Quantify Self

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About me:

Freelance MLE by day, hobbyist learner and programmer by night. Love reading about new health-related researches. Love playing around with gadgets. Have time.

Wanna connect?

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Structure

1. Motivation
2. Data sources
    a. Definition
    b. Bias
    c. Examples
    d. Tipps
3. Sample analysis
4. QA

Data collection

Scope

- Lifestyle tracking
- Consumer grade devices
- Not suitable for medical advice
- Structured data collection (numeric representation)

Active DC (manual): questionnaire style data collection. Topics are predefined, score is actively provided by the participant (mental state and interpretation of physical markers)

Passive DC (automated): data is collected without intervention of the participant (physical markers).

Hybrid DC: user controls conditions of data collection without intervention during the process (physical markers).

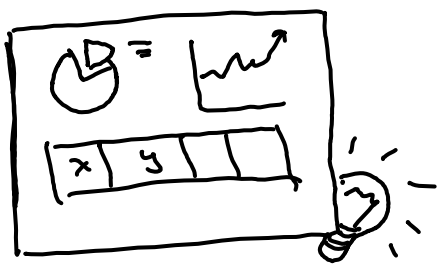
Biases

Bias is systematic patterns of deviation from norm and/or rationality in judgment

Data Collection

Data Analysis

Data Representation



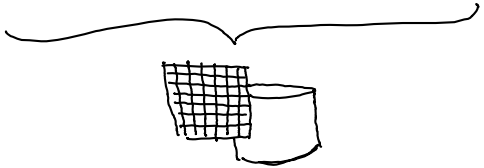
Active Tracking

Structured

- Scale
- Predefined questions
- Frequent

- Graphs
- Numbers

- Wrong scope
- Wrong scale
- Wrong time/frequency
- “Wrong” representation

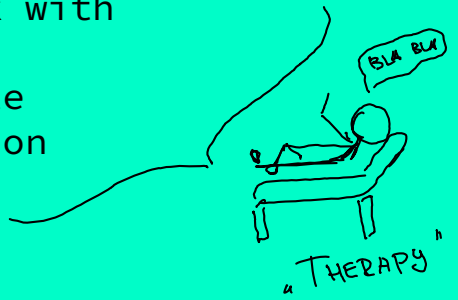


Unstructured

- Free text/images
- No topic limitations
- On “desire”

- Text
- Img

- Hard to standardize and automate
- Hard/Impossible to scale
- Hard to work with missing data
- Hard to scale representation

