



Exploring New Ways for Psychological Data Collection and Analysis with Cognitive-Affective Maps

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Department for Cognition, Action and Sustainability

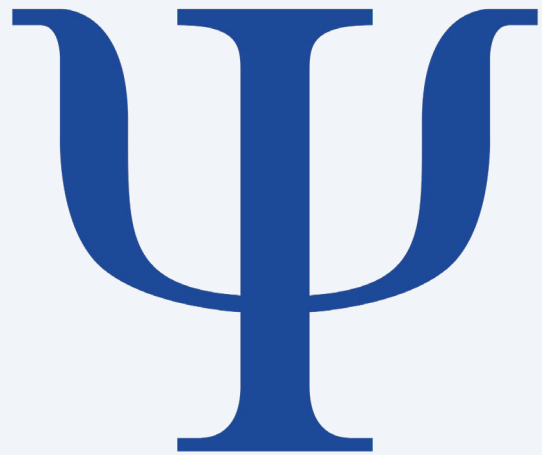
Myself

2014 - 2019

2019 - 2022

2022 - ?

Psychology Studies



Thesis on
Cognitive-Affective Maps

**Bridging Over the Troubled Waters of
Quantitative and Qualitative Methods:
Exploring Cognitive-Affective Maps in Empirical Research**



Faculty of Economics and Behavioral Sciences
Albert-Ludwigs University
Freiburg im Breisgau
Summer Term 2022

Basic Income Research



1) Cognitive-Affective Maps (CAMs) Introduction

- a. Exemplary CAM
- b. CAMs Background
- c. Empirical Approach
- d. CAM Software Applications

