Shadow's Edge Gameplay Data

Data exploration

Monthly Update

January 2021

Data Analytics Report – Mid May **2021**

Achievements Feb – Mid May
- Journal automated Sentiment analysis completed and included in Journal Jupyter Notebook
- Player Profiles based on Engagement – including unregistered players – base analysis done, Jupyter Notebook started
- Release engagement comparison analysis
- Journal Thematic Analysis completed first set of journals – ready for review with psychologist

Plans for May - June
- Define Columbia Release Research Project
- Complete Player profile report (Navot/Sydnie report)
- Qualitative research with players since Nov 2020 as baseline input for Columbia release
- Include Community Release in release comparison analysis
- On hold:
  - Set-up pre-processing and data cleaning for artworks
  - Set-up M-Turk thematic analysis for journals & artwork
  - Set-up NLP framework for Spanish (TBD)

Key learnings this month:
- Out of 50k downloads, we have 7.5k registered players; 4% of players registered voluntarily in last period compared to 1% one year ago, we have this baseline now to compare what new release brings with earlier registration
- Key themes in journals are mental & emotional topics, followed by social relations and dealing with a physical illness; 16% of journals have a prevalent exploratory positive theme in them; Majority of players mention art, drawing, writing in their journals as successful coping strategies; there is a dropoff point for active journal writers at the end of Disruption
- 5 of 6 Top Engagement Prompts by nr of words written are in Discovery, 5 Inquire into Relationships; investigate whether to bring these topics more up front for more players to be exposed to them

Upcoming Decisions
- Thematic analysis of 100 top engaged journals using formal scales from healthmeasures.net?
- Agree on ualitative Analysis Tool / Professional thematic analysis to use for Columbia release

Open Issues
- Navot had to go to military duty - Player profile report pending until he is back
- Combine the data sources pre registration (online Gameanalytics service) / after registration (our in-house analytics database) is not possible; work-around: bring up registration earlier in game with Community Gallery

Changes to Game based on Data Learnings

Date	Learning		Change in the game	Status
May 2021	Drop-off point at the end of disruption, first page of disillusionment		Adapt pacing of game, ensure disillusionment has a more unique feel to it compared to disruption – through story, move messaging system to disillusionment	Run User Tests in June, Implement with Columbia Release
Mar 2021	Players «chew» through content fast		Adapt pacing of game, analyse end of game to ensure engaged players can keep playing	Run User Tests in June, Implement with Columbia Release
Dec 2020	Nr of database records do not match nr of new players in the game		Offer registration much earlier in the game; make it appealing by showing curated Shadowgram art pieces in the «community gallery» to join the community and by highlighting your data will be backed-up to the cloud by registering	Implemented
Dec 2020	Many Journal walls are empty		Need to signal clearly which walls belong to the journal page when painted	Implemented
Dec 2020	Data cleansing is cumbersome		Check for one-word entries or single letter entries and add further data quality enhancements in the game user interface	Run User Tests in June, Implement with Columbia Release
Dec 2020	Many short answers to prompts – maybe related to UI		Change the writing prompt look & feel to convey the page is endless – some players provided feedback that they thought they could not write longer than one screen	Run User Tests in June, Implement with Columbia Release
Dec 2020	No information on gender and age of players – general issue in psychological data available – could be USP		Test new registration screen with next playtest with mandatory vs optional vs no gender and age fields	Tested, Implement with Service Release
Dec 2020	New Gameanalytics data export shows individual player behavior prior to registration – availability 3 months back		Make sure User ID in Cloud Gameanalytics and User ID in Game backend can be matched; potentially need to change cloud analytics service	On hold

Journal data exploration and analysis

Main take-aways so far

Journal Thematic Analysis – Impact for Future

Players write when **something concrete is on their mind or to process a past trauma**, writing just for self exploration happens less.

- Coded **657 Journals** (about 25% of all journals – focusing on more recent entries)
- **306 provided clear information on context / theme / reason to play**
- Rest of journals was not linked to a clear theme / context / reason to play
- Themes often include an intense story / struggle / past trauma

- There seems to be a correlation between clarity of context / theme and intensity of journal writing (statistical analysis pending)
- This matches finding in quantitative data pointing to higher % of engaged serious illness players

- Coding resulted in 414 codes -> from these we can derive around 15 - 20 Meta Category codes
- Idea is to relate the Meta Categories to psychological scales
- This could allow us to measure impact in game
- Need Psychologist to support the creation of this model that we can then translate into game mechanics

MEnTal & Emotional Themes are Prevalent, Followed by Social Relations and Physical Health

Meta Themes in Player Journals

Social Relations, 28%

Mental and Emotional, 50%
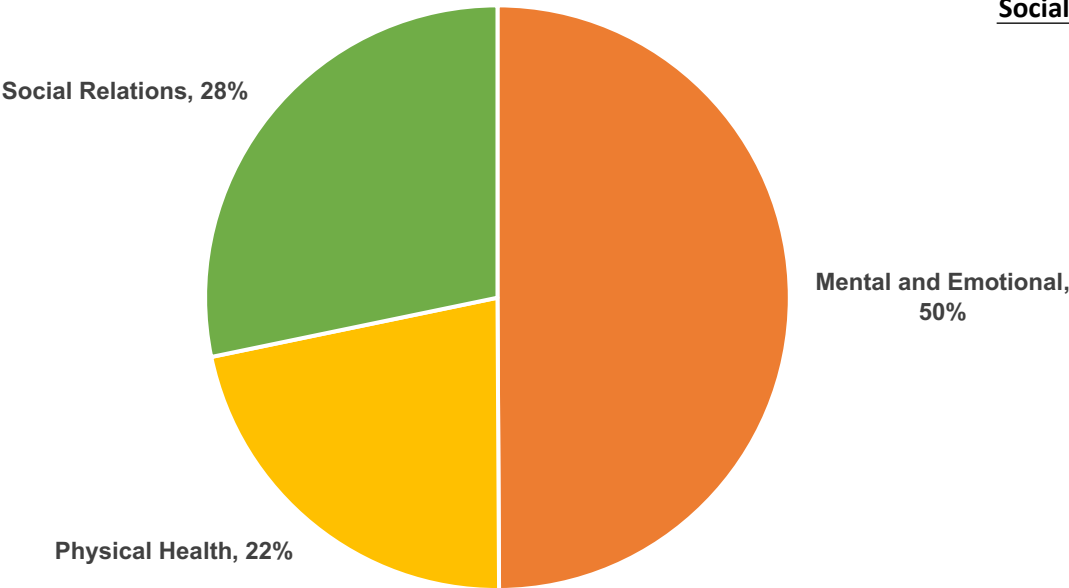
Physical Health, 22%

Meta Theme	Pages	Words	Avg Words/Pages
Mental and Emotional	4661	88287	19
Physical Health	2039	61765	30
Social Relations	2638	49083	19
	9338	199135	21

