

## ARTICLE SUPPLEMENTARY MATERIAL

### Supplementary Material - Using Knowledge Construction Theory to Evaluate Learning Processes: A Randomized Controlled Trial on Showing Gradually Built-up Concept Maps Alongside a Scientific Text

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#### ARTICLE HISTORY

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#### ABSTRACT

In the following the Supplementary Material of the paper - “Using Knowledge Construction Theory to Evaluate Learning Processes: A Randomized Controlled Trial on Showing Gradually Built-up Concept Maps Alongside a Scientific Text” is presented, including further details on the CoMap tool (Section 1), factual knowledge test (Section 2), and English test (Section 3). In the paper, we investigated a predefined concept map that builds up gradually while reading a scientific text in an experimental study, using knowledge construction theory as a framework to assess the kind of learning it facilitates. The intervention group ( $n=44$ ) exhibited significantly more knowledge construction ( $t(89)=1.94$ ,  $p=.029$ ,  $d=0.41$ ) than the control group ( $n=47$ ). Further analyses showed that the intervention supports basic knowledge construction levels, i.e., *simple processing* and *assimilation*, but not medium and complex levels. These results show that predefined concept maps can help make scientific texts cognitively accessible to a wide audience (e.g., to inform public debate). They further illustrate that assessing an intervention’s impact on knowledge construction levels can support context-specific decision-making about its suitability.

## 1. CoMap Tool

The CoMap tool is an interactive concept map. It represents concepts and their connections as a labeled graph. When a concept (=a node) is clicked, a definition of the concept is presented. In our experiment, the CoMap tool visualized core concepts and connections between concepts in the scientific text that participants were reading.

### 1.1. Short Video of CoMap Tool

A short video of the CoMap tool is available in the Supplementary Materials folder under the name *short-video-comap-tool.mp4*. In the video, the following actions are

shown (by captioning it is pointed out in the video when these actions take place): i) *gradual buildup of the concept map* - the CoMap tool is linked to the *reading view*, which shows checkboxes under each paragraph of the scientific text. Once the check box is checked, the corresponding essential concepts of this paragraph are presented in the CoMap tool. Resulting in a paragraph-by-paragraph buildup of the concept map. ii) *show/hide concept definitions* - when a concept is clicked, the corresponding definition will be shown; when it is clicked again, the definition will be hidden. iii) *move concepts and reset alignment* - the user can drag the concepts to a new position; pressing the “refresh” button will restore the original predefined alignment of the concept map.

## 1.2. Content of CoMap Tool

The concept map content, i.e., the concrete concepts and connections, including labels and definitions for the concepts, was created by two of the authors of the paper entitled “Predefined Concept Maps for Understanding Scientific Texts: An Experiment on Learning and Knowledge Construction” (hereafter referred to as “concept map authors”) based on the scientific text selected for this experiment Eerland et al. (2011). The concept map was self-created because of two reasons: i) no predefined concept map existed for this specific text, and ii) although there are tools for automatically creating concept maps from texts, we wanted to ensure high-quality (expert curated) concept map content. To identify the essential concepts the two concept map authors independently read the paper and extracted a list of concepts per paragraph that the authors considered essential for understanding the publication. In the following the authors compared the identified concepts and decided to remove some concepts considered less important in a reflective discussion. Then, the occurrence frequency of each concept was calculated by counting the words in the scientific text that referred to that concept. Concepts occurring less than three times in the publication were removed from the list of concepts. Finally, 24 concepts and their connections were selected. For each concept, the authors created a definition based on online sources in field of psychology (e.g., APA Dictionary of Psychology American Psychological Association (2018)), and more general sources (e.g., Wikipedia Wikipedia (2003c)). The complete concept map consisted of seven subsections. Two additional authors of this paper reviewed the concept map to ensure comprehensibility. The completely constructed concept map is shown in Figure 1; all concepts and their definitions are listed in Table 1.