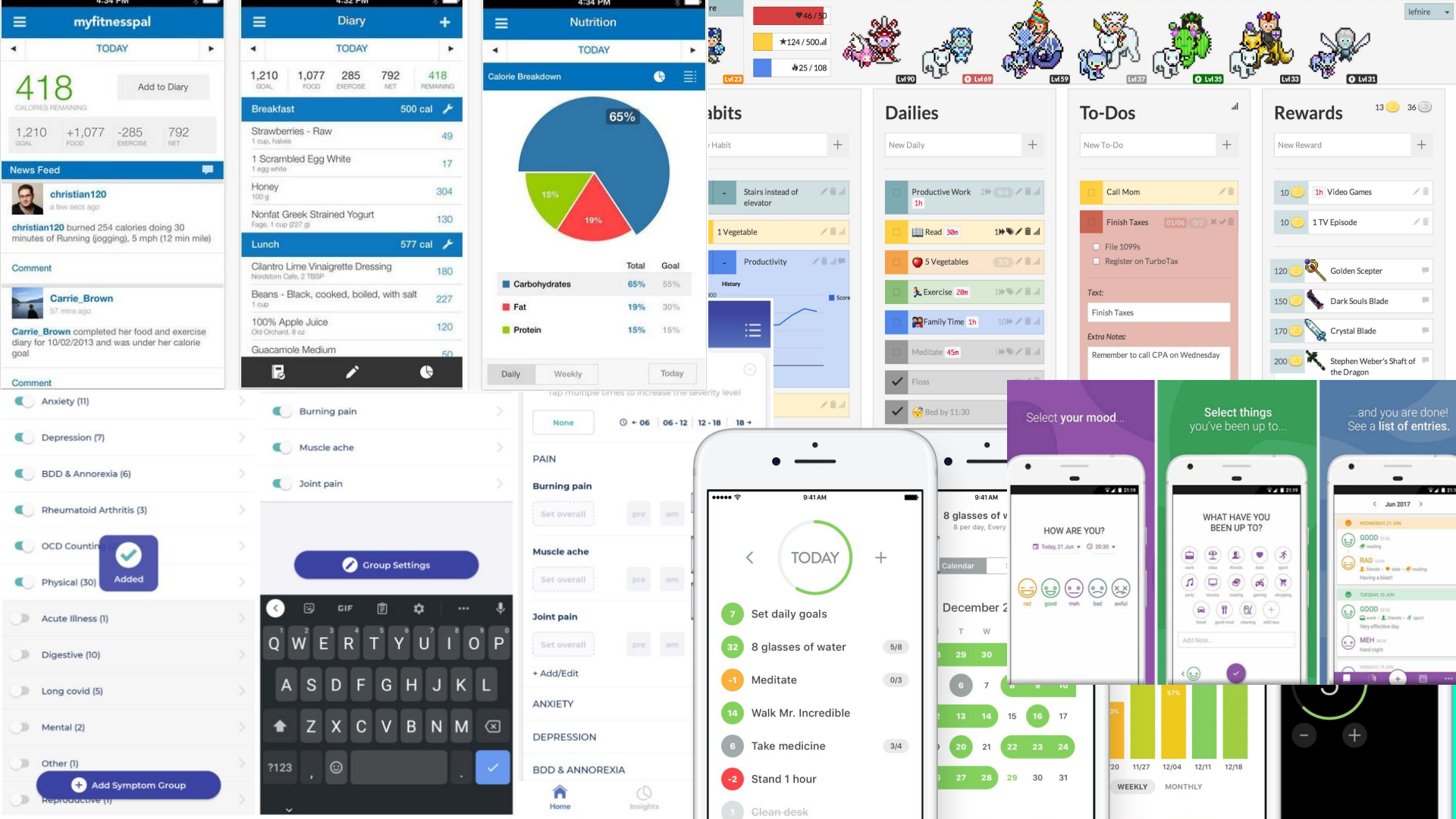


Biases minimized

- **Anchoring** (one feature to rule them all)
- **Apophenia** (everything is connected!)
- **Availability heuristic** (attention span)
- **Conformation bias** (data torture)
- **Egocentric bias** (can do it all!)
- **Extension Neglect** (undersampling)
- **Logical fallacy** (ignore data drift)
- …

Biases caused

- **Apophenia** (everything is connected!)
- **Conformation bias** (data torture)
- **Framing effect** (presentation matters)
- **Curse of knowledge** (decision paralysis)
- **Information bias** (need more data!)
- **Outcome bias** (hindsight)
- …


myfitnesspal
TODAY
418
CALORIES REMAINING
Add to Diary
1,210 GOAL
+1,077 FOOD
-285 EXERCISE
792 NET
News Feed
christian120
a few secs ago
christian120 burned 254 calories doing 30 minutes of Running (jogging), 5 mph (12 min mile)
Comment
Carrie_Brown
57 mins ago
Carrie_Brown completed her food and exercise diary for 10/02/2013 and was under her calorie goal
Comment
Diary
TODAY
1,210 GOAL
1,077 FOOD
285 EXERCISE
792 NET
418 REMAINING
Breakfast 500 cal
Strawberries - Raw 1 cup, halves 49
1 Scrambled Egg White 1 egg white 17
Honey 100 g 304
Nonfat Greek Strained Yogurt Fage, 1 cup (227 g) 130
Lunch 577 cal
Cilantro Lime Vinaigrette Dressing Nordstom Cafe, 2 TBSP 180
Beans - Black, cooked, boiled, with salt 1 cup 227
100% Apple Juice Old Orchard, 8 oz 120
Guacamole Medium 50
Nutrition
TODAY
Calorie Breakdown
65%
15%
19%
Total Goal
Carbohydrates 65% 55%
Fat 19% 30%
Protein 15% 15%
Daily Weekly Today
46 / 50
124 / 500
25 / 108
Habits
Stairs instead of elevator
1 Vegetable
Productivity
History
Dailies
New Daily
Productive Work 1h
Read 30m
5 Vegetables
Exercise 20m
Family Time 1h
Meditate 45m
Floss
Bed by 11:30
To-Dos
New To-Do
Call Mom
Finish Taxes
File 1099s
Register on TurboTax
Text:
Finish Taxes
Extra Notes:
Remember to call CPA on Wednesday
Rewards
13 36
New Reward
10 1h Video Games
10 1 TV Episode
120 Golden Scepter
150 Dark Souls Blade
170 Crystal Blade
200 Stephen Weber's Shaft of the Dragon
Anxiety (11)
Depression (7)
BDD & Annorexia (6)
Rheumatoid Arthritis (3)
OCD Counting
Physical (30)
Acute Illness (1)
Digestive (10)
Long covid (5)
Mental (2)
Other (1)
Add Symptom Group
Added
Burning pain
Muscle ache
Joint pain
Group Settings
Tap multiple times to increase the severity level
None
PAIN
Burning pain
Set overall
Muscle ache
Joint pain
+ Add/Edit
ANXIETY
DEPRESSION
BDD & ANNOREXIA
Home
Insights
Select your mood...
HOW ARE YOU?
Select things you've been up to...
WHAT HAVE YOU BEEN UP TO?
...and you are done! See a list of entries.
TODAY
7 Set daily goals
32 8 glasses of water 5/8
-1 Meditate 0/3
14 Walk Mr. Incredible
6 Take medicine 3/4
-2 Stand 1 hour
Clean desk
December
WEEKLY
MONTHLY

Solution maybe...

