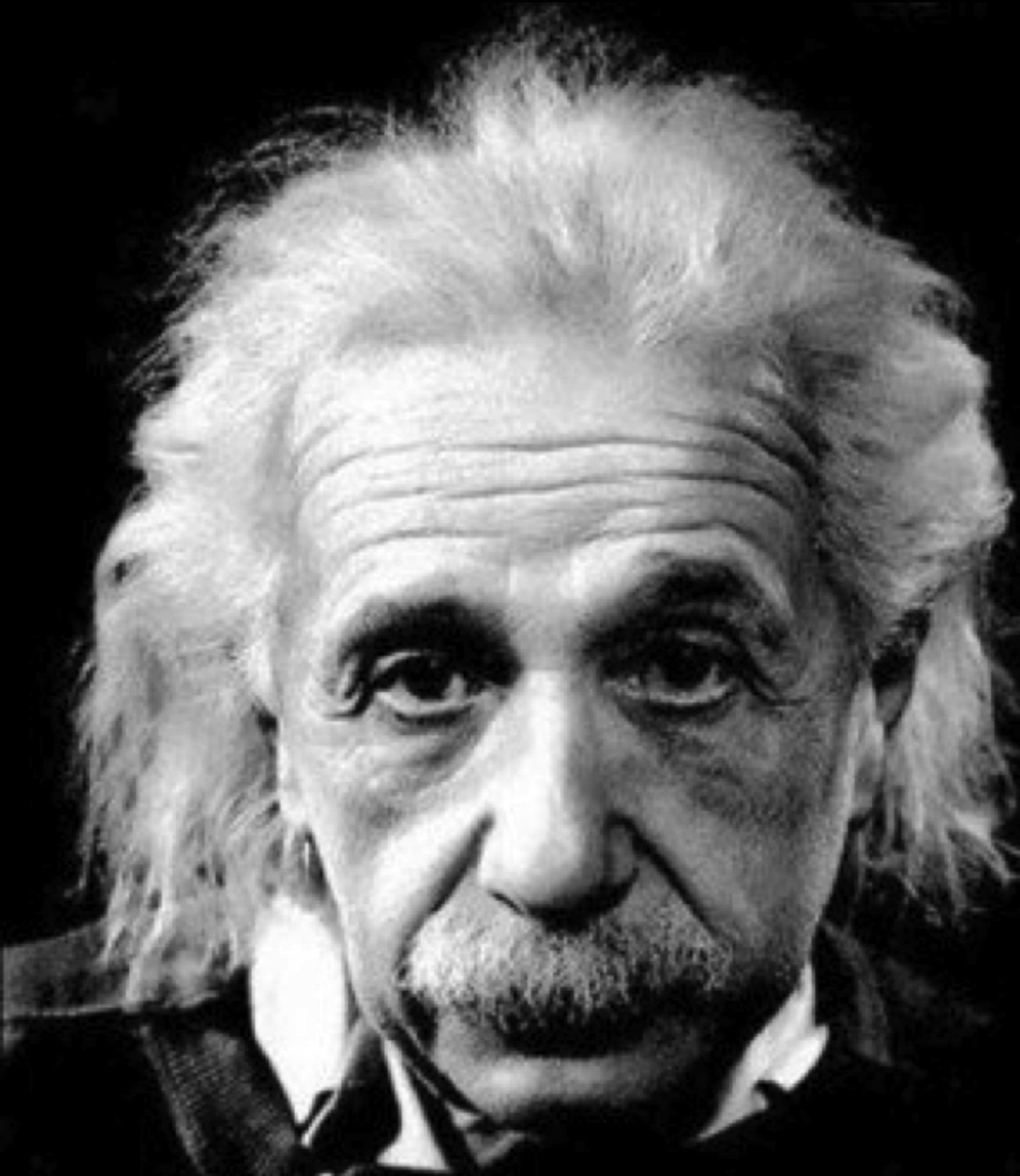
unpleasant pleasant

Continue



TNM107

SKRIVA RESULTAT



**ANYONE WHO
HAS NEVER MADE
A MISTAKE HAS
NEVER TRIED
ANYTHING NEW.**

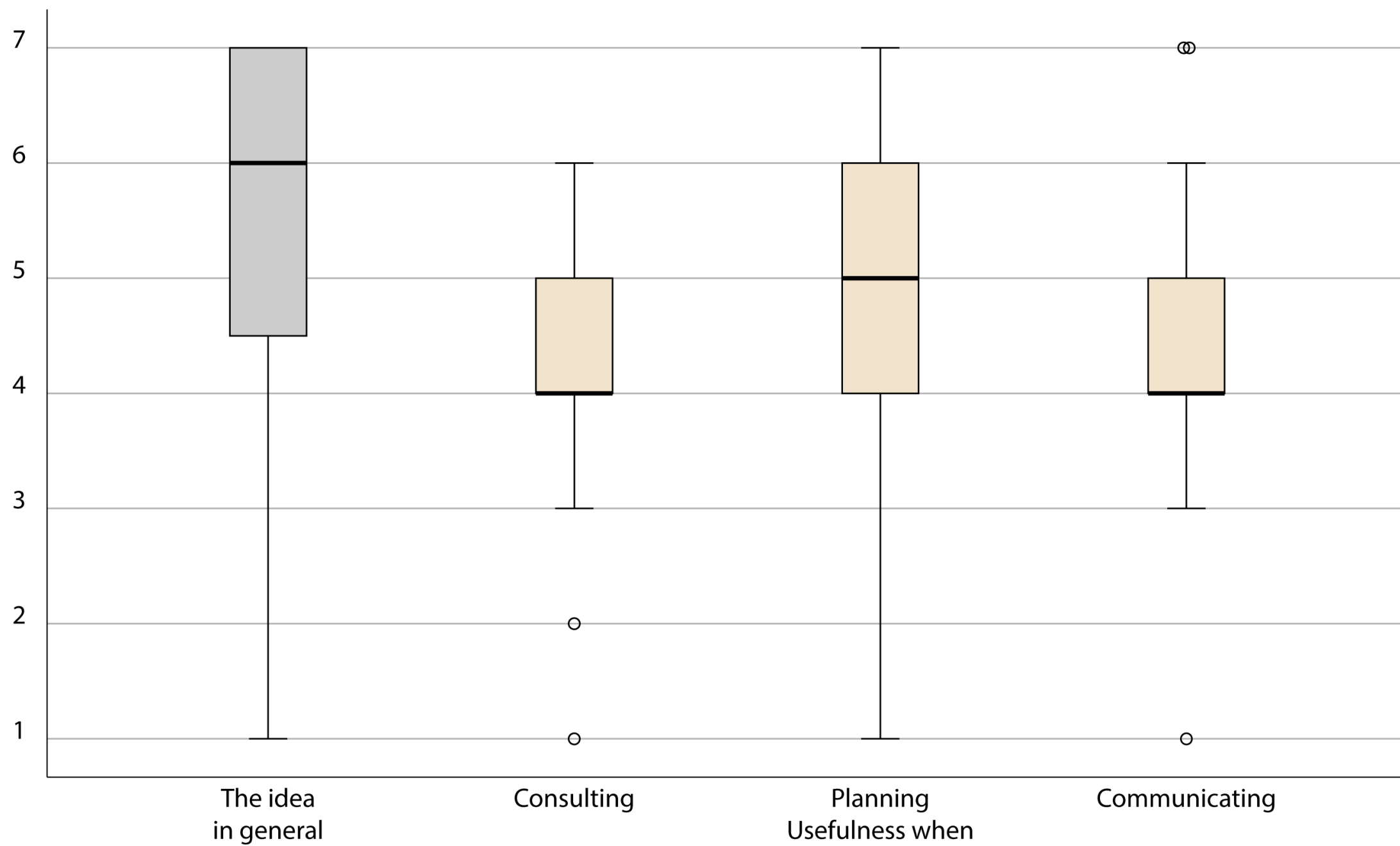