Table 1.: Names, Respective Paragraph in Reading Material (Eerland et al., 2011), Definitions and Source of Definitions of Concepts

Concept Names	Respective Paragraph	Definition
body posture	Abstract	“Body posture refers to the positioning of a person’s body. Different positions are defined by different names, all of which are different body postures, for example upright or right-leaning standing posture.” (SureHire Inc., 2001)

mental- number-line theory		Abstract	“Humans seem to represent numbers as different visual-spatial shapes, usually along a horizontal continuum. Smaller numbers are aligned on the left side of the continuum and larger numbers on the right side - this is the so-called 'mental number line'.” (Galton, 1880, retrived from Nature, 2020)
magnitude es- timates		Introduction	“Magnitude estimation is a scaling method used to assess quantitative judgements and ratios. For example, if a reference brightness is given a value of 50, a light that is subjectively perceived as twice as bright should be given a value of 100.” (Psychology Wiki - Fandom, 2021)
memory re- trieval		Introduction	“Memory retrieval or recall is remembering information or events that were previously encoded and stored in the brain.” (The Human Memory 2010-2022, 2019)
anchoring- and- adjustment heuristic		Introduction	“The anchoring and adjustment heuristic describes cases in which a person uses a specific target number or value as a starting point, known as an anchor, and subsequently adjusts that information until an acceptable value is reached over time. Often, those adjustments are inadequate and remain too close to the original anchor, which is a problem when the anchor is very different from the true answer. For example: During hiring negotiations, a hiring manager might consider offering a very low compensation package to a prospective candidate. Now, because of the lower starting point, the candidate might end up joining at a relatively lower initial salary even after several rounds of negotiation.” (Dotdash Meredith Publishing - Investopedia, 2015)
anchoring pro- cess		Introduction	“The anchoring process is a cognitive bias whereby individual’s decisions are influenced by a particular reference point or 'anchor'. Once the value of the anchor is set, subsequent arguments, estimates, etc. made by an individual may change from what they would have otherwise been without the anchor. For example, an individual may be more likely to purchase a car if it is placed alongside a more expensive model (the anchor). Prices discussed in negotiations that are lower than the anchor may seem reasonable, perhaps even cheap to the buyer, even if said prices are still relatively higher than the actual market value of the car.” (Wikipedia, 2020)

experiment	Participants	“An experiment is a procedure carried out to support or refute a hypothesis or determine the efficacy or likelihood of something previously untried. Experiments provide insight into cause-and-effect by demonstrating what outcome occurs when a particular factor is manipulated. Experiments vary greatly in goal and scale but always rely on a repeatable procedure and logical or statistical analysis of the results.” (Wikipedia, 2003b)
participants	Participants	“A research participant is a person who voluntarily participates in human subject research after giving informed consent to be the subject of the research.” (Wikipedia, 2013)
right-handed	Participants	“Someone who is right-handed uses their right hand rather than their left hand for activities such as writing and sports, and for picking things up.” (Collins, 2018)
apparatus	Apparatus	“Apparatus broadly refers to the equipment, machinery, or structure that is necessary for a particular purpose or activity. In psychology, this means the equipment or measures that are necessary for conducting research.” (AlleyDog.com, 2020)
Wii Balance Board	Apparatus	“The Wii Balance Board is an accessory for the Wii and Wii U video game consoles. Unlike the usual balance board for exercises, it does not shake but tracks the user’s centre of balance.” (Wikipedia, 2007)
center of pressure (COP)	Apparatus	“In biomechanics, the centre of pressure (CoP) is the term for the point of application of the ground reaction force vector. Analysis of the centre of pressure is common in studies of human posture control and walking. It is assumed that changes in motor control are reflected in changes in the centre of pressure.” (Wikipedia, 2012a)
estimation questions	Materials	“Estimation questions, also known as guesstimate questions, are a broader category of interview questions that ask you to guess a particular value.” (Hacking the Case Interview, 2020)
magnitude of displacement	Materials	“Magnitude of displacement is equal to the linear distance between initial and final positions along the straight line joining two positions i.e. the shortest distance between initial and final positions.” (Singh, 2010), retrieved from (Rice University, OpenStax CNX, 2010)
analysis	Results	“Analysis is the process of breaking a complex topic or substance into smaller parts in order to gain a better understanding of it.” (Wikipedia, 2003a)