1. Simple goal
2. Dimension reduction
3. Detailed raw data export
4. Applicable filters
5. Configurable UI
6. Gamification (optional)
7. Frequent aggregated analysis (very optional)

Automated Tracking

Wearables + apps

- Hardware-driven
- Data collection algorithm
- Data analysis algorithm
- Real time + Hybrid tracking
- Manual input possible

- Graphs
- Numbers
- Real time feedback

- Pre-defined baseline
- Wrong scale (results presentation)
- “Wrong” representation
- Measurement obstructions
- Insufficient time/frequency
- Data loss
- Undisclosed algorithms

Sensors and Approaches

- **Optical sensors** (Photoplethysmography)
- **Bioimpedance sensor**
- **Accelerometer**
- **Temperature sensor**
- **Gyroscope**
- **GPS**
- **…**
- **ECG**
- **EEG**

SLEEP

84 Good

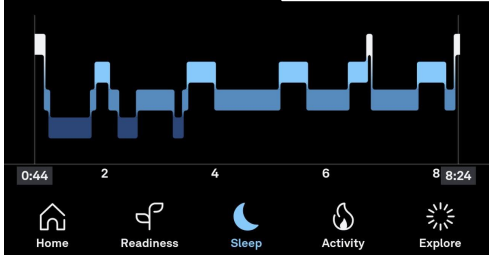
Sleep contributors

Total sleep	7 h 22 min
Efficiency	96%
Restfulness	Optimal
REM sleep	2 h 2 min, 28%
Deep sleep	1 h 16 min, 17%
Latency	7 min
Timing	Pay attention

Time asleep

7 h 22 min

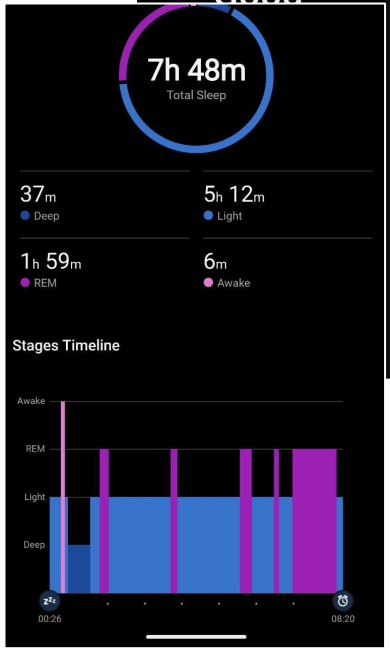
Total duration 7 h 40 min



86

100

Good



SCORE FACTORS

Sleep Duration 7h 48m	Excellent
Stress 16 Avg	Fair
Deep 37m	Fair
Light 5h 12m	Fair
REM 1h 59m	Excellent
Awake/Restlessness	Excellent

Biases minimized

- **Anchoring** (one feature to rule them all)
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- **Curse of knowledge** (decision paralysis)
- **Outcome bias** (hindsight)
- …

Biases caused

- **Framing effect** (presentation matters)
- **Information bias** (need more data!)
- **Authority bias** (you know better)
- …

Solution maybe...

1. Detailed raw data export
2. Applicable filters
3. Pair with manual tracking
4. Frequent aggregated analysis (optional)
5. Analyse comparable periods
6. Design proxy features
7. Calibration with other gadgets (super optional)

Analysis

Scope

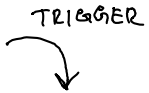
- Time series analysis
- Track anomalies/extremes into separate stream
- Heavily rely on own mappings
- Hypothesis are based of scientific research
- Checking regularly with a doctor

Components

- Trend
- Cycles / Seasonality
- Noise
- Anomalies - keep an eye on them

Sample analysis

When and what

1. Look out for outliers 

2. Rely on short-horizon analysis from an app
3. Compare similar time-frames 

4. Compute trend and co yourself
5. Use multiple apps with different context
6. Don’t sweat it 

Insights

- Best training time: for mood, energy, focus 
- Best meditation time 
- Identify bad things 
- Interesting things about specific types of activities 
- How to get into flow 
- Most impactful activities for health targets 
- Are you “ruminating” type of person 
- Better organization 
- …

Turning into cyborg...

Sources used:

- Biases list https://en.wikipedia.org/wiki/List_of_cognitive_biases
- Apps examples:
  - Habitica
  - MyFitnessPal
  - Habitslist
  - Bearable
  - Daylio
- Sensors:
  - IPPG
  - Bioimpedance
  - ECG
  -
- Interesting reads:
  - Cornell and Washington Universities (2017). Semi_Automated_tracking:_A_Balanced_Approach_for_Self-Monitoring_Applications
  - Riggare, S., Scott Duncan, T., Hvitfeldt, H. *et al.* "You have to know why you're doing this": a mixed methods study of the benefits and burdens of self-tracking in Parkinson's disease. *BMC Med Inform Decis Mak* **19**, 175 (2019).

Github repo: https://github.com/Alisa-lisa/conferences/tree/master/EP_2023