Albert Einstein

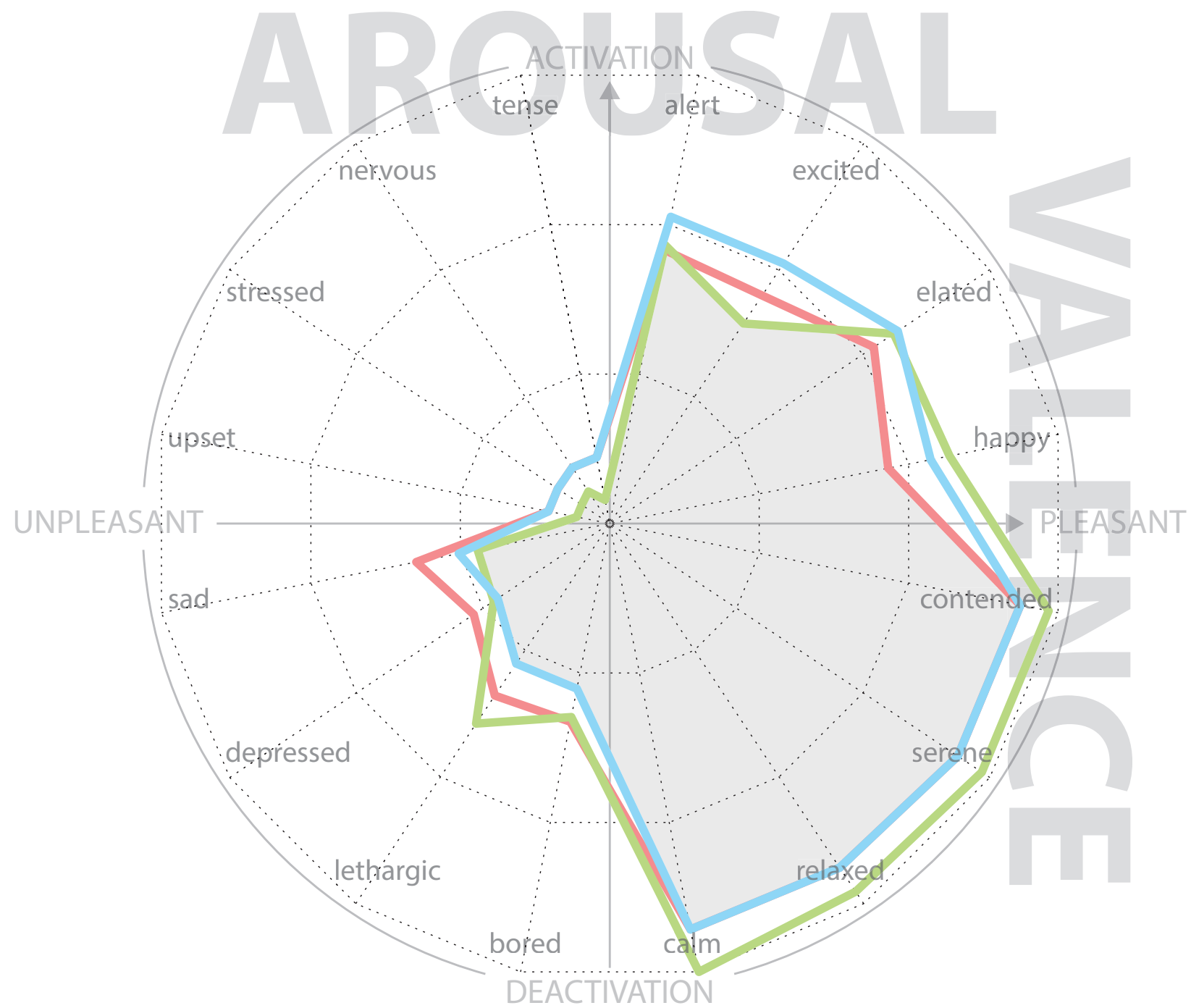
ATT SKRIVA RESULTATET

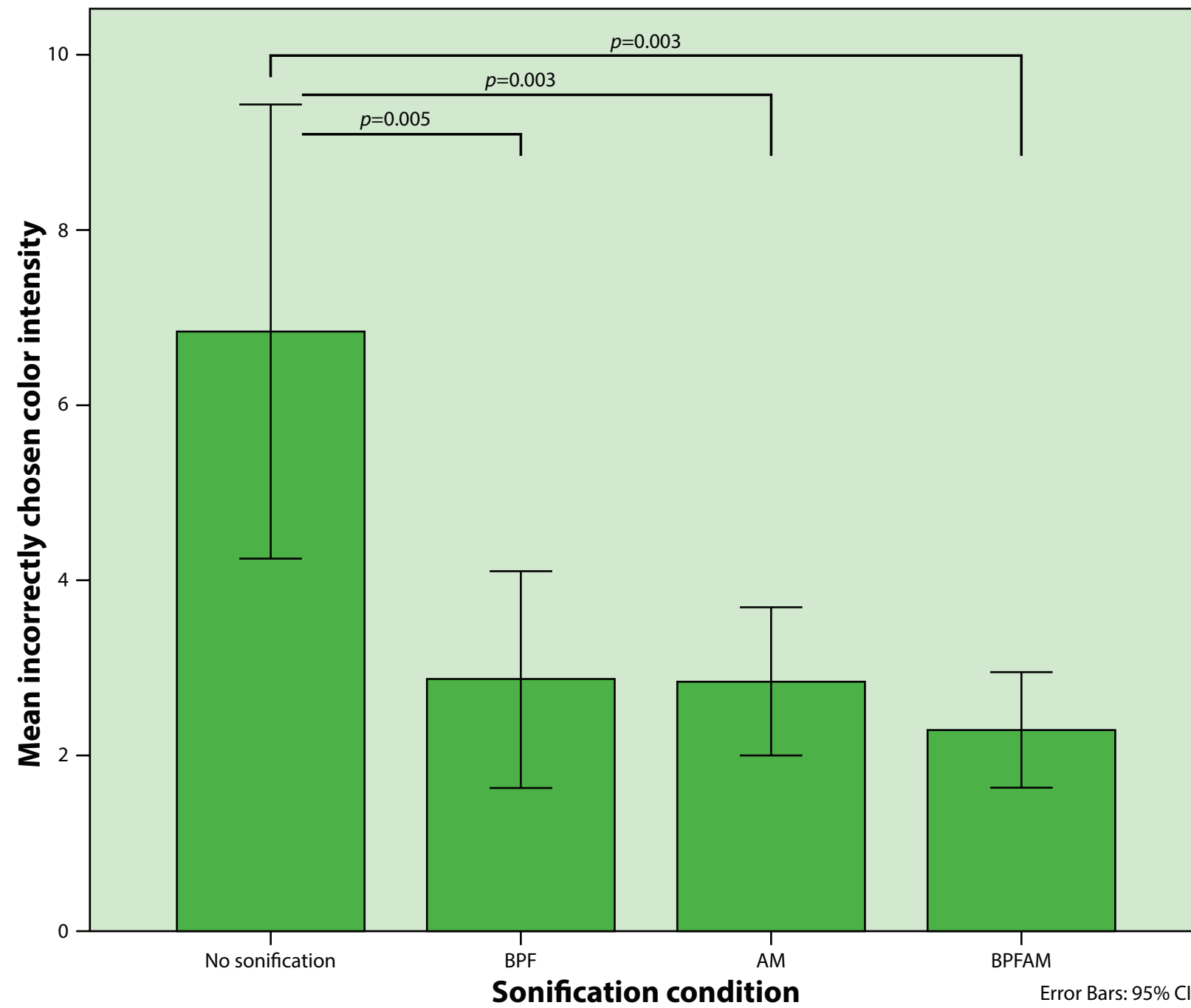
- Redogör för resultatet
 - klart, tydligt, och korrekt
- Presentera resultat, och beskrivande statistik
- Resonera inte
 - Undvik att analysera
 - Undvik att diskutera
 - Undvik att relatera till annan forskning

VAR EXAKT OCH KORREKT

- Resultatpresentationen ska överensstämma med metodbeskrivningen
- Resultatet ska presentera allt (?)
- Använd bra figurer och tabeller för att underlätta för läsaren
- Om resultatet är korrekt formulerat finns inga egna värderingar