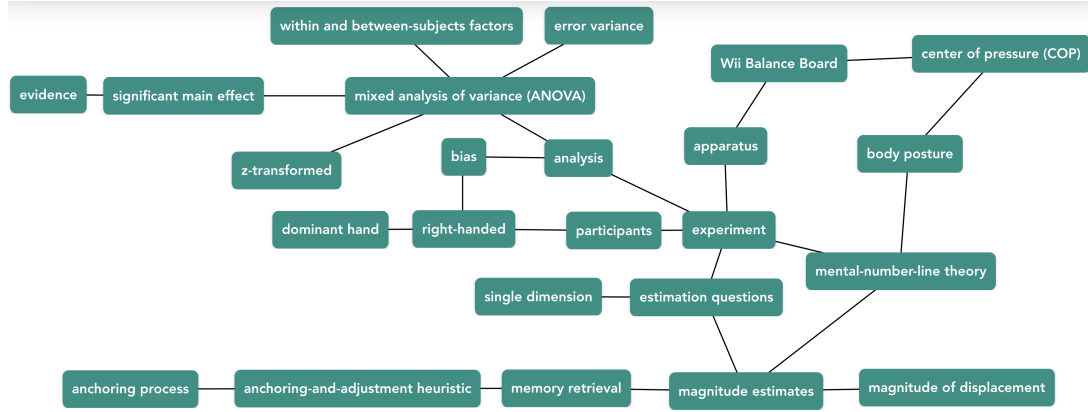
single dimension	Results	<p>“In physics and mathematics, a sequence of <math>n</math> numbers can specify a location in <math>n</math>-dimensional space. When <math>n = 1</math>, the set of all such locations is called a one-dimensional space or a single dimension. An example of a one-dimensional space is the number line, where the position of each point on it can be described by a single number.” translated from (Wikipedia, 2004a)</p>
within-between-subjects factors	and Results	<p>“A within-subjects variable or factor is an independent variable that is manipulated by testing each subject at each level of the variable. For example, if an experiment is conducted comparing four methods of teaching vocabulary, and if each of the four teaching methods is used with the same group of subjects, then the teaching method is a within-subjects variable.” (Rice University, Online Statistics Education, 2009) and “A between-subjects variable is one in which different groups of subjects are used for each level of the variable. If an experiment is conducted comparing four methods of teaching vocabulary, and if four different groups of subjects are used for each of the four teaching methods, then the teaching method is a between-subjects variable.” (Rice University, Online Statistics Education, 2010)</p>
mixed analysis of variance (ANOVA)	Results	<p>“In statistics, a mixed-design analysis of variance model, also known as a split-plot ANOVA, is used to test for differences between two or more independent groups while participants are undergoing repeated measures. Thus, in a mixed-design ANOVA model, one factor (a fixed effects factor) is a between-subjects variable. The other (a random effects factor) is a within-subjects variable. Thus, overall, the model is a type of mixed-effects model. A repeated measures design is used when multiple independent variables or measures exist in a data set, but all participants have been measured on each variable.” (Wikipedia, 2012b)</p>
z-transformed	Results	<p>“The z-transformation is a standardisation process that enables the comparison of values from different distributions. Using a distribution mean and standard deviation, the z-transformation transforms different distributions into a standardised distribution, allowing the comparison of different metrics. The standardised distribution includes z-scores, hence the term z-transformation.” (Banas, 2017)</p>

significant main effect	Results	“Main effect is a statistical term used in the context of experimental designs and their analysis. In statistical analysis of variance, which is often used to analyse data collected using a design of experiment, the main effect is the statistically significant difference between the levels of an independent variable (the variable used to try to model the dependent variable) and a dependent variable (the variable whose value depends on the effect of another variable), without taking into account the influence of other factors.” (Dew, 2008)
error variance	Results	“Error variance is the statistical variability in results caused by the influence of variables other than the independent (i.e. target) variable. It is difficult to control for all influencing variables.” (Penn State Departmental Web Space, 2013)
bias	Discussion	“Bias is disproportionate weight in favour of or against an idea or thing, usually in a closed-minded, prejudicial, or unfair way. Biases can be innate or learned. People may develop biases for or against an individual, a group, or a belief. In science and engineering, a bias is a systematic error.” (Wikipedia, 2004b)
dominant hand	Discussion	“In human biology, handedness is an individual’s preferential use of one hand, known as the dominant hand, due to it being stronger, faster or better in dexterity. The other hand, comparatively often the weaker, less dextrous or simply less subjectively preferred, is called the non-dominant hand.” (Wikipedia, 2004d)
evidence	Discussion	“Evidence for a statement is that which supports that statement. It is usually understood as an indication that the supporting statement is true (e.g. supported by data).” (Wikipedia, 2004c)

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## 2. Factual Knowledge Test

We designed a set of single-choice questions to test participants’ knowledge of the reading material (paper by Eerland et al., 2011) content. This test was given before reading the paper (pre-factual knowledge test) and after reading the paper (post-factual knowledge test). Altogether we developed twelve questions asking about essential concepts, statistics, theories, and their implications, resulting in twelve points. The questions and answer options are listed in Table 2. In our computational environment, the answer options were displayed in random order for each question and participant.