Journals were coded with a set of terms describing what the journal talks about; then we assigned each journal a single meta-Category and sub-category out of a predefined list

Of the 657 coded Journals so far, 73% had an Identifiable theme, 27% were either gibberish or not codable

Active writers of coded journals so far are 524 players

Breakdown of Mental & Emotional Journal Themes

49% Depression, Anger, Anxiety, Guilt, Shame, Self Worth
key themes found in the data

Meta Theme	Meta Sub-Theme	Pages	Words	% Pages	% Words
Mental and Emotional	Depression, Sadness	863	15'123	19%	17%
	Art, Coping, Being positive, Exploring	757	13'479	16%	15%
	Self acceptance, self worth	700	14'936	15%	17%
	Anger, Anxiety, Guilt, Shame, Trust	683	12'849	15%	15%
	Gender or Sexual Identity	312	5'128	7%	6%
	Growing up, Becoming a Man/Woman	305	5'433	7%	6%
	Control, Self harm, Impulse Control	296	6'736	6%	8%
	Suicidal thoughts or feelings	217	5'353	5%	6%
	Drugs, Addiction, Substance Abuse	183	3'112	4%	4%
	Diagnosis, Borderline, Bipolar, PTSD	147	2'502	3%	3%
	Overwhelmed, Stress	132	2'125	3%	2%
		4'661	**88'287**	**100%**	**100%**

7% LGBTIQ
Journals including Gender & Sexual Identity related thoughts

7% Being a Man / Woman
Themed Journals

16% Positive Strategies
Art, Drawing, Music are key coping strategies that are working

6% Self Harm
Active and recovering

5% Mention of Suicidal Thoughts
today or in the past; no statements about taking action or concrete approaches to end life

Breakdown of Physical Health Sub-Themes

Meta Theme	Meta Sub-Theme	Pages	Words	% Pages	% Words
Physical Health	Serious Illness - Not defined	658	16'984	32%	27%
	Cancer	575	14'171	28%	23%
	Chronic Pain	244	8'722	12%	14%
	Disability	78	1'521	4%	2%
	Leucemia	77	2'227	4%	4%
	Diabetes	74	2'249	4%	4%
	Brain Injury	57	682	3%	1%
	Endometriosis, Diabetes	52	7'999	3%	13%
	Accident	49	1'585	2%	3%
	Heart Condition	36	3'138	2%	5%
	Seizures	36	524	2%	1%
	Gastroenterologic Illness	34	637	2%	1%
	EDS	30	275	1%	0%
	Hearing Loss	24	889	1%	1%
	Dysphagia	15	162	1%	0%
		2'039	61'765	100%	100%

32% Non specific but talk about i.e. "my illness", "being sick"

56% Specific Illness Journals that mention a serious illness, today or in the past; the most mentions are Cancer (28%)

12% Living with Chronic Pain and the impact on daily life and impact on social relations

Social Relationships Sub-Themes

Meta Theme	Meta Sub-Theme	Pages	Words	% Pages	% Words
Social Relations	Loss, Grief	512	8'531	19%	17%
	Isolation, Loneliness	419	6'293	16%	13%
	Abuse, Assault	398	7'283	15%	15%
	Relationships, Family, Friends, Love, Separation	375	5'344	14%	11%
	Job, School, Finances	253	5'117	10%	10%
	Pandemic	250	9'239	9%	19%
	Abandonment	177	3'061	7%	6%
	Bullying, Racism	105	2'414	4%	5%
	Family or Friend is ill	89	1'036	3%	2%
	Being a parent or caretaker	60	765	2%	2%
		2'638	49'083	100%	100%

19% Loss & Grief
can be death of a parent, family member or friend

16% Isolation & Loneliness
Including the fear that loneliness will never go away

9% Pandemic
of journals talk about the individual effects of the pandemic

15% Abuse or Assault
Mainly in the past and writing about impact on today's life still

7% Abandonment
Mainly in the past and writing about impact on today's life still

Possible Next Steps

- Review results with psychologist
- Decide on official scales to map Categories and Sub-categories to
  (i.e. free scales from healthmeasures.net)
- Re-code a subset of journals using the new codes by people unrelated to the project, i.e.
  a) Psychologist
  b) M-Turk Experiment

Healthmeasures.net - PROMIS Scales (Free)

Free scales on healthmeasures.net

List of Pediatric Measures

Available PROMIS® Measures for Pediatric Self-Report (ages 8-17) and Parent Proxy Report (ages 5-17)

Pediatric and Parent Proxy Domains	Definition	Pediatric Bank/ Scale # items	Short Form # items
Global Health*	Overall evaluation of one's physical and mental health.	7, 9	
Mental Health			
Cognitive Function	Difficulties in cognitive abilities (e.g., memory, attention, and decision making), and difficulties in the application of such abilities to everyday tasks (e.g., planning, organizing, calculating, remembering, and learning).	43	7
Emotional Distress – Anger	Angry mood (irritability, frustration), negative social cognitions (interpersonal sensitivity, envy, disagreeableness), and efforts to control anger.	9	5
Emotional Distress – Anxiety	Fear (fearfulness, panic), anxious misery (worry, dread), hyperarousal (tension, nervousness, restlessness), and somatic symptoms related to arousal (racing heart, dizziness).	15	8
Emotional Distress – Depressive Symptoms	Negative mood (sadness, guilt), views of self (self- criticism,worthlessness), and social cognition (loneliness, interpersonal alienation), as well as decreased positive affect and engagement (loss of interest, meaning, and purpose).	14	8
Life Satisfaction	Global and context-specific evaluations of a child's life. Conceptual facets include global evaluations of life, context-specific evaluations of life, assessments of life conditions, and comparisons of one's life with others' lives.	42	4, 8a, 8b
Meaning and Purpose	A child's sense that life has purpose and there are good reasons for living, including hopefulness, optimism, goal-directedness, and feelings that one's life is worthy.	44	4, 8
Positive Affect	A child's momentary positive or rewarding affective experiences, such as feelings and mood associated with pleasure, joy, elation, contentment, pride, affection, happiness, engagement, and excitement.	39	4, 8
Psychological Stress Experiences	The thoughts or feelings about self and the world in the context of environmental or internal challenges. Items represent 3 facets of psychological stress reactions: feeling overwhelmed, perceived lack of control of capacity to manage one's life, and cognitive-perceptual disruption.	19	4, 8