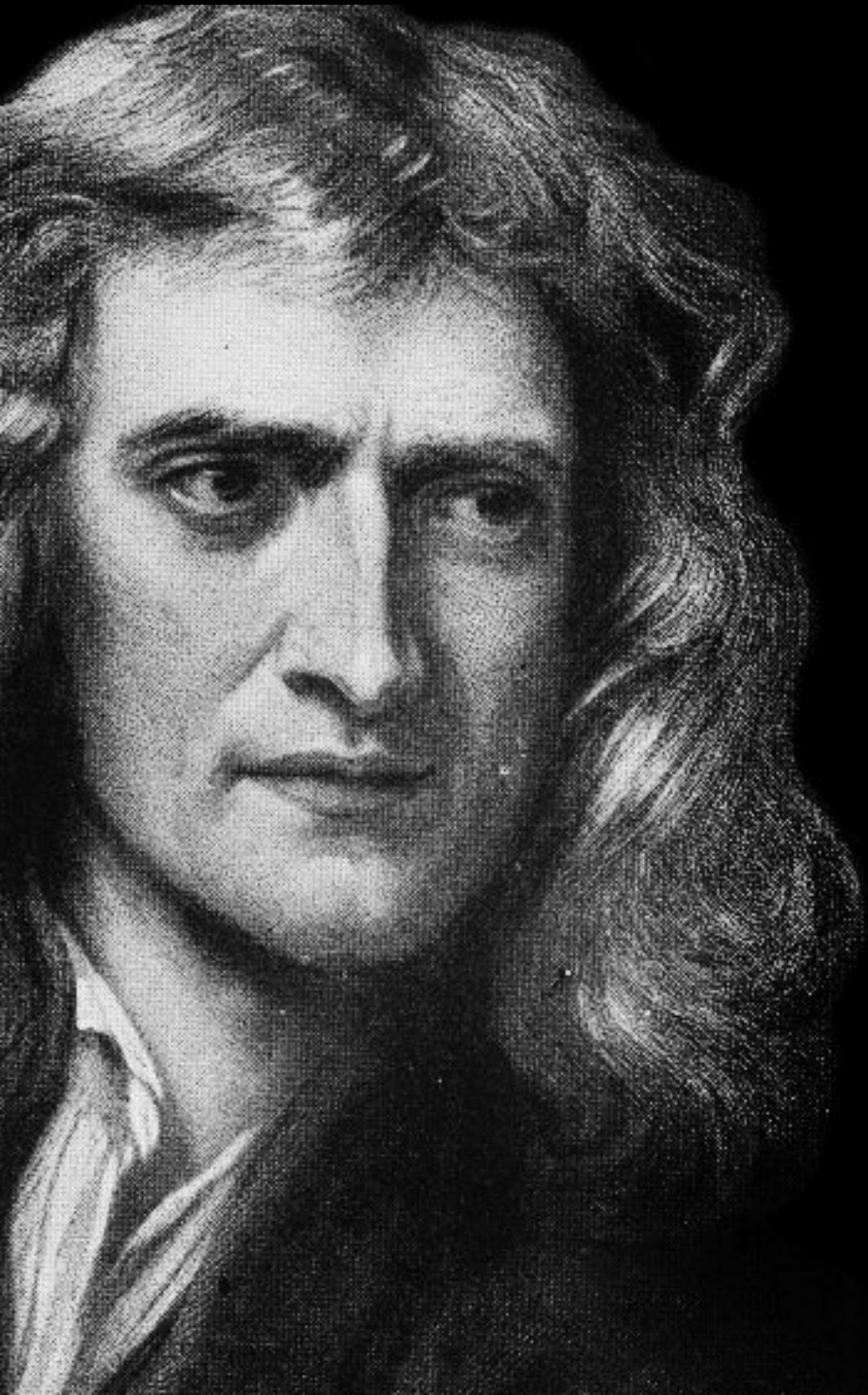






TNM107

SKRIVA DISKUSSION



What we know is a **drop**,
what we don't know is an **ocean**.

–Isaac Newton

ATT SKRIVA DISKUSSION

- Inled gärna med kort sammanfattning av syfte, metod och resultat (typ en mening)
- Dela upp diskussionen i bra avsnitt
- Diskutera resultatet
- Diskutera i relation till annat arbete