**Figure 1.** Complete Concept Map (Content of CoMap Tool).

Table 2.: Questions and Answer Options of the Factual Knowledge Test of the Reading Material Eerland et al. (2011), Respective Correct Answers are Depicted in Bold.

Question	Answer Options (Correct Answer in Bold)
What influences people's estimation of quantities?	1) Artistic skills, 2) Hearing ability, <b>3) Body posture</b> , 4) Gender
The Wii Balance board can measure:	1) Stress levels through skin conductivity, 2) The strength of the dominant leg, 3) Heartbeats per minute, 4) <b>Center of pressure - measure of body posture</b>
People associate _____ with their right visual field:	1) Fractions, 2) Smaller numbers, 3) Lower case letters, 4) Upper Case letters, <b>5) Larger numbers</b>
People associate _____ with their left visual field:	1) Fractions, <b>2) Smaller numbers</b> , 3) Lower case letters, 4) Upper Case letters, 5) Larger numbers
The directional bias describes:	1) The tendency to take the path that is on the side of the dominant hand at unfamiliar crossings, 2) The tendency, when asked to turn around, to turn to the side of the dominant leg, <b>3) The tendency to favour whichever hip is on the same side as the dominant hand when attempting to gain balance</b> , 4) The tendency to describe directions in very familiar places in an overly detailed way

Which transformation is commonly used in statistics to compare data between questions when the values of the different questions are not standardized?	1) Log-Transformation 2) Rotative Transformation, 3) Reflective Transformation, <b>4) Z-Transformation</b>
In which area does the “anchoring and adjustment heuristic” occur?	1) Bonding behavior in relationships, 2) Boat docking process, 3) Money exchange rates, <b>4) Estimations and biased decision making</b>
Which of these statements is true:	1) “Estimates of heights are significantly smaller when people lean to the right than when they lean to the left.”, 2) “Estimates of heights are significantly smaller when people lean to the right than when they are standing upright.”, 3) “Estimates of heights are significantly smaller when people stand upright than when they lean to the left.”, <b>4) “Estimates of heights are significantly smaller when people lean to the left than when they lean to the right.”</b>
With which statistical procedure is a “significant main effect” associated?	1) Pearson’s r correlation, 2) T-Test, <b>3) ANOVA</b> , 4) Mann-Whitney U Test
What is the “mental number line theory” describing?	1) people mentally represent numbers above and below a line with smaller numbers above and larger numbers below the line, 2) people mentally represent numbers along a line with smaller numbers on the right and larger numbers on the left, 3) people mentally represent numbers above and below a line with larger numbers above and smaller numbers below the line, <b>4) people mentally represent numbers along a line with smaller numbers on the left and larger numbers on the right</b>
What is the “magnitude of displacement”?	<b>1) distance, as measured directly between the start point and the end point</b> , 2) the half distance, as measured directly between the start point and the end point, 3) distance, as measured directly between the start point and the end point divided by 2, 4) distance, as measured directly between the start point and the end point multiplied by 2



Which of the following estimation questions could also be answered with values of non-natural numbers?

1) How many hours are 231 days?, 2) How many number-one hits had Michael Jackson had in Germany?, 3) How many grandchildren does Queen Beatrix of the Netherlands have?, 4) **How many hot dogs are eaten in the USA each year?**

### 3. English Test

To measure the English proficiency of the study participants, we used the Cambridge general English short test Cambridge University Press & Assessment (2017b). The test consists of 25 questions that test general English abilities and is scored along the Cambridge English and recommendation scales (Cambridge University Press & Assessment, 2017a). Questions and answer options are listed in Table 3. In our computational environment, the answer options were displayed in random order for each question and participant.

Table 3.: Questions and Answer Options of Cambridge General English Short Test (Cambridge University Press & Assessment, 2017b), Respective Correct Answers are Depicted in Bold.