Physical Health			
Asthma Impact	Asthma-specific symptoms that include cough, wheeze, shortness of breath, and avoidance of triggers. Also, asthma-associated impacts such as missing school or activities with other children.	17	8
Fatigue	Range of symptoms, from mild subjective feelings of tiredness to an overwhelming, debilitating, and sustained sense of exhaustion.	25	10
Pain – Behavior	Behaviors that typically indicate to others that an individual is experiencing pain. These actions or reactions can be verbal or nonverbal, and involuntary or deliberate.	47	8
Pain – Interference	Consequences of pain on relevant aspects of one's life. This includes the extent to which pain hinders engagement with social, cognitive, emotional, physical, and recreational activities.	20	8
Pain Quality	Specific physical sensations and affective components associated with pain. Because pain can be felt and described in so many ways, this category of pain contains a variety of attributes, such as perceived temperature (e.g., cold), sensations (e.g., throbbing), and perceived affective qualities of pain (e.g., uncomfortable).	56	
Pain Quality - Affective			8
Pain Quality - Sensory			8
Physical Activity	Self-reported capability rather than actual performance of physical activities. This includes the functioning of one's upper extremities (dexterity), lower extremities (walking or mobility), and central regions (neck, back), as well as instrumental activities of daily living.	10	4, 8
Physical Function – Mobility	Activities of physical mobility such as getting out of bed or a chair to activities such as running.	24	8
Physical Function – Upper Extremity	Activities that require use of the upper extremity including shoulder, arm, and hand activities.	34	8
Physical Stress Experience	The physically experienced sensations associated with responses to internal or external challenges including arousal, agitation, pain, and gastrointestinal distress.	26	4, 8
Sleep-Related Disturbance	Assesses reported thoughts of one's sleep quality, and perceived difficulties with falling or staying asleep. Conceptual facets include sleep quality, sleep onset, and sleep continuity.	15	4, 8
Sleep-Related Impairment	Assesses perceptions of sleepiness during usual awake hours and reported impairments during the day associated with sleep problems or daytime sleepiness. Conceptual facets include daytime sleepiness, sleep offset, impact: cognitive, impact: activities, and impact: emotional.	13	4, 8
Strength Impact	A child's capacity to perform functional activities of daily living that require significant amount of muscle force generation.	12	4, 8

Social Health			
Peer Relationships	Quality of relationships with friends and other acquaintances.	15	8
Family Relationships	The subjective (affective, emotional, cognitive) experience of being involved with one's family, feeling like an important person in the family, of feeling accepted and cared for, and feeling that family members, especially parents, can be trusted and depended on for help and understanding.	47	4, 8
Profiles			
PROMIS Pediatric/Parent Proxy Profile 25	A collection of 4-item short forms assessing anxiety, depressive symptoms, fatigue, pain interference, physical function-mobility, and peer relationships as well as a single pain intensity item.		25
PROMIS Pediatric/Parent Proxy Profile 37	A collection of 6-item short forms assessing anxiety, depressive symptoms, fatigue, pain interference, physical function-mobility, and peer relationships as well as a single pain intensity item.		37
PROMIS Pediatric/Parent Proxy Profile 49	A collection of 8-item short forms assessing anxiety, depressive symptoms, fatigue, pain interference, physical function-mobility, and peer relationships as well as a single pain intensity item.		49

Healthmeasures.net - NIH Scales (Free)

Free scales on myhealthmeasures.org

NIH Toolbox Emotion Battery – Ages 8-17 Self-Report

Construct	Measure	Description	# of Items	Preview	Manual
Negative Affect					
Anger	Anger FF Ages 8-17 v2.0	Attitudes of hostility and cynicism often associated with experiences of frustration impeding goal-directed behavior.	5	Preview Measure	User Guide
Fear	Fear FF Ages 8-17 v2.0	Symptoms of anxiety that reflect autonomic arousal and perceptions of threat.	8	Preview Measure	User Guide
Sadness	Sadness FF Ages 8-17 v2.0	Low levels of positive affect; comprised of symptoms that are primarily affective (poor mood) and cognitive (negative perceptions of self, the world, and the future) indicators of depression.	8	Preview Measure	User Guide
Psychological Well-Being					
Emotion Control	Emotion Control FF Ages 8-17 v2.0	Refers to the ability to control the frequency and intensity of positive and negative emotions when they occur.	10	Preview Measure	User Guide
Positive Affect	Positive Affect CAT Ages 13-17 v2.0	Feelings that reflect a level of pleasurable engagement with the environment, such as happiness, joy, excitement, enthusiasm, and contentment.	CAT	Preview Measure	User Guide
	Positive Affect FF Ages 13-17 v2.0		10	Preview Measure	User Guide
	Positive Affect FF Ages 8-12 v2.0		9	Preview Measure	User Guide
Life Satisfaction	General Life Satisfaction CAT Ages 13-17 v2.0	One's cognitive evaluation of life experiences and whether one likes his/her life or not.	CAT	Preview Measure	User Guide
	General Life Satisfaction FF Ages 8-12 v2.0		5	Preview Measure	User Guide

Stress & Self-Efficacy					
Perceived Stress	Perceived Stress FF Ages 13-17 v2.0	Individual perceptions about the nature of events and their relationship to the values and coping resources of an individual.	10	Preview Measure	User Guide
Self-Efficacy	Self-Efficacy CAT Ages 13-17 v2.0	A person's belief in his/her capacity to manage functioning and have control over meaningful events.	CAT	Preview Measure	User Guide
	Self-Efficacy CAT Ages 8-12 v2.0		CAT	Preview Measure	User Guide
Social Relationships					
Social Support	Emotional Support FF Ages 8-17 v2.0	The perception that people in one's social network are available to listen to one's problems with empathy, caring, and understanding.	7	Preview Measure	User Guide
Companion-ship	Loneliness FF Ages 8-17 v2.0	Perceptions that one is alone, lonely, or socially isolated from others.	7	Preview Measure	User Guide
	Friendship FF Ages 8-17 v2.0	Perceptions of the availability of friends or companions with whom to interact or affiliate.	5	Preview Measure	User Guide
Social Distress	Perceived Hostility FF Ages 8-17 v2.0	The extent to which an individual perceives his/her daily social interactions as negative or distressing. This can include aspects of perceived hostility (e.g., how often people argue with me, yell at me, or criticize me) and perceived insensitivity (e.g., how often people don't listen when I ask for help, or don't pay attention to me).	5	Preview Measure	User Guide
	Perceived Rejection FF Ages 8-17 v2.0		5	Preview Measure	User Guide