ATT SKRIVA DISKUSSION

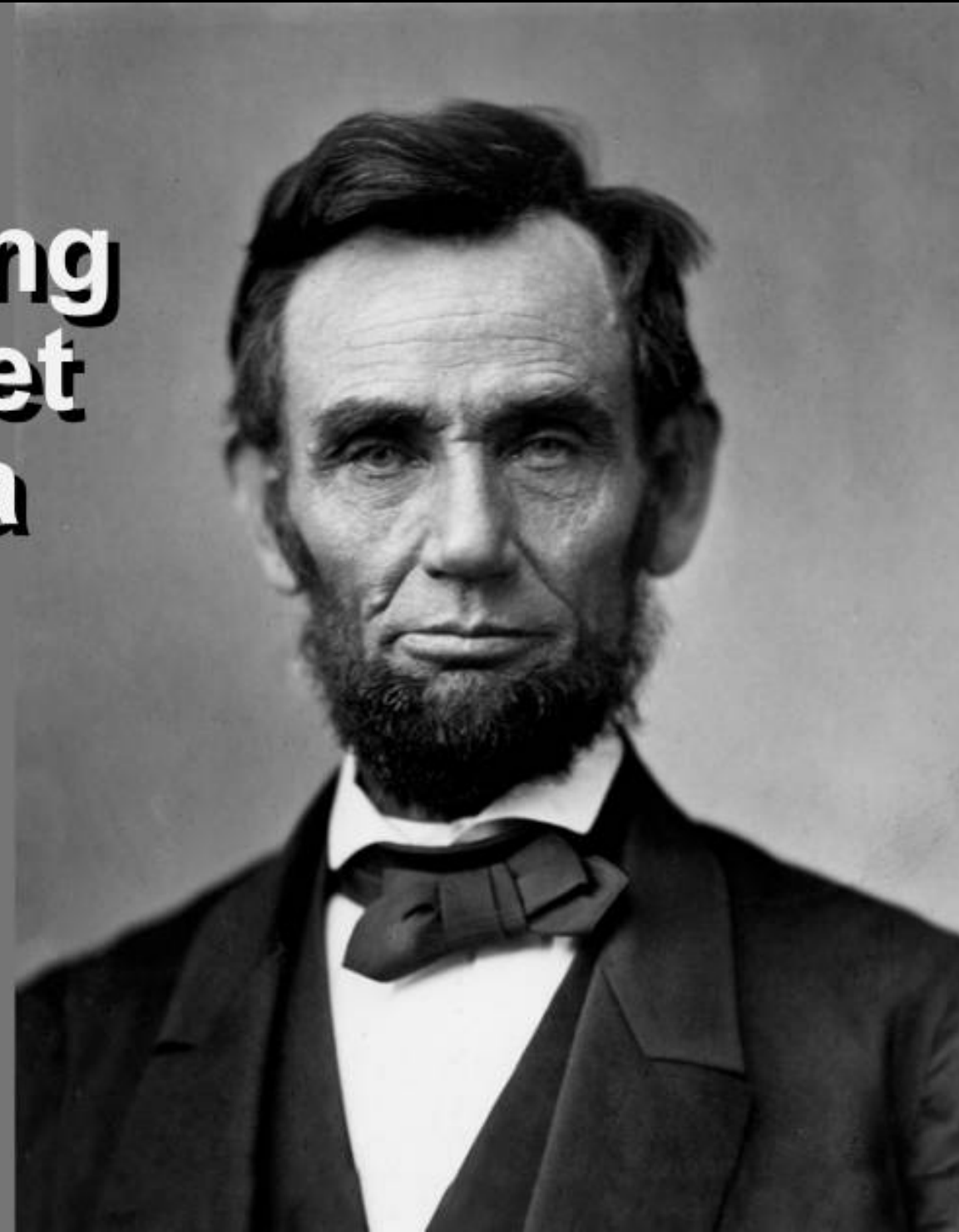
- Diskutera teori, relaterat arbete, metod
- Berör validitet och reliabilitet
se gärna mer tips här om detta:
<https://infovoice.se/validitet-och-reliabilitet/>
- Sätt arbetet i ett större sammanhang, framtida arbete

TNM107

SKRIVA SLUTSATS

**“Don’t believe everything
you read on the Internet
just because there’s a
photo with a quote
next to it.”**

— Abraham Lincoln



ATT SKRIVA SLUTSATSEN

- Inled gärna med kort sammanfattning av syfte, metod och resultat (en mening?)
- Slutsatsen är inte en sammanfattning
- Slutsatsen är den viktiga (nya) kunskapen
- Slutsatsen är "the take-home message"
- Slutsatsen besvarar forskningsfrågor
- Slutsatsen uppfyller syftet