Question	Answer Options (Correct Answer in Bold)
Can I park here?	1) <b>Only for half an hour.</b> 2) Sorry, I did that. 3) It's the same place.
What colour will you paint the children's bedroom?	1) <b>We can't decide.</b> 2) I hope it was right. 3) It wasn't very difficult.
I can't understand this email.	1) <b>Would you like some help?</b> 2) Don't you know? 3) I suppose you can.
I'd like two tickets for tomorrow night.	1) <b>I'll just check for you</b> 2) How much did you pay? 3) Afternoon and evening.
Shall we go to the gym now?	1) <b>I'm too tired.</b> 2) It's very good. 3) Not at all.
His eyes were ..... bad that he couldn't read the number plate of the car in front.	1) <b>so</b> 2) such 3) too 4) very
The company needs to decide ..... and for all what its position is on this point.	1) <b>once</b> 2) here 3) first 4) finally

Don't put your cup on the ..... of the table – someone will knock it off.	1) <b>edge</b> 2) outside 3) boundary 4) border
I'm sorry - I didn't ..... to disturb you.	1) <b>mean</b> 2) hope 3) think 4) suppose
The singer ended the concert ..... her most popular song	1) <b>with</b> 2) by 3) as 4) in
Would you mind ..... these plates a wipe before putting them in the cupboard?	1) <b>giving</b> 2) making 3) doing 4) getting
I was looking forward ..... at the new restaurant, but it was closed.	1) <b>to eating</b> 2) to eat 3) to have eaten 4) eating
.... tired Melissa is when she gets home from work, she always makes time to say good-night to the children.	1) <b>No matter how</b> 2) Whatever 3) However much 4) Although
It was only ten days ago ..... she started her new job.	1) <b>that</b> 2) then 3) since 4) after
The shop didn't have the shoes I wanted, but they've ..... a pair specially for me.	1) <b>ordered</b> 2) booked 3) commanded 4) asked
Have you got time to discuss your work now or are you ..... to leave?	1) <b>about</b> 2) thinking 3) round 4) planned
She came to live here ..... a month ago.	1) <b>almost</b> 2) quite 3) beyond 4) already
Once the plane is in the air, you can ..... your seat belts if you wish.	1) <b>unfasten</b> 2) undress 3) unlock 4) untie
I left my last job because I had no ..... to travel.	1) <b>opportunity</b> 2) place 3) position 4) possibility
It wasn't a bad crash and ..... damage was done to my car.	1) <b>little</b> 2) small 3) light 4) mere
I'd rather you ..... to her why we can't go.	1) <b>explained</b> 2) would explain 3) to explain 4) will explain

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Before making a decision, the leader considered all ..... of the argument.    1) **sides** 2) features 3) perspectives 4) shades

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This new printer is recommended as being ..... reliable.    1) **highly** 2) greatly 3) strongly 4) readily

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When I realised I had dropped my gloves, I decided to ..... my steps.    1) **retrace** 2) regress 3) resume 4) return

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Anne's house is somewhere in the ..... of the railway station.    1) **vicinity** 2) region 3) quarter 4) district

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#### References

- AlleyDog.com. 2020. AlleyDog.com - Appartus. Retrieved September 20, 2022 from <https://www.alleydog.com/glossary/definition.php?term=Appartus>
- American Psychological Association. 2018. APA Dictionary of Psychology. Retrieved July 7, 2022 from <https://dictionary.apa.org/>
- John Banas. 2017. The SAGE Encyclopedia of Communication Research Methods. <https://doi.org/10.4135/9781483381411>
- Cambridge University Press & Assessment. 2017a. The Cambridge English Scale. Retrieved June 20, 2022 from <https://www.cambridgeenglish.org/exams-and-tests/cambridge-english-scale/>
- Cambridge University Press & Assessment. 2017b. General English - Test your English. Retrieved June 20, 2022 from <https://www.cambridgeenglish.org/test-your-english/general-english/>
- Collins. 2018. Collins Dictionary - right-handed. Retrieved September 20, 2022 from <https://www.collinsdictionary.com/de/worterbuch/englisch/right-handed>
- Dennis Dew. 2008. Encyclopedia of Survey Research Methods. <https://doi.org/10.4135/9781412963947>
- Dotdash Meredith Publishing - Investopedia. 2015. Investopedia - Economics & Behavioral Economics & Anchoring and Adjustment. Retrieved September 20, 2022 from <https://www.investopedia.com/terms/a/anchoring-and-adjustment.asp>