Release Engagement Comparison

Serious Illness - General Teen – Path to Mastery Release

Release Engagement Comparison

Timeframe	Aug'17-Jul'19	Aug'19-Oct'20	Nov '20-Apr'21		
Release	Serious Illness Release	General Teen Release	Path to Mastery		
Months covered	24	15	6		Retention Observation
Total Downloads	6'110	29'368	51'843		
New Players in Period	6'110	23'258	22'475		
Average new Players / Month	255	1'551	3'746	242%	Campaigns 2021 tripled average user growth / month
Distinct Registered People	6'110	6'400	7'118		Emails with registrations
New Player IDs in Backend	6'110	290	917		Players who created at least one journal entry
% Registered Players	100%	1%	4%	4%	Registration was mandatory in the beginning
Game Engagement					
Journal Entries Overall	16'792	18'038	35'216		Journal entries doubled in the last six months
Journal Entries Period	5'879	12'144	17'193		
Journal Entries / Month	245	810	2'866	354%	Journal entries increase stronger than player numbers
Journal Writers in Period	681	778	1'013	130%	
Journal Writers / Month	28	52	169	326%	Journal Writers increase stronger than new player numbers
Average Journal Entries / Writer	9	16	17	197%	They don't write more, but more people write
% Journal Writers/New Players / month	11%	3%	5%		Serious illness players have more writers
Shadowgram Posts Overall	1'587	3'779	5'383		
Shadowgram Posts Period	1'587	2'192	1'604		
Average new Posts / Month	66	146	267	183%	Shadowgram Posts increase stronger than player numbers
Shadowgramers in period	120	251	301		As many people posting to Shadowgram in last six months as in 2 years before
Shadowgramers/Month	5	17	50	300%	
Average posts / Shadowgramer	13	9	5		Shadowgramers more active
% Shadowgram Posters	2%	1%	1%		

+242% Player Growth
New Campaigns are showing better results. Average CPI USD 1 can be lowered to industry benchmark 0.45 – 0.80 with consisten UA execution

4x
More plays up to disillusionment

Journal Data Doubled
in last six months, high engagement in journals

Serious Illness Community has higher % of writers
Journals / player
Posts / player higher

3x more people posting
Shadowgram becomes a livelier and diverse place with campaigns; community rule of thumb: 1% content creators, 8% likers / supporters, rest lurkers

Lowering the threshold for mental Health support

Cost of therapy in the US

USD 45 subsidized cost/therapy hour

USD 100-200 cost/private therapy

- **Many therapists decline to accept insurance!**
- **Cost with a private therapist USD 100 – 200**
- **Cost for subsidized treatment can be lower with long waitlists**

https://www.psychologytoday.com/us/basics/therapy/cost-and-insurance-coverage

Shadow's Edge Acquisition Cost

USD 1 media spend/download

USD 25 media spend/engaged player

Experience of players who play until Phase 2 "Disillusionment"

- **Learn about using journaling and art to support yourself**
- **Find at least 14 prompts**
- **Can discover four pigeons**
- **Can do breathing exercise**

Player Profiles

Analysis of quantitative play-data including unregistered players

Analysis of full Dataset (including unregistered Players) - Navot / SyDnie Analysis

Questions to answer

- How many players choose to register vs not register?

- What is the behaviour of unregistered players?

- What player profiles are there based on type of engagement (writing, art, exercises, walk-thru or any combination)?

- Make a principal component analysis on the questions / are there clusters that produce more engagement, less engagement?

- What is the relation between pages answered / walls painted –can we confirm the hypothesis that there are writers, artists, searchers, and players combining all? And what is the ratio of them? Does any behavior indicated how long they will stick with the game?

- What player profiles do we see based on play duration?

Journal data exploration and analysis

Main take-aways so far

Data cleaning and preprocessing

Journaling data cleaning process:

- Dropping all empty, NaNs and otherwise no text inputs.
- Tokenizing the sentences into single word vectors.
- Dropping all stopwords (commonly used, short, function words)
- Comparing each word to the English dictionary, to determine if it is in English or not.
- Dropping all entries that had more then 50% non-English words.

Main finding:

At the end of the process, we lost close to 50% the data. That is partly expected, as some of the data is not in English. However, more writing inviting UI should be considered.

Two thirds of participants who write in the journal create readable texts; one third enters jibberish or single letters or words

Majority of new players in December has not registered (yet)

Number of entries left

Stage	Original Size	No Empty Cells	English Only	No Single words
Number	15871	15476	9340	7366
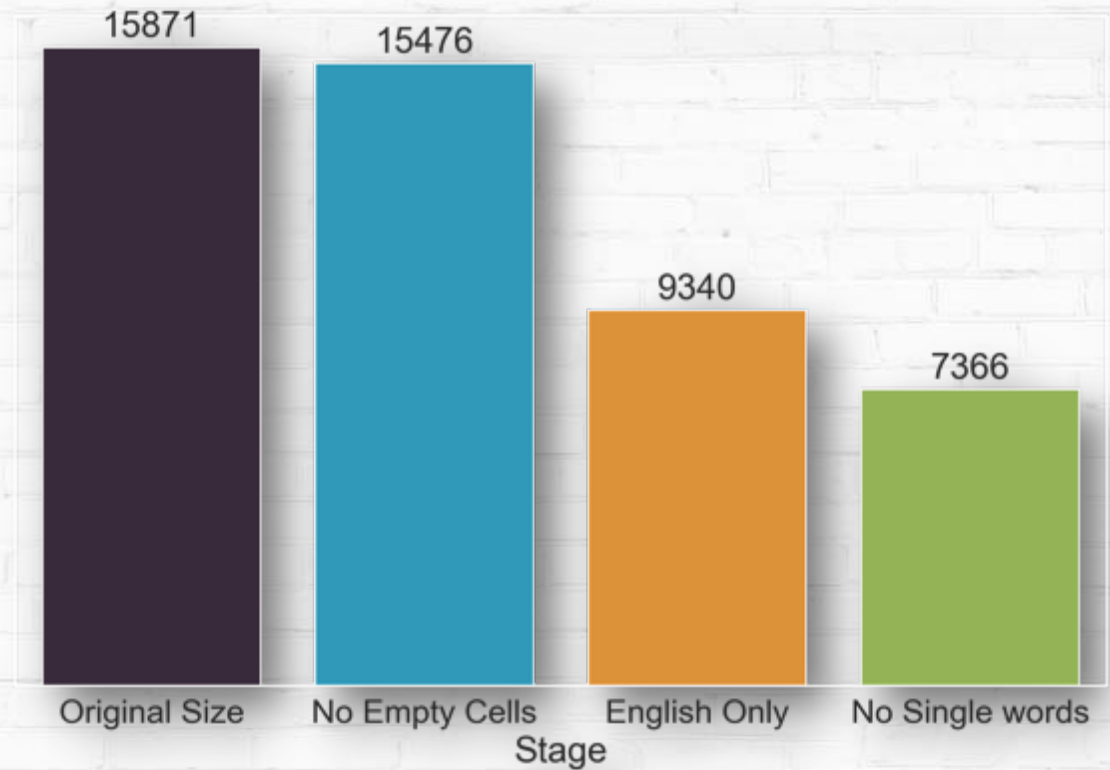
Most journal entries have less than 15 words – this is consistent across phases, slightly more words in discovery
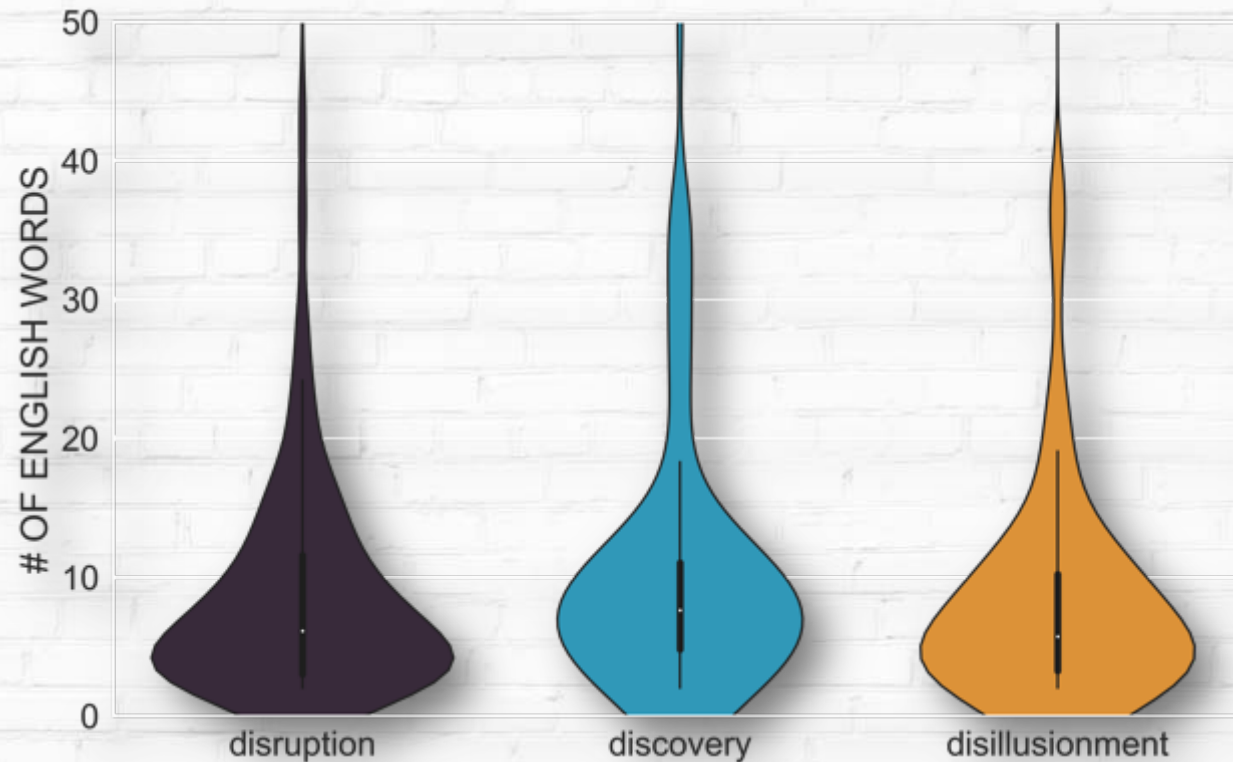
Number of content carrying English words was used as an indicator for engagement with journaling

Main findings

- There is a high number of outliers in the data → we need to decide how we treat those.

- There seem to be no to little difference as far as overall engagement between the different game phases. → A deeper exploration of the content conveyed in different phases could be beneficial.

Engagement (number of words) per game block
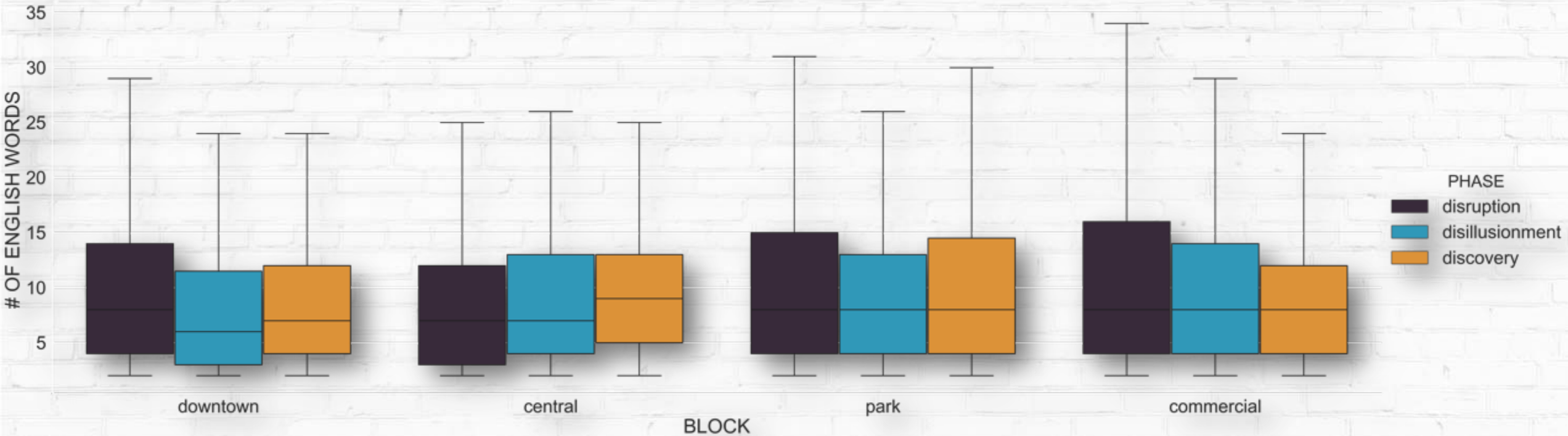
two Distinct player populations

There are close to 40% of participants have journaled only once, forming a distinct group.

Main findings

- Need to correlate with a similar counting process of art works, to see if those are just unengaged participants, or if there is a group that primarily paint, and a group that primarily journal.
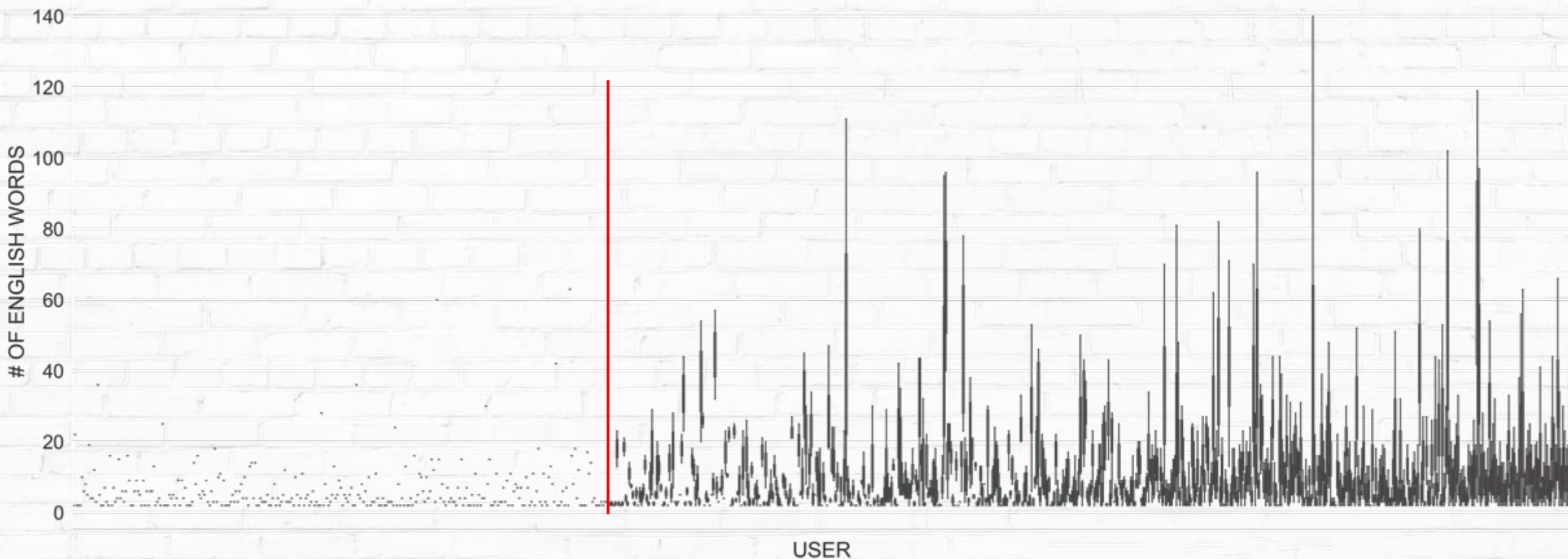
Overall number of words used Per page across all players
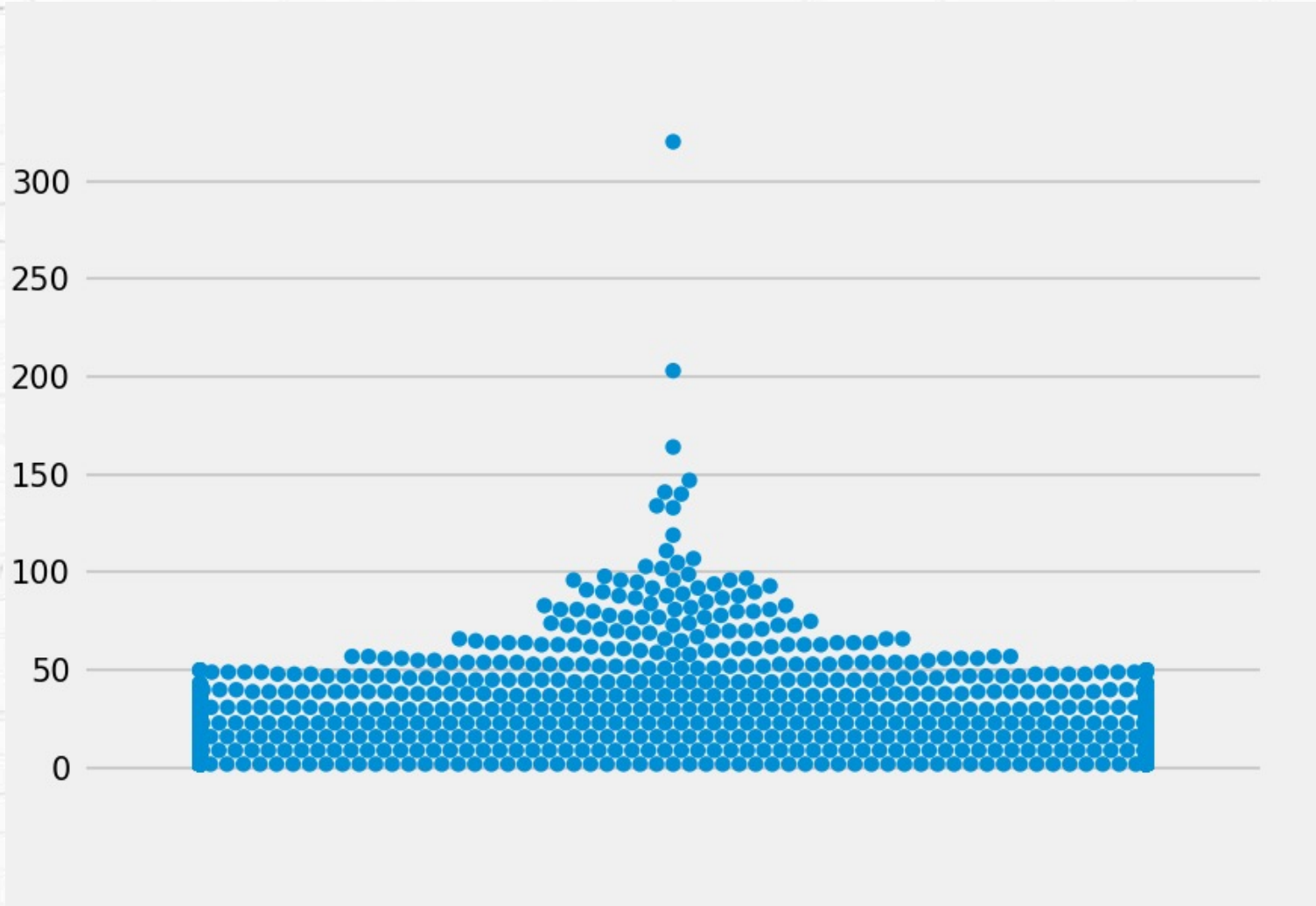
Some pages attract more words than others Average number of words Per journal Prompt
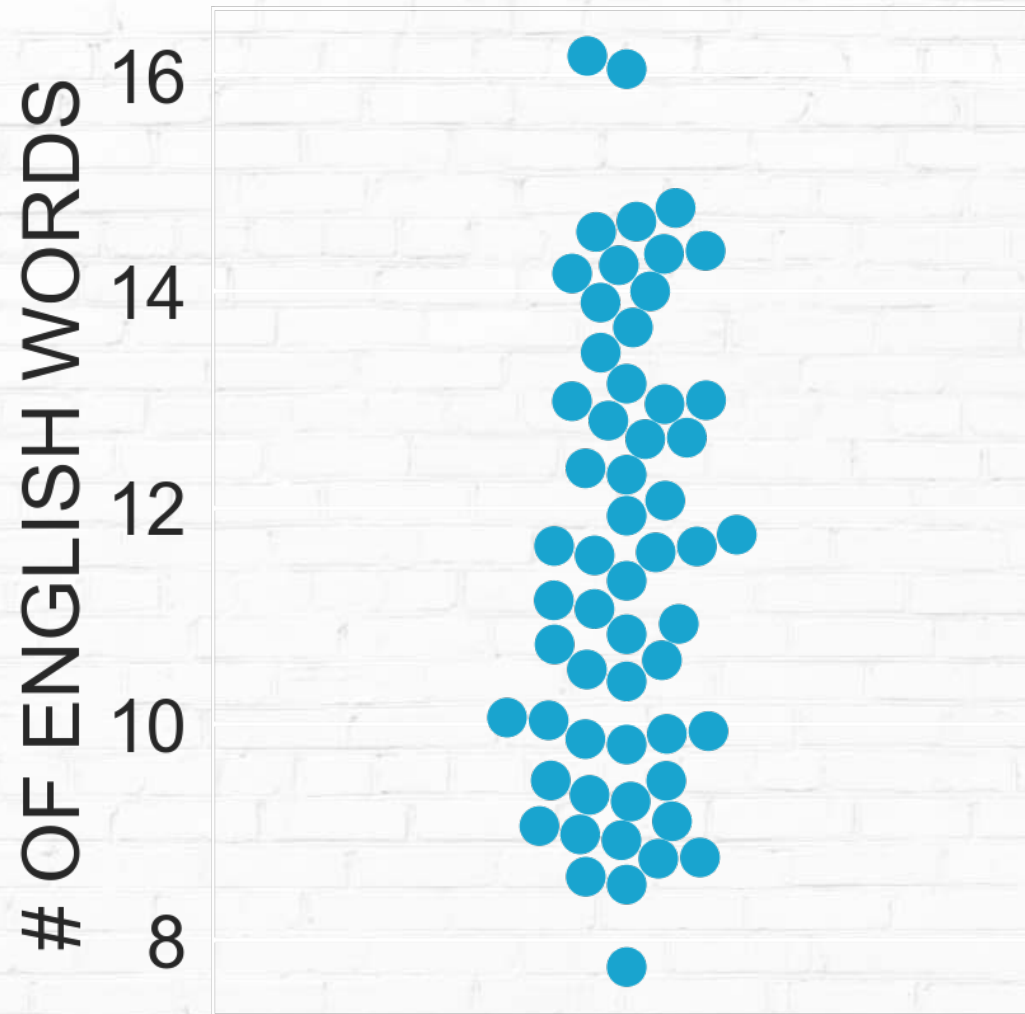
Engagement per Prompt
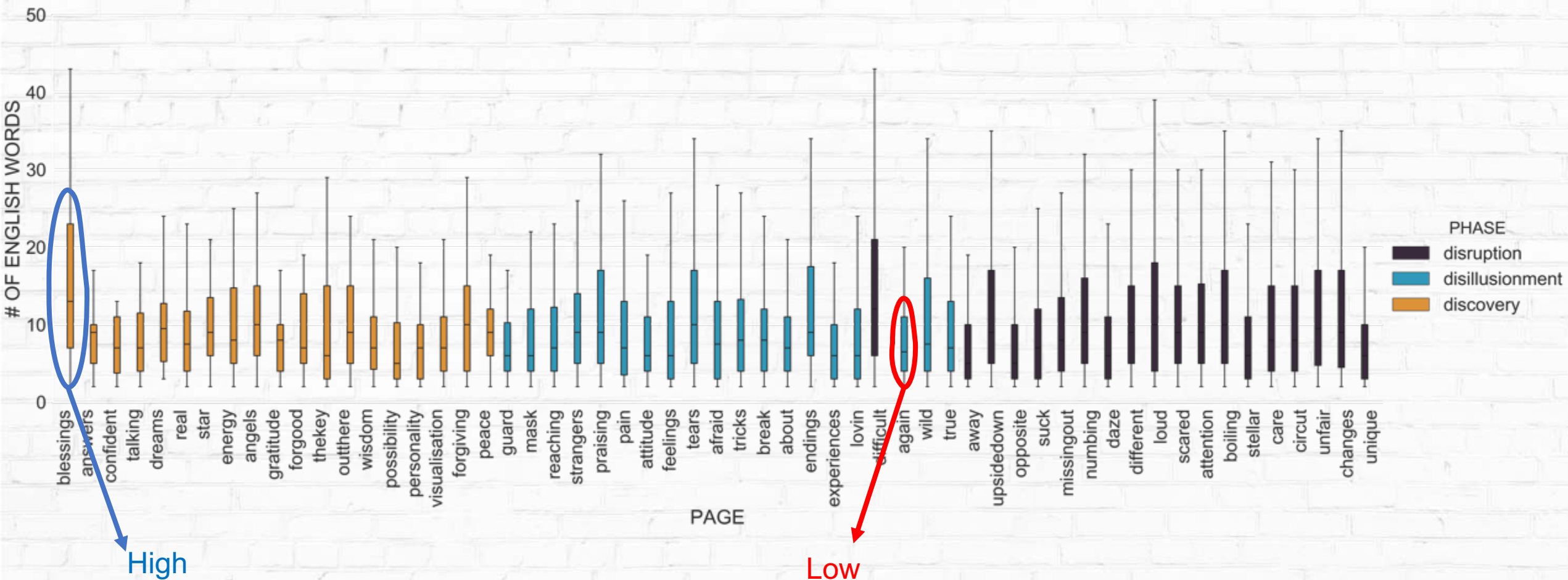
5 of 6 Top Engagement Prompts are in Discovery, 5 Inquire into Relationships

Rank	Page		Avge # words	Phase
1	**blessings after the storm**	**What is your *rainbow* after the storm?**	**16.2**	**Discovery**
2	difficult people	When was someone *mean* to you?	16.1	Disruption
3	**Angels fly**	**Where do you find *hope*?**	**14.8**	**Discovery**
4	**Star in your own story**	**Put your challenge on the *big screen*!**	**14.6**	**Discovery**
5	**Getting Cofident**	**Step over your *shadow*!**	**14.6**	**Discovery**
6	**forgiving**	**Who's *let you down*?**	**14.4**	**Discovery**
7	guard (my armor)	When do you put up your *guard?*	14.3	Disillusionment
8	upsidedown world	Have you ever asked "why me?"	14.2	Disruption
9	Endings and Beginnings	How are your relationships *changing*?	14.2	Disillusionment
10	loud	What have you *overheard* that has left you worried?	14.0	Disruption

What does this mean: it is surprising as this list does not correspond to the ranking of most answered prompts, so it seems a relevant finding. Relationships and connection often come up in player interviews also as difficult and strongly impacted when «dealing» with stuff and are often also the cause of issues; maybe discovery entices to write more, because it is writing about hope and joyful things, maybe it is also that player who play the game through get more into the writing.
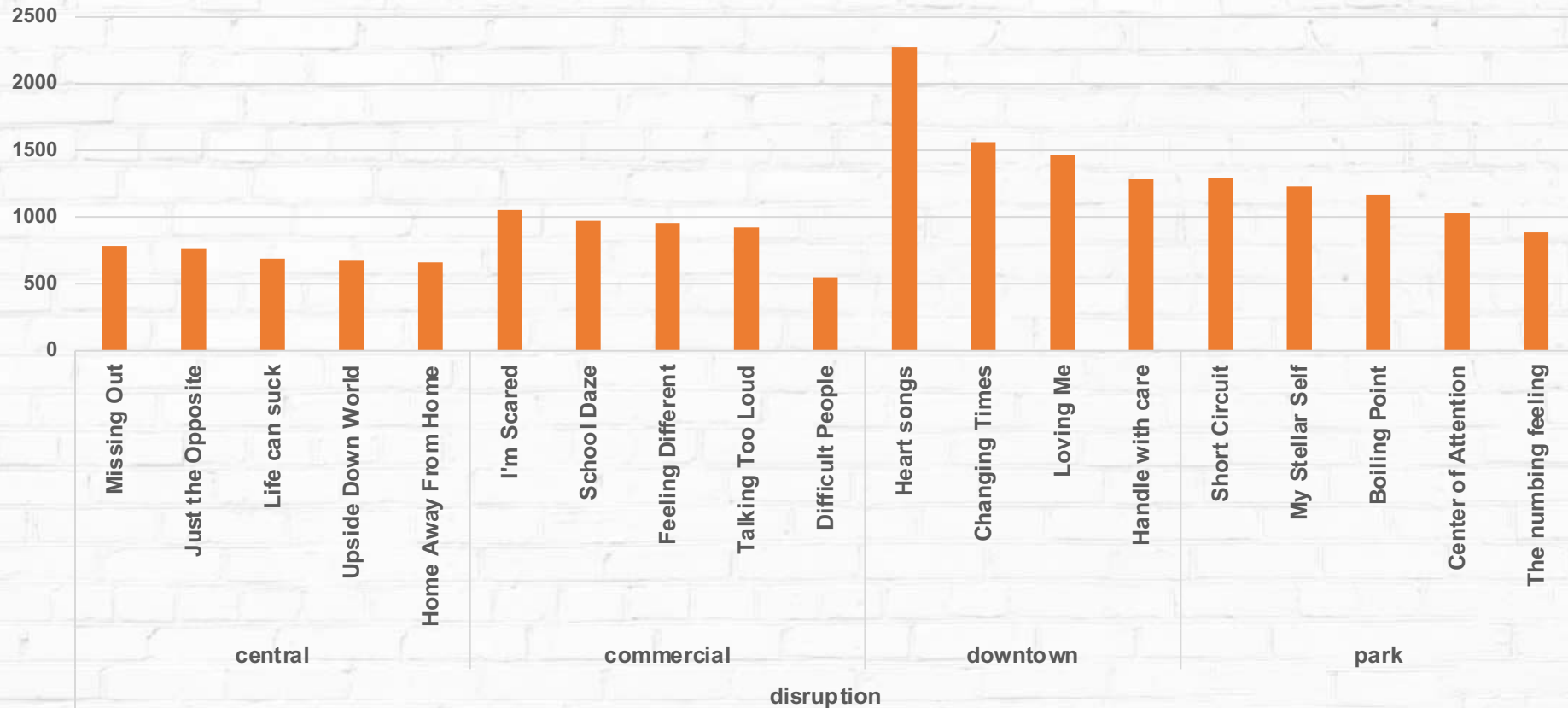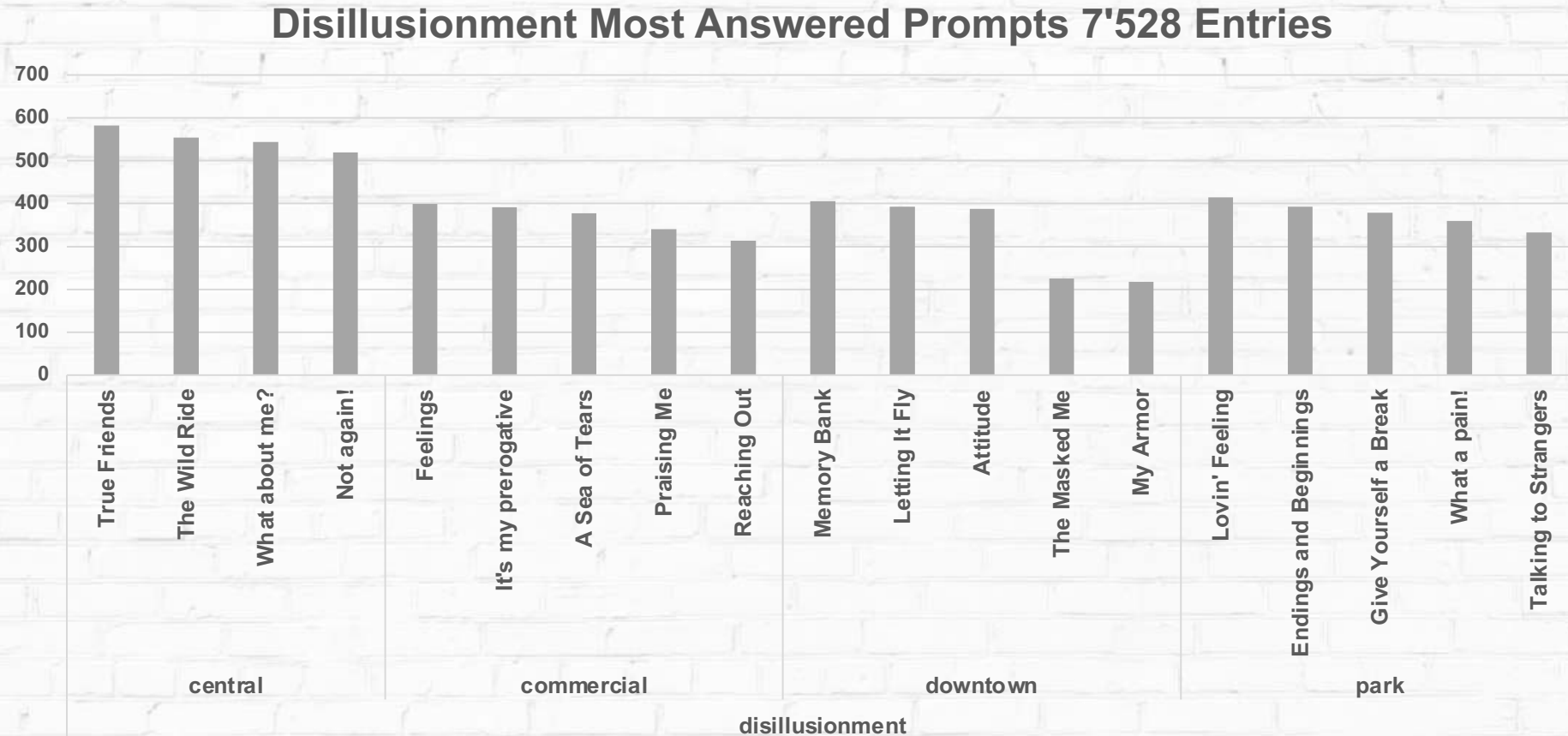