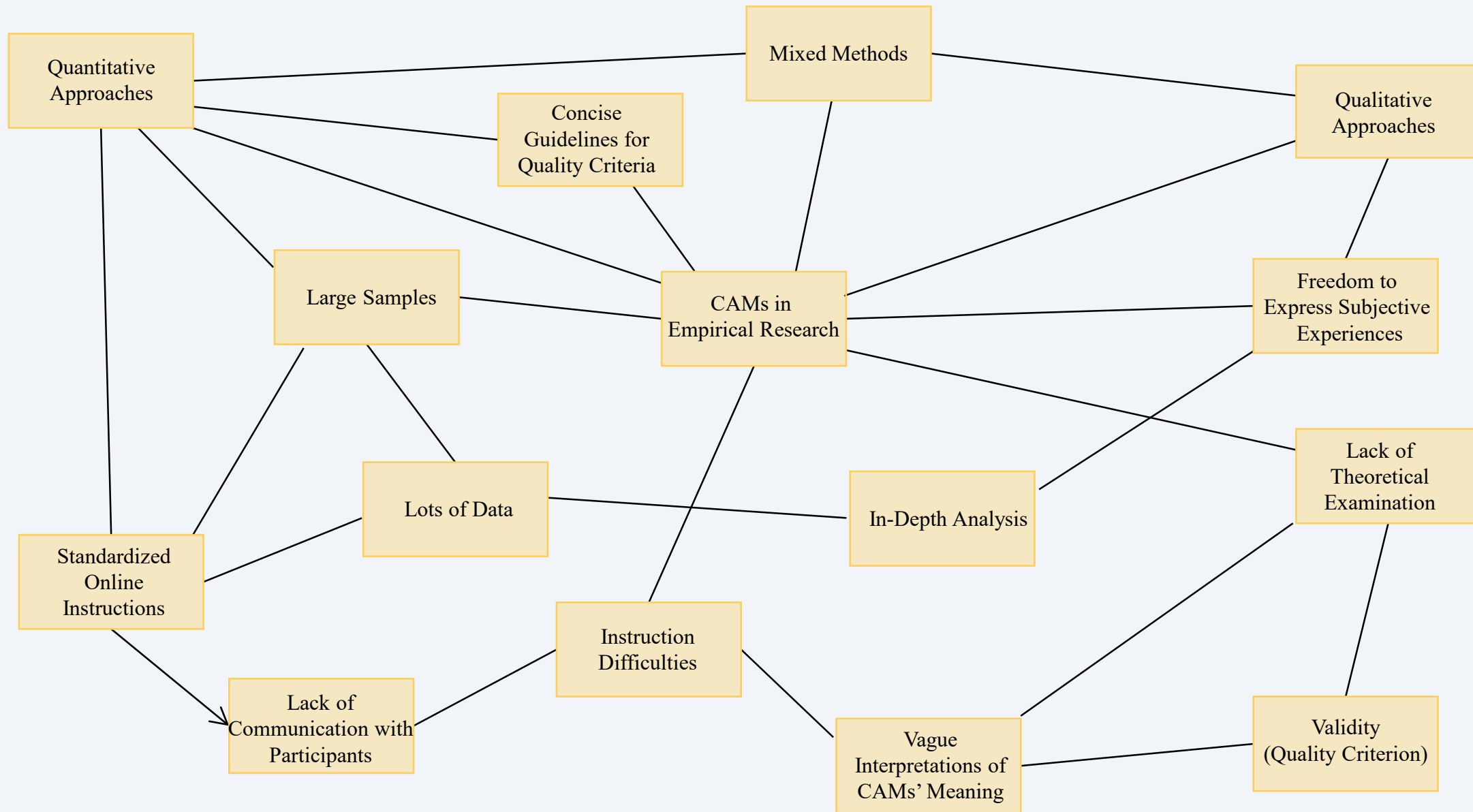
2) CAM Application

- a. Exemplary CAM Designs
- b. Exemplary CAM Analyses
- c. Difficulties

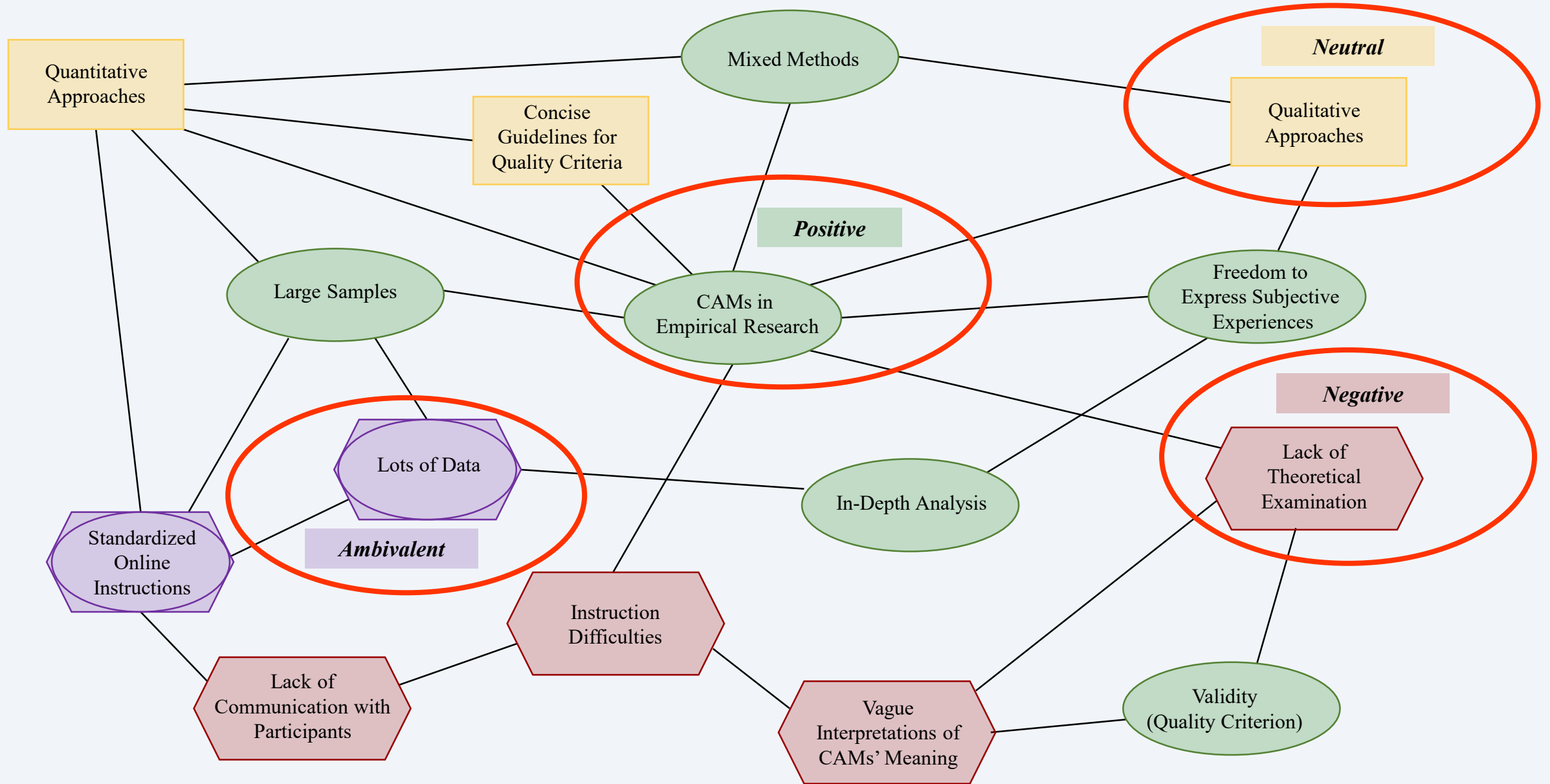
3) Draw Your Own CAM

4) Discussion/Questions

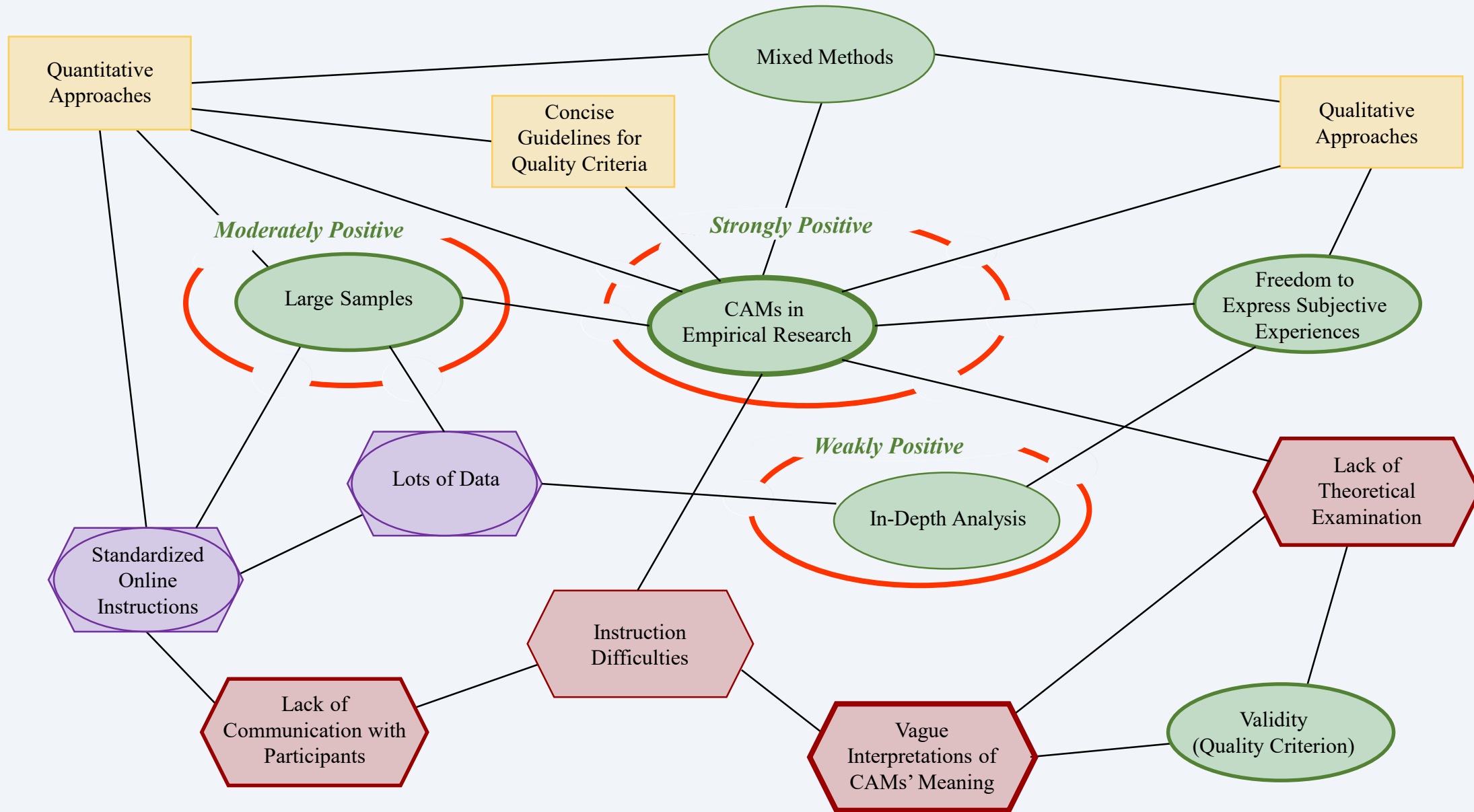
Exemplary CAM



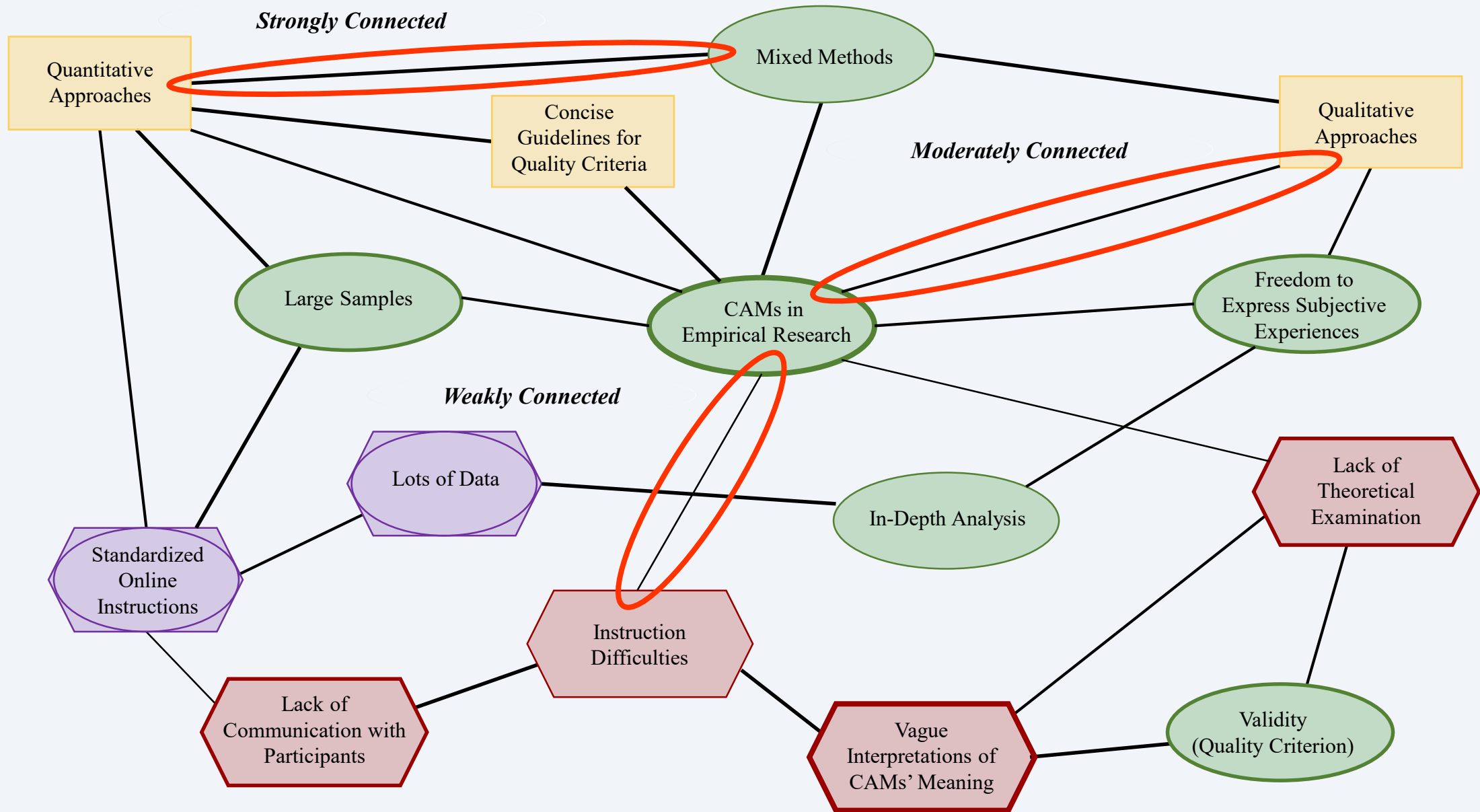
Exemplary CAM



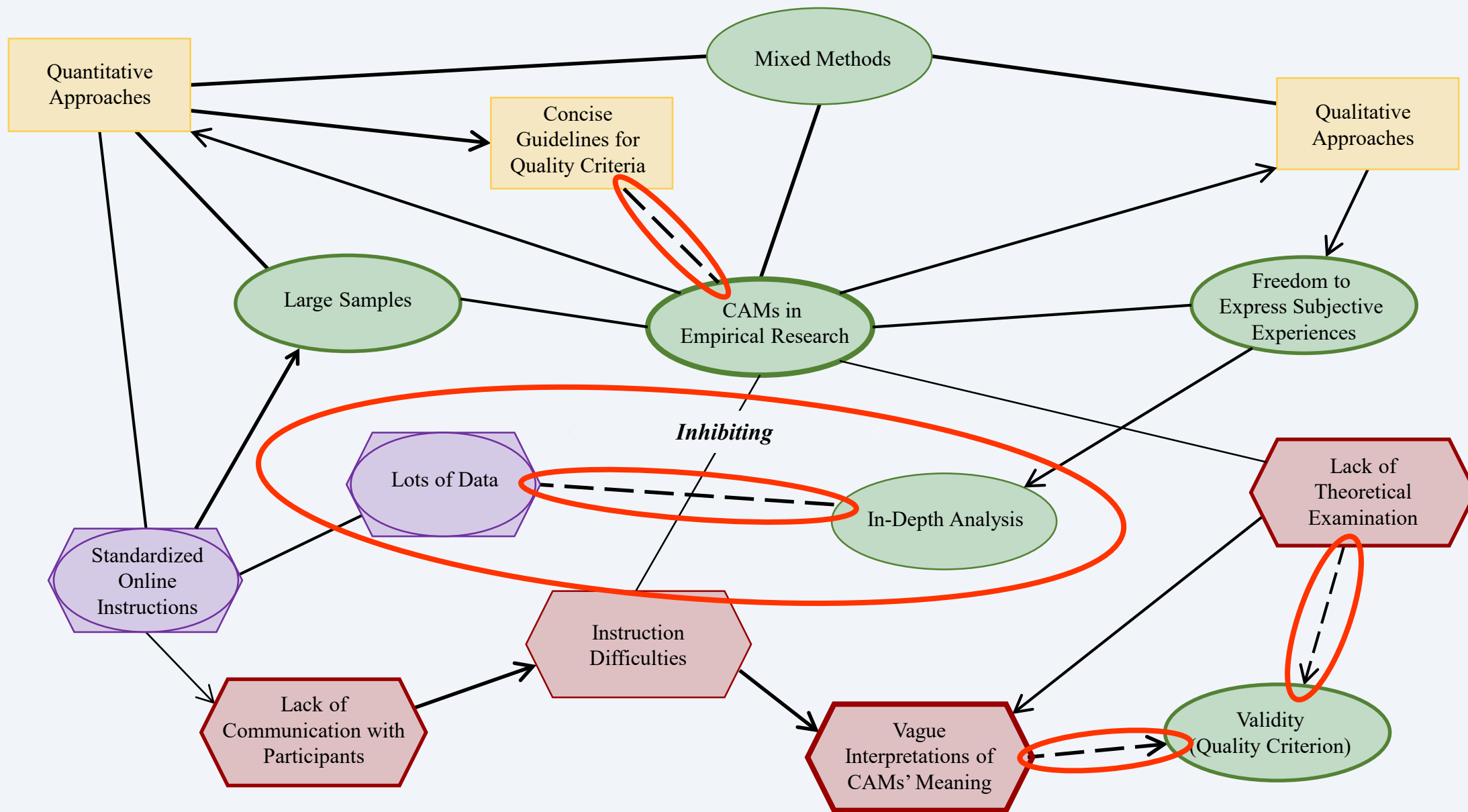
Exemplary CAM



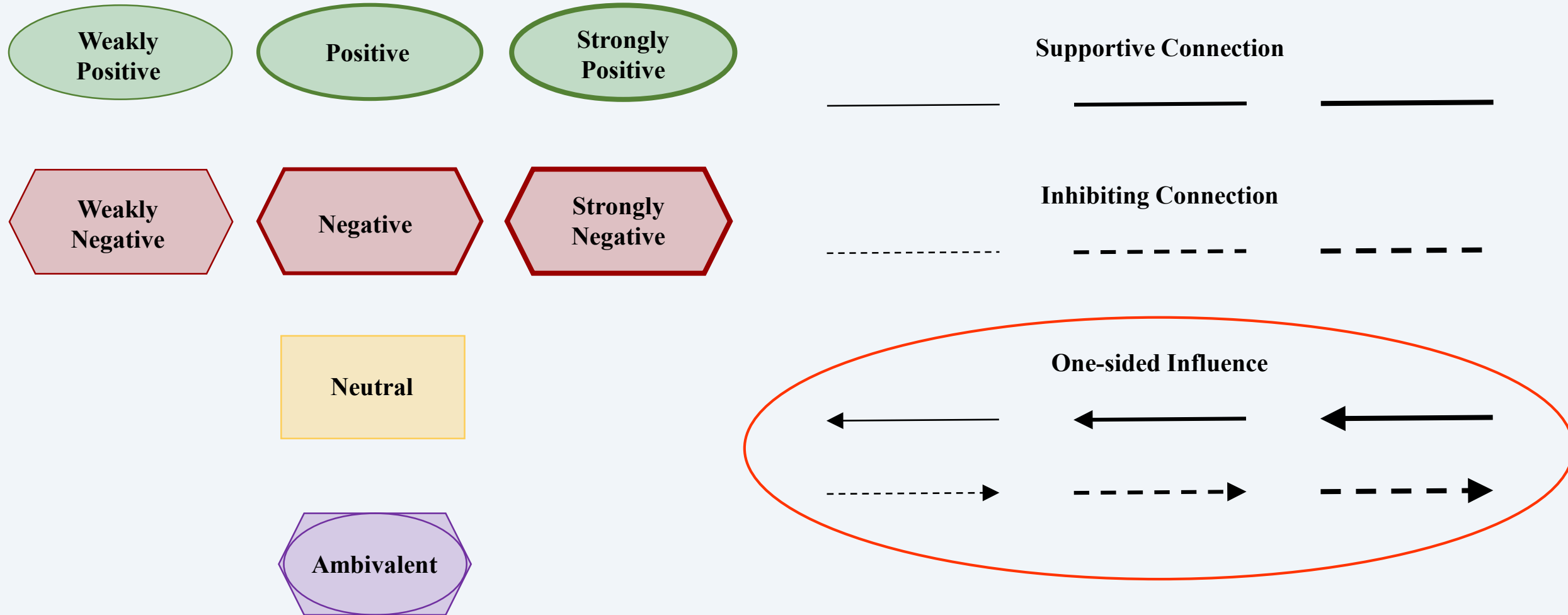
Exemplary CAM



Exemplary CAM



Mapping Rules Summary



Paul Thagard

2010



<https://paulthagard.com/blog/>

EMPATHICA: A Computer Support System with Visual Representations for Cognitive-Affective Mapping

Paul Thagard

University of Waterloo

Philosophy Department, University of Waterloo, Waterloo, Ontario, Canada, N2L 3G1;
pthagard@uwaterloo.ca.

Abstract

EMPATHICA is a computer program under development to facilitate cognitive-affective mapping using visual representations. A cognitive-affective map is a concept graph that includes information about the positive and negative emotional values of what is represented. Potential applications include conflict resolution, literary analysis, and decision-making.

Graph Semantics

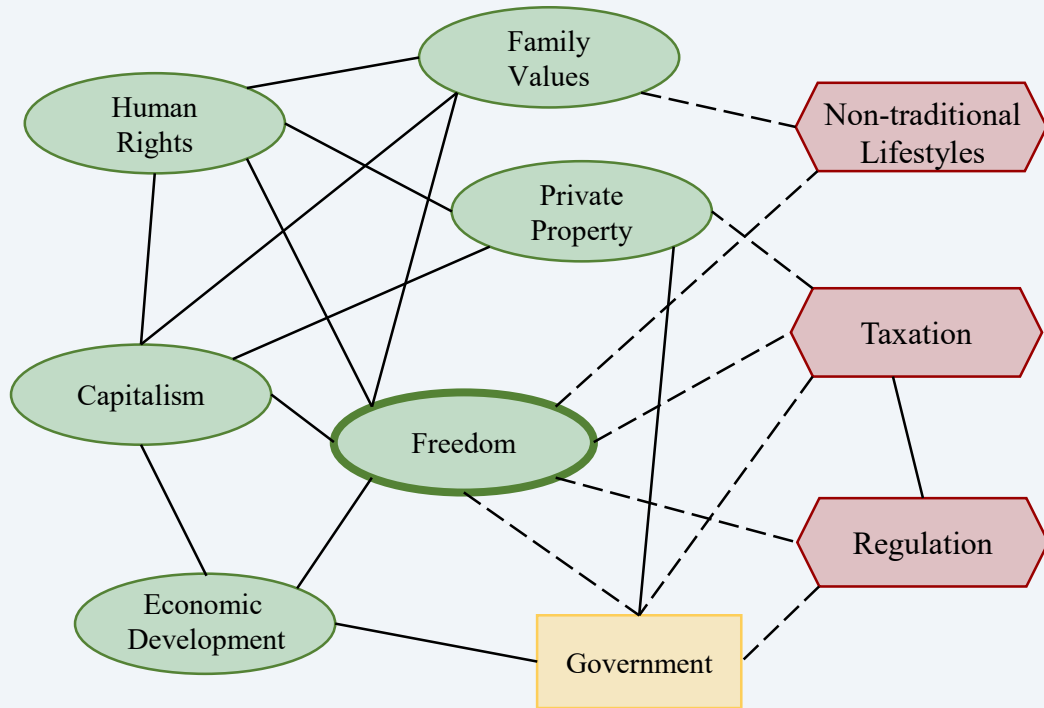
1. A cognitive-affective map is a labeled graph in which the vertices (nodes) represent concepts along with their affective (emotional) values. The edges in the graph represent the links between the concepts.

Thagard, P. (2010). EMPATHICA: A computer support system with visual representations for cognitive-affective mapping. In K. McGregor (Ed.), Proceedings of the workshop on visual reasoning and representation (pp. 79-81). Association for the Advancement of Artificial Intelligence Press.

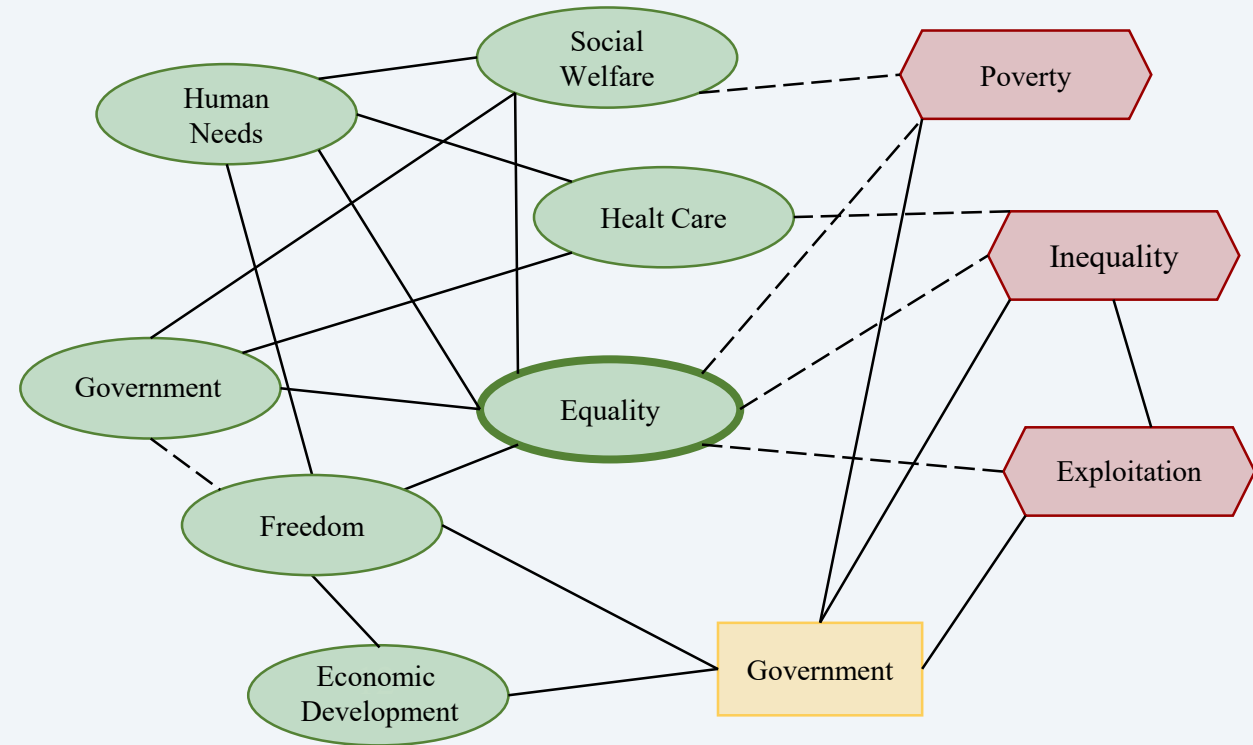
Initial Application of CAMs

CAMs for conflict resolution & contrasting ideologies/perspectives

Conservative Ideology



Progressive Ideology



Thagard, P. (2015). The Cognitive–Affective Structure of Political Ideologies. In: Martinovsky, B. (eds) Emotion in Group Decision and Negotiation. Advances in Group Decision and Negotiation, vol 7. Springer, Dordrecht. https://doi.org/10.1007/978-94-017-9963-8_3

- CAMs drawn by participants
- Large data sets
 - Standardized online data collection
- Different study designs
 - E.g., experiment; cross-sectional; longitudinal ...
- Quantitative & qualitative analysis

Qualitative versus Quantitative Approaches

Qualitative

Reconstructing Social Relations

Theory Building

Hermeneutic

Holistic

Individual Experiences

Observations

Interviews



Quantitative

Standardized & Controlled Conditions

Hypothesis Testing

Cause-Effect Relations

Questionnaires

Statistic

Experiments

Large Samples



Cognitive-Affective Maps

Combination of Qualitative and Quantitative Approaches

Qualitative

- Expression of individual perspectives
- Little suggestive influence by researchers' presuppositions
- Contextualization

Quantitative

- Large samples can be collected
- Quantification of semantic content
- Statistical Analyses/significance tests

Mixed Methods

Empirical Research Applications

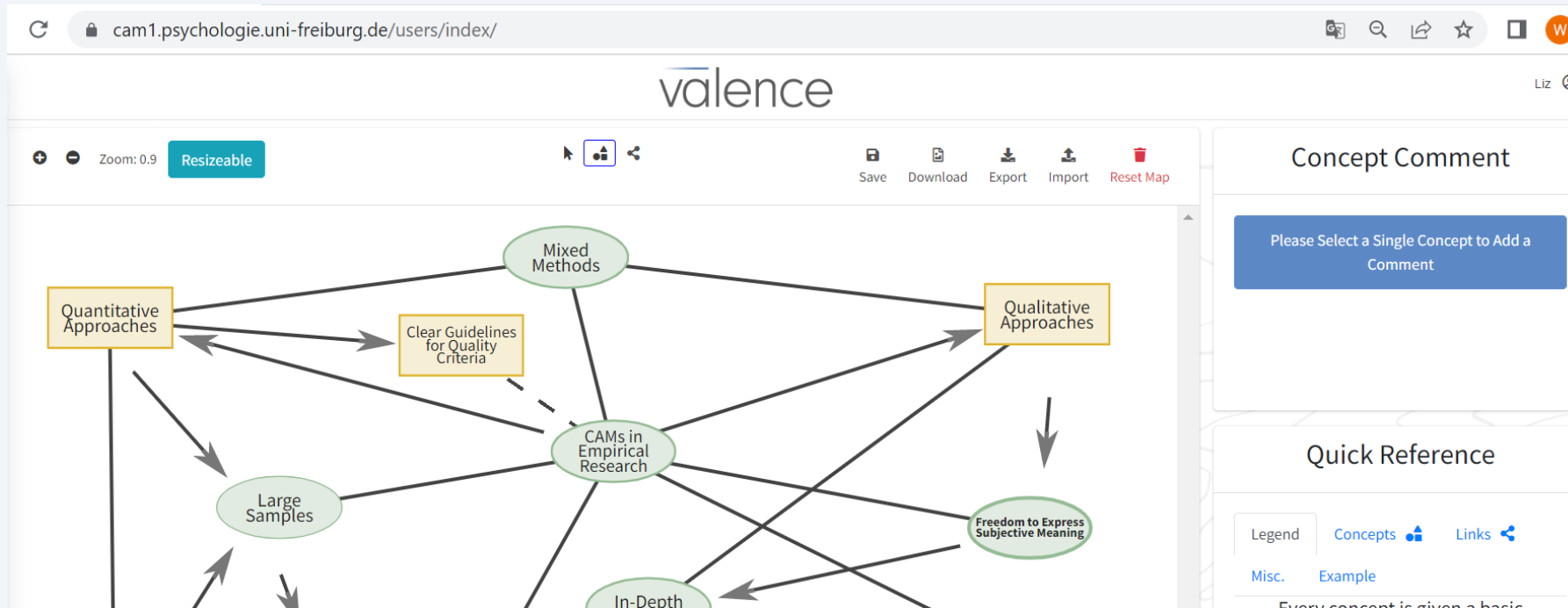
- CAMs drawn by participants
- Large data sets
 - Standardized online data collection
- Different study designs
 - E.g., experiment; cross-sectional; longitudinal ...
- Quantitative & qualitative analysis
- Application examples in our department
 - Technology acceptance; sustainability; corona pandemic, clinical psychology

<https://www.psychologie.uni-freiburg.de/abteilungen/Allgemeine.Psychologie/research/cam-research>

Software Applications

Valence: <https://cam1.psychologie.uni-freiburg.de/>

C.A.M.E.L.: <http://drawyourminds.de>



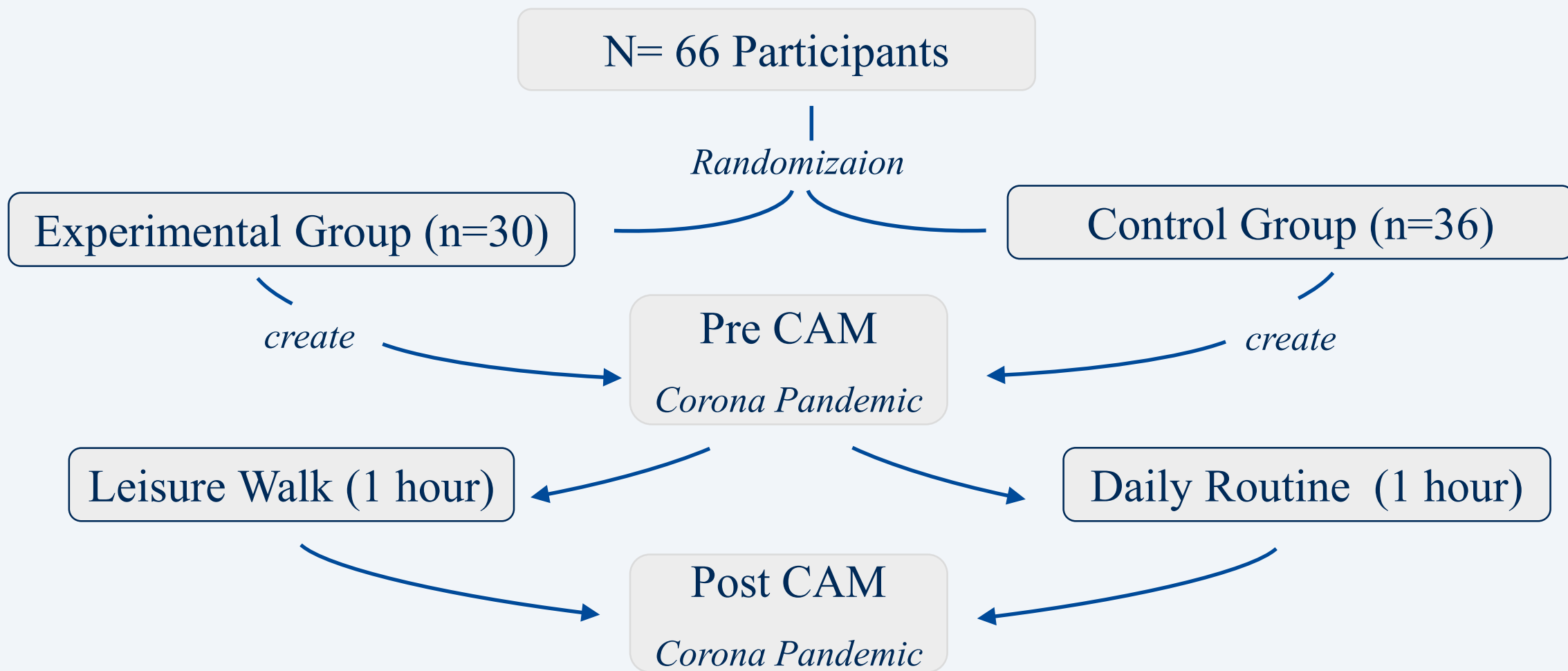
Rhea, C., Reuter, L., & Piereder, J. (2020) *Valence software release* [Software]. Open Science Framework.

<https://doi.org/10.17605/OSF.IO/9TZA2>

Gouret, F., Fenn, J., & Kiesel, A. (2022). *Cognitive-affective maps extended logic* (Version 1.0.4) [Computer software].

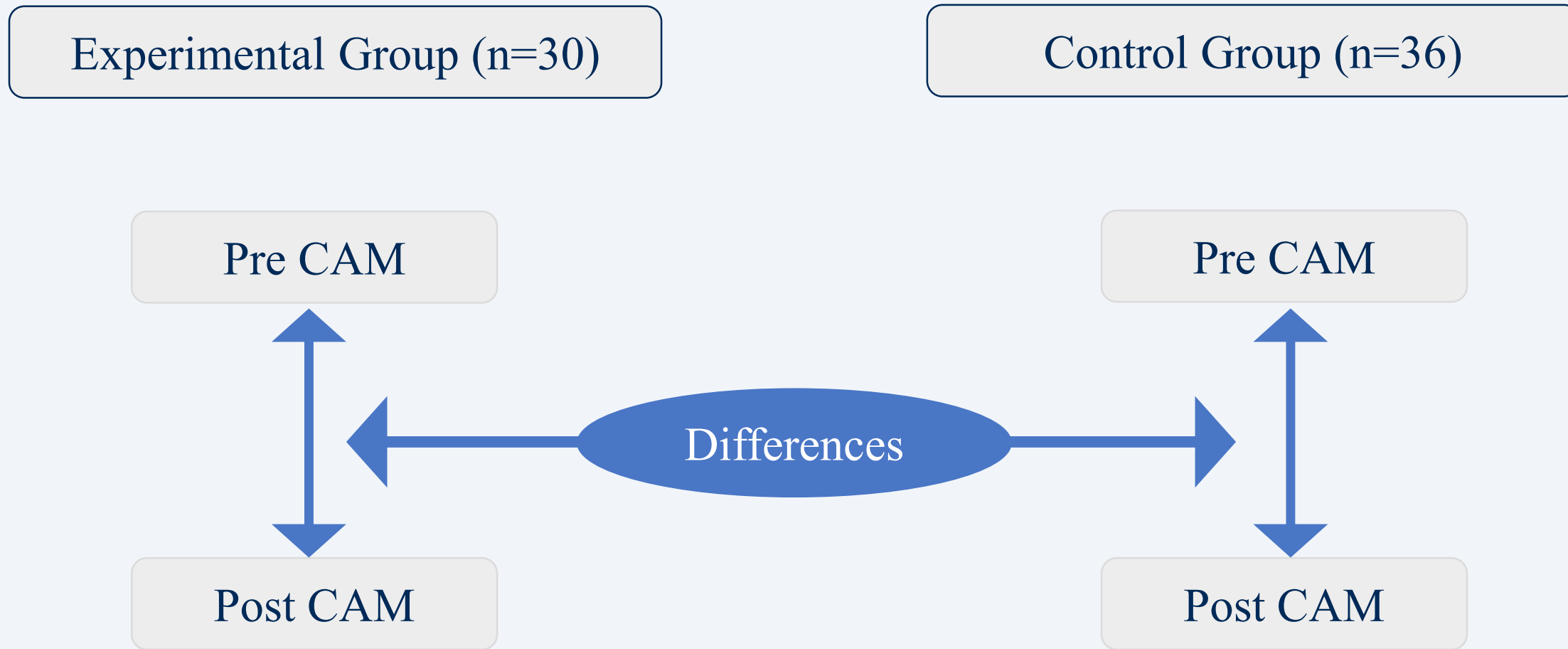
<https://github.com/CAMgalaxy/CAMgalaxy.github.io>

Experimental Design



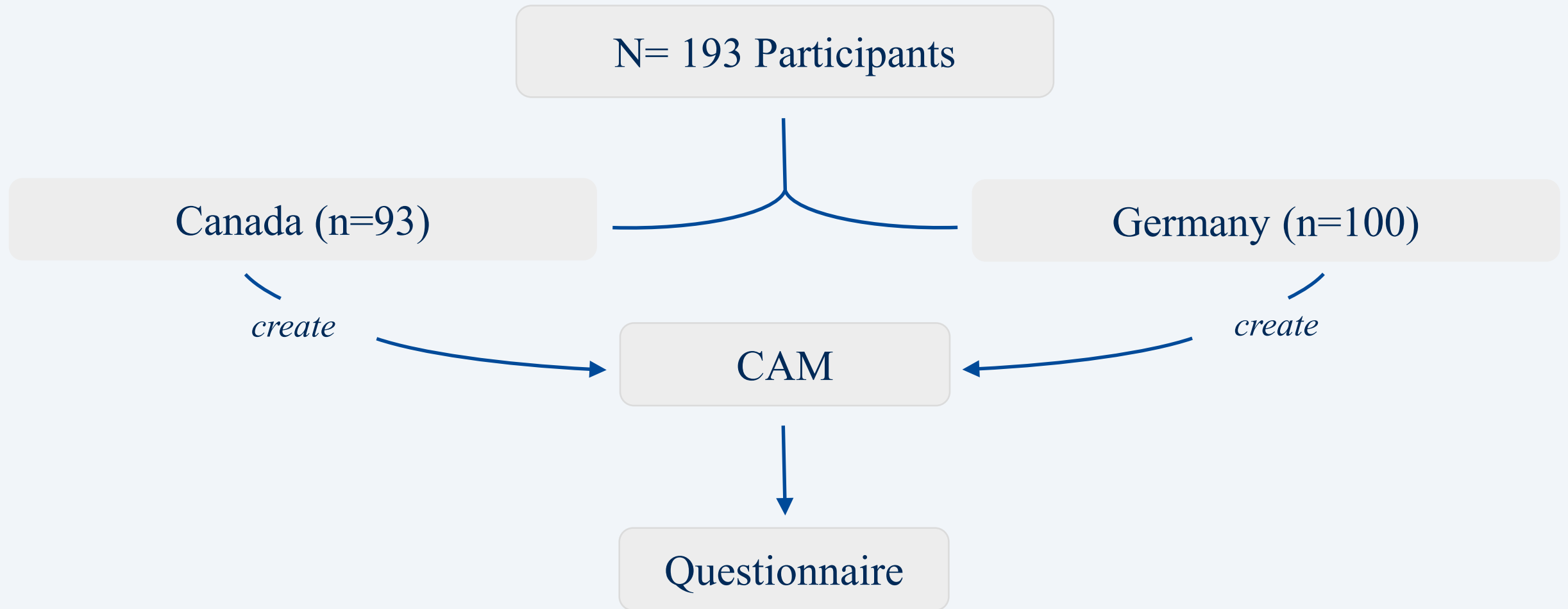
Reuter, L., Fenn, J., Bilo, T. A., Schulz, M., Weyland, A. L., Kiesel, A., & Thomaschke, R. (2021). Leisure walks modulate the cognitive and affective representation of the corona pandemic: Employing cognitive-affective maps within a randomized experimental design. *Applied Psychology: Health and Well-Being*, 13(4), 952-967. <https://doi.org/10.1111/aphw.12283>

Experimental Design



Reuter, L., Fenn, J., Bilo, T. A., Schulz, M., Weyland, A. L., Kiesel, A., & Thomaschke, R. (2021). Leisure walks modulate the cognitive and affective representation of the corona pandemic: Employing cognitive-affective maps within a randomized experimental design. *Applied Psychology: Health and Well-Being*, 13(4), 952-967. <https://doi.org/10.1111/aphw.12283>

Correlational Design

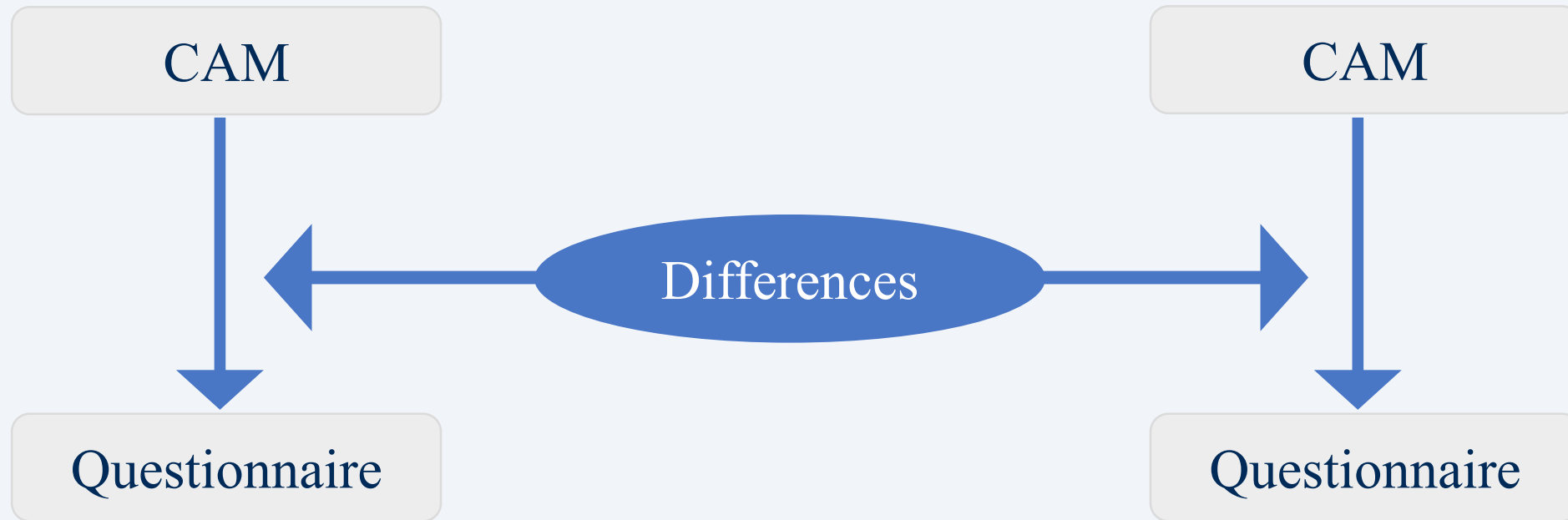


Mansell, J., Reuter, L., Rhea, C., & Kiesel, A. (2021). A novel network approach to capture cognition and affect: COVID-19 experiences in Canada and Germany. *Frontiers in Psychology*, 12. <https://doi.org/10.3389/fpsyg.2021.663627>

Correlational Design

Canadian Sample

German Sample



Optional Preset Concepts

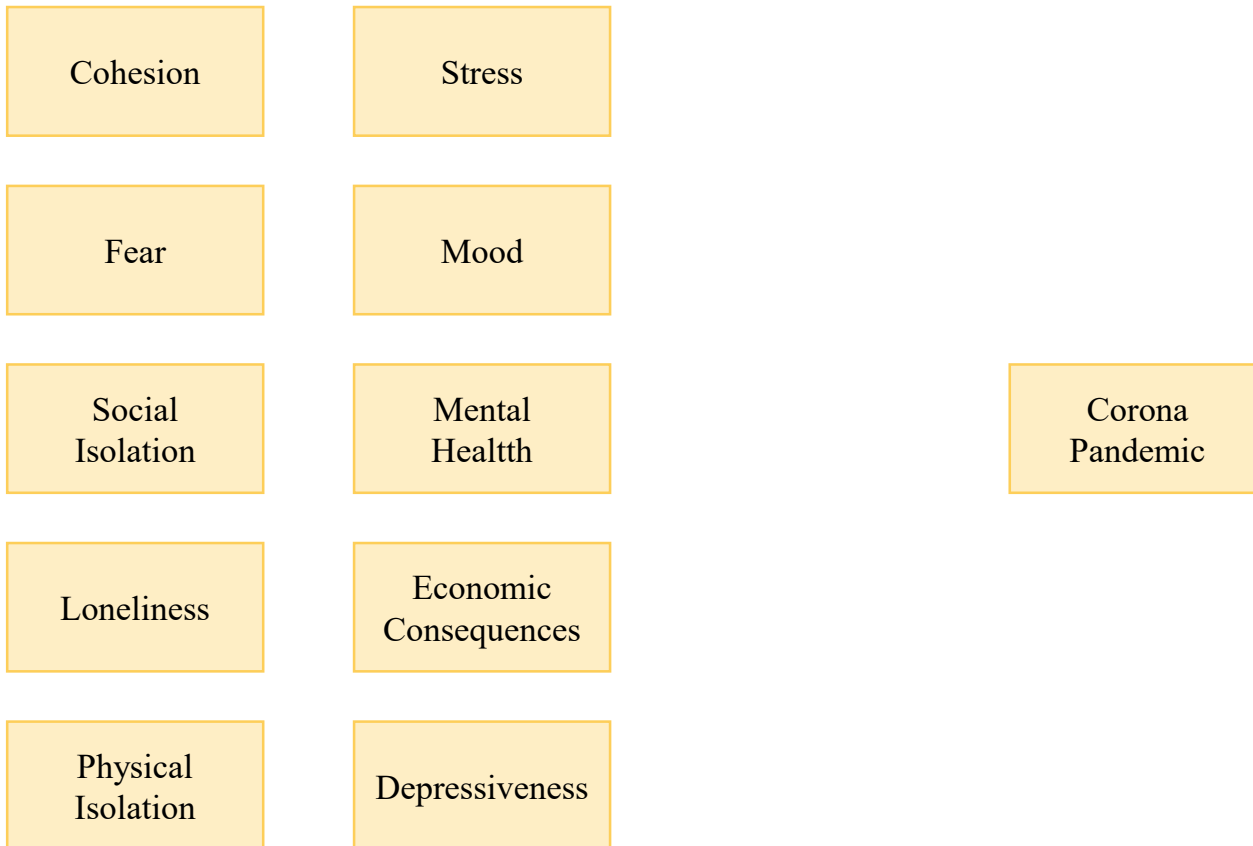
valence

Liz

Zoom: 1 [Resizable](#)



[Save](#) [Download](#) [Export](#) [Import](#) [Reset Map](#)



Concept Comment

[Add Comment](#)

[Delete Concept](#)

Text Size 16

[Update Text Size](#)

Quick Reference

Legend

[Concepts](#)

[Links](#)

[Misc.](#)

[Example](#)

Every concept is given a basic emotional value



Neutral Concept



Positive Concept



Negative Concept

Frequency of Concepts

Corona Pandemic (100%)

Fear (86%)

Stress (85%)

Loneliness (83%)

Economic Consequences (83%)

Mental Health (81%)

Social Isolation (78%)

Physical Isolation (74%)

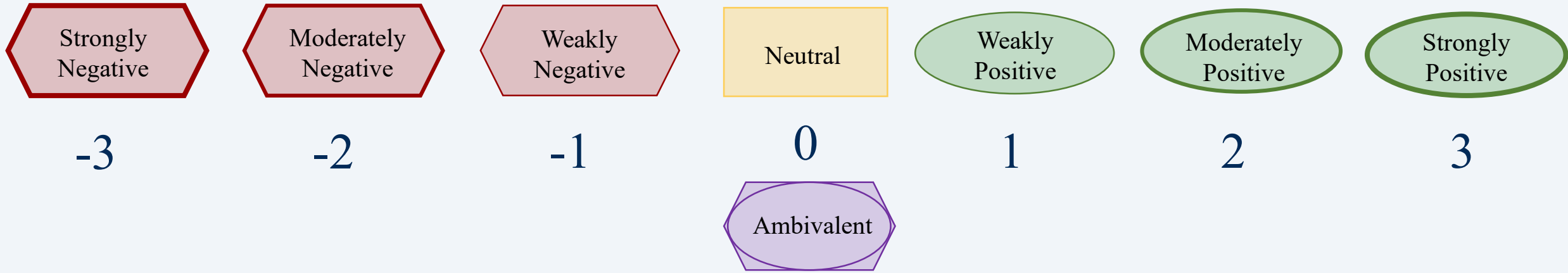
Cohesion (69%)

Mood (66%)

Depressiveness (65%)

Reuter, L., Fenn, J., Bilo, T. A., Schulz, M., Weyland, A. L., Kiesel, A., & Thomaschke, R. (2021). Leisure walks modulate the cognitive and affective representation of the corona pandemic: Employing cognitive-affective maps within a randomized experimental design. *Applied Psychology: Health and Well-Being*, 13(4), 952-967.
<https://doi.org/10.1111/aphw.12283>

Network Analyses



Network Parameters

Average CAM valence

Frequency of positive/negative/neutral/ambivalent concepts

Density

Number of concepts/connections

Centrality

Triadic closure

....

Rating Categories

Content

Are there new terms in the second CAM?

Are terms omitted in the second CAM?

Do terms remain the same?

None	Some	Many
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Valence

Does the overall valence change?

Does the valence of the original concept (nature imitation in technical products) change?

Does the valence of the consistent terms (if existing) change?

No	Yes, more positive afterwards	Yes, more negative afterwards	Yes, more neutral afterwards	Yes, more ambivalent afterwards	Neither, but...
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Ethical Principles in CAMs

N= 18 Students



Pre CAM

*Nature Imitation
through Technological Products*



Ethics Seminar Attendance

Ethical-Philosophical Foundations of Sustainability



Post CAM

Ethical Principles

Anthropocentric argument / value of rationality / human beings

Argument of aesthetic contemplation

Argument of the capability approach / of the good life

Argument of human hybris

Argument of weak sustainability / three-pillar model

Argument of strong sustainability / dependency argument /

biosphere as resource / boundary

Autonomy argument

Basic needs argument / argument of 'survival'

Biocentrism argument / value of life

Design argument

Harmony argument

Holism argument

In dubio pro malo argument (Jonas' heuristic of fear')

...

Krebs, A. (2016). Naturethik im Überblick. In A. Krebs (Ed.), *Naturethik. Grundtexte der gegenwärtigen tier- und ökoethischen Diskussion* (pp. 337-379). Suhrkamp.

Muraca, B. (2010). *Denken im Grenzgebiet. Prozessphilosophische Grundlagen einer Theorie starker Nachhaltigkeit*. Karl Alber.

Höfele, P., Reuter, L., Estadieu, L., Livanec, S., Stumpf, M., & Kiesel, A. (2022). Connecting the methods of psychology and philosophy: Applying cognitive-affective maps (CAMs) to identify ethical principles underlying the evaluation of bioinspired technologies. *Philosophical Psychology*. <https://doi.org/10.1080/09515089.2022.2113770>

Quality criteria of CAMs?

Theoretical foundation?

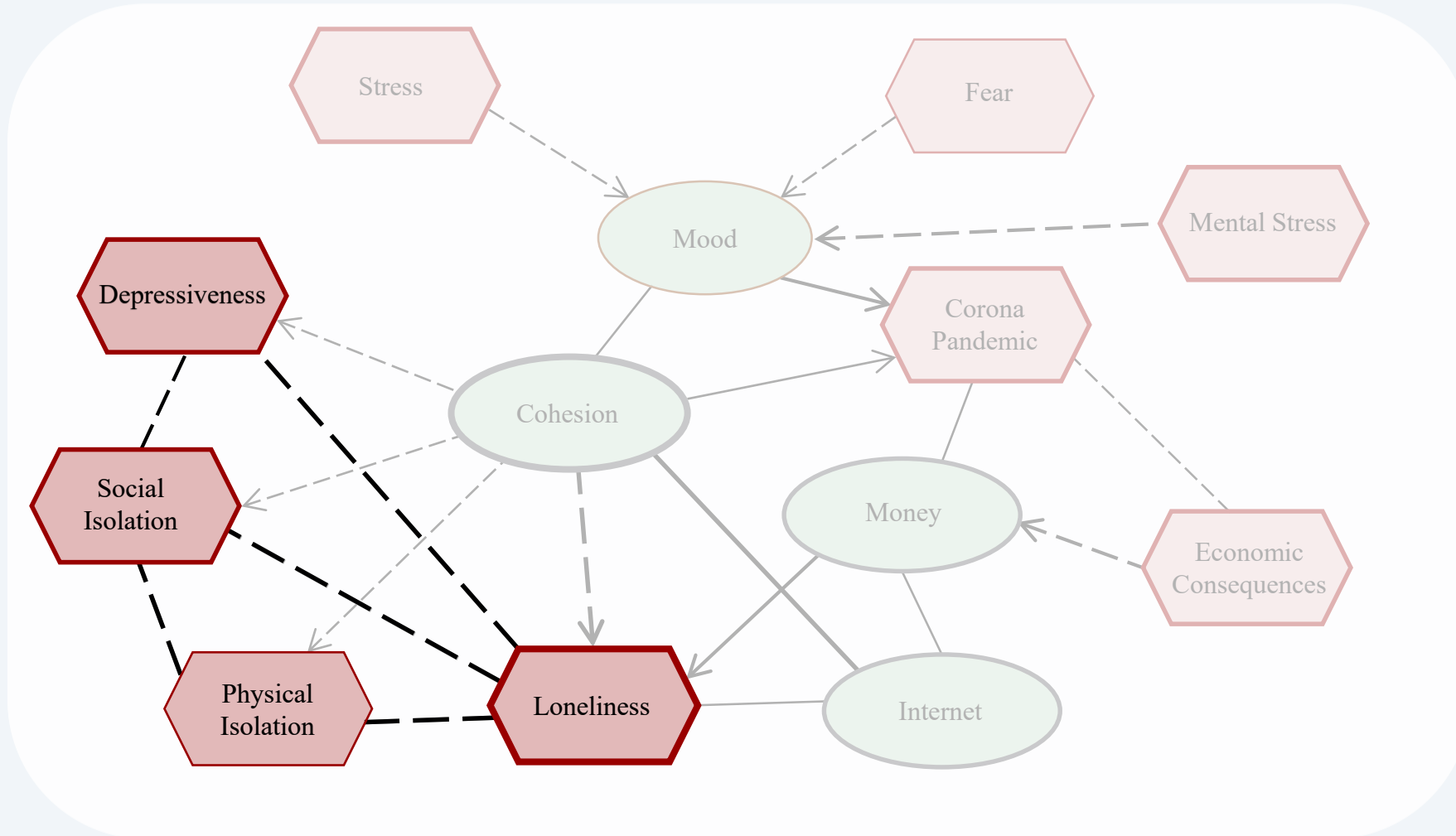
How to treat ambivalent concepts (e.g., for mean valence)?

Meaning of network parameters (e.g., density)?

Is the creation of a CAM a kind of intervention?

How to interpret dashed/solid connections?

Connection Difficulties



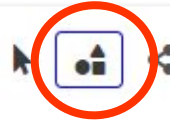
Draw Your Own CAM!

<https://cam1.psychologie.uni-freiburg.de/>

The screenshot shows the Valence website interface. At the top, the logo "valence" is displayed on the left, and "En/De" is on the right. A yellow banner contains a maintenance notice: "Valence wird zurzeit überarbeitet, weshalb einige Funktionen vorübergehend nicht verfügbar sein können. Bitte melden Sie jegliche Probleme an carterrhea93@gmail.com." Below this, a blue button labeled "Weiter ohne Registrierung" is circled in red. At the bottom, a white login box contains the text "Melden Sie sich an, um zu beginnen." followed by input fields for "Benutzername:" and "Passwort:".

How to Use the Software

Concept Mode



Create a New Concept

Single Click on the Empty Space

Change Concepts' Valence

Double Click on a Concept and Use the Slider

Connection Mode



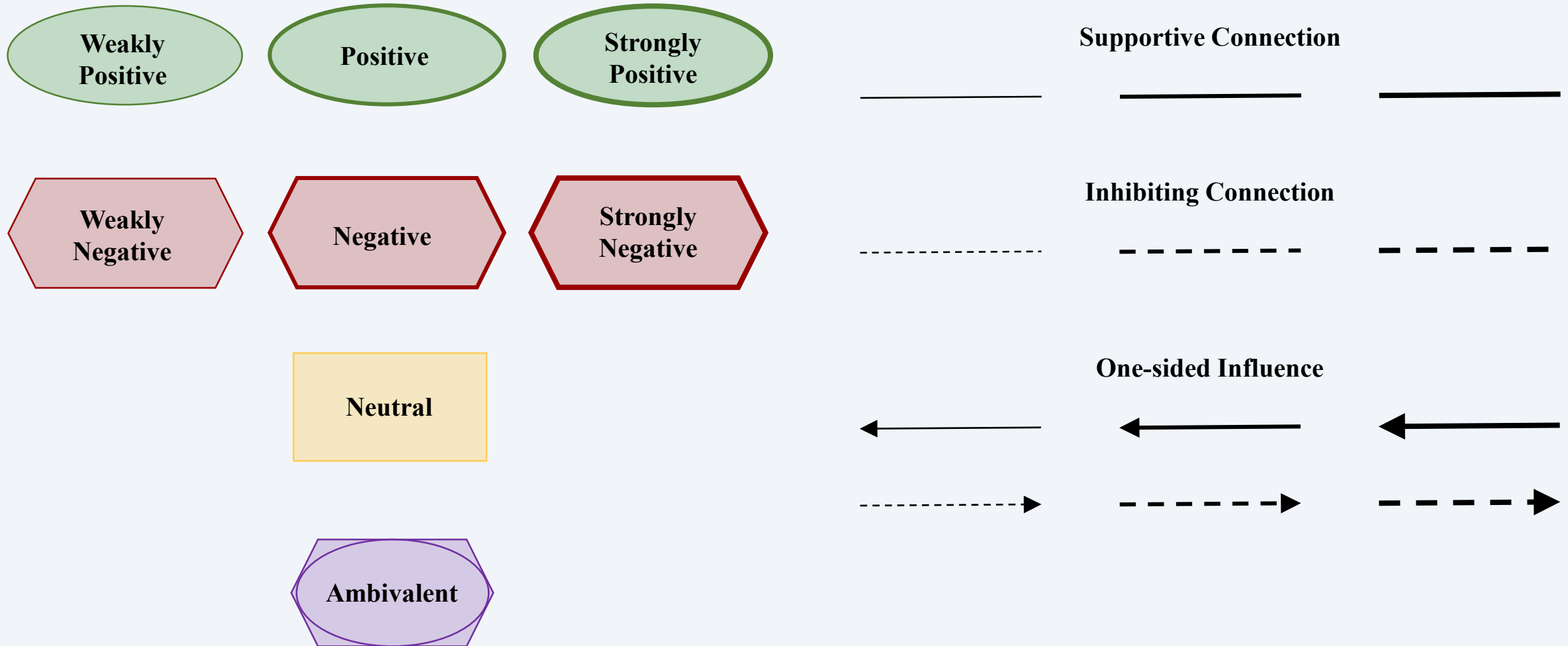
Connect Two Concepts

Single Click on Both Concepts

Change Connection Type

Double Click on a Connection and Use the Bar on the Right Side

Mapping Rules Summary





Thanks for CAMing!