- Anita Eerland, Tulio M Guadalupe, and Rolf A Zwaan. 2011. Leaning to the left makes the Eiffel Tower seem smaller: posture-modulated estimation. *Psychological Science* 22, 12 (2011), 1511–1514.
- Francis Galton. 1880. Visualised numerals. *Nature* 21, 533 (1880), 252–256.
- Hacking the Case Interview. 2020. Market Sizing Questions: Strategies, Examples, and Answers. Retrieved September 20, 2022 from <https://hackingthecaseinterview.thinkific.com/pages/market-sizing>
- Nature. 2020. Nature - Article - Visualised Numerals. Retrieved September 20, 2022 from <https://www.nature.com/articles/021252a0>
- Penn State Departmental Web Space. 2013. Error Variance. Retrieved September 20, 2022 from <https://www.dept.psu.edu/liberalarts/sites/cogsci/oldsite/teaching/psy200/ResearchMethods/ErrorVariance.html>
- Psychology Wiki - Fandom. 2021. Fandom - Psychology Wiki - Magnitude estimation. Retrieved September 20, 2022 from [https://psychology.fandom.com/wiki/Magnitude\\_estimation](https://psychology.fandom.com/wiki/Magnitude_estimation)
- Rice University, Online Statistics Education. 2009. Within-Subjects Factor, Within-Subjects Variable, Repeated-Measures Factor, Repeated-Measures Variable. Retrieved September 20, 2022 from <https://onlinestatbook.com/glossary/within-subjects.html>
- Rice University, Online Statistics Education. 2010. Between-Subjects Factor, Between-Subjects Variable. Retrieved September 20, 2022 from <https://onlinestatbook.com/glossary/between-subjects.html>
- Rice University, OpenStax CNX. 2010. Kinematics fundamentals- 1.13 Displacement. Retrieved September 20, 2022 from <https://cnx.org/contents/5183e995-a1fb-47a0-b9ce-99fd487393d8:d567a16b-34f8-4681-bd95-ff119a1fb8f3g>
- Sunil Kumar Singh. 2010. Kinematics fundamentals. (2010).
- SureHire Inc. 2001. Workplacetesting.com - Dictionary ¿ Ergonomics ¿ Body Posture. Retrieved September 20, 2022 from <https://www.workplacetesting.com/definition/2624/body-posture>
- The Human Memory 2010-2022. 2019. The Human Memory - Memory Recall and Retrieval System. Retrieved September 20, 2022 from <https://human-memory.net/memory-recall-retrieval/>
- Wikipedia. 2003a. Wikipedia - Analysis. Retrieved September 20, 2022 from <https://en.wikipedia.org/wiki/Analysis>
- Wikipedia. 2003b. Wikipedia - Experiment. Retrieved September 20, 2022 from <https://en.wikipedia.org/wiki/Experiment>
- Wikipedia. 2003c. Wikipedia, The Free Encyclopedia. Retrieved September 20, 2022 from [https://en.wikipedia.org/wiki/Main\\_Page](https://en.wikipedia.org/wiki/Main_Page)
- Wikipedia. 2004a. Wikipedia - 1D. Retrieved September 20, 2022 from <https://de.wikipedia.org/wiki/1D>
- Wikipedia. 2004b. Wikipedia - Bias. Retrieved September 20, 2022 from <https://en.wikipedia.org/wiki/Bias>
- Wikipedia. 2004c. Wikipedia - Evidence. Retrieved September 20, 2022 from <https://en.wikipedia.org/wiki/Evidence>
- Wikipedia. 2004d. Wikipedia - Handedness. Retrieved September 20, 2022 from <https://en.wikipedia.org/wiki/Handedness>
- Wikipedia. 2007. Wikipedia - Wii Balance Board. Retrieved September 20, 2022 from [https://en.wikipedia.org/wiki/Wii\\_Balance\\_Board](https://en.wikipedia.org/wiki/Wii_Balance_Board)
- Wikipedia. 2012a. Wikipedia - Center of pressure (terrestrial locomotion). Retrieved September 20, 2022 from [https://en.wikipedia.org/wiki/Center\\_of\\_pressure\\_\(terrestrial\\_locomotion\)](https://en.wikipedia.org/wiki/Center_of_pressure_(terrestrial_locomotion))
- Wikipedia. 2012b. Wikipedia - Mixed-design analysis of variance. Retrieved September 20, 2022 from [https://en.wikipedia.org/wiki/Mixed-design\\_analysis\\_of\\_variance](https://en.wikipedia.org/wiki/Mixed-design_analysis_of_variance)
- Wikipedia. 2013. Wikipedia - Research participant. Retrieved September 20, 2022 from [https://en.wikipedia.org/wiki/Research\\_participant](https://en.wikipedia.org/wiki/Research_participant)

Wikipedia. 2020. Wikipedia - Anchoring (cognitive bias). Retrieved September 20, 2022 from [https://en.wikipedia.org/wiki/Anchoring\\_\(cognitive\\_bias\)](https://en.wikipedia.org/wiki/Anchoring_(cognitive_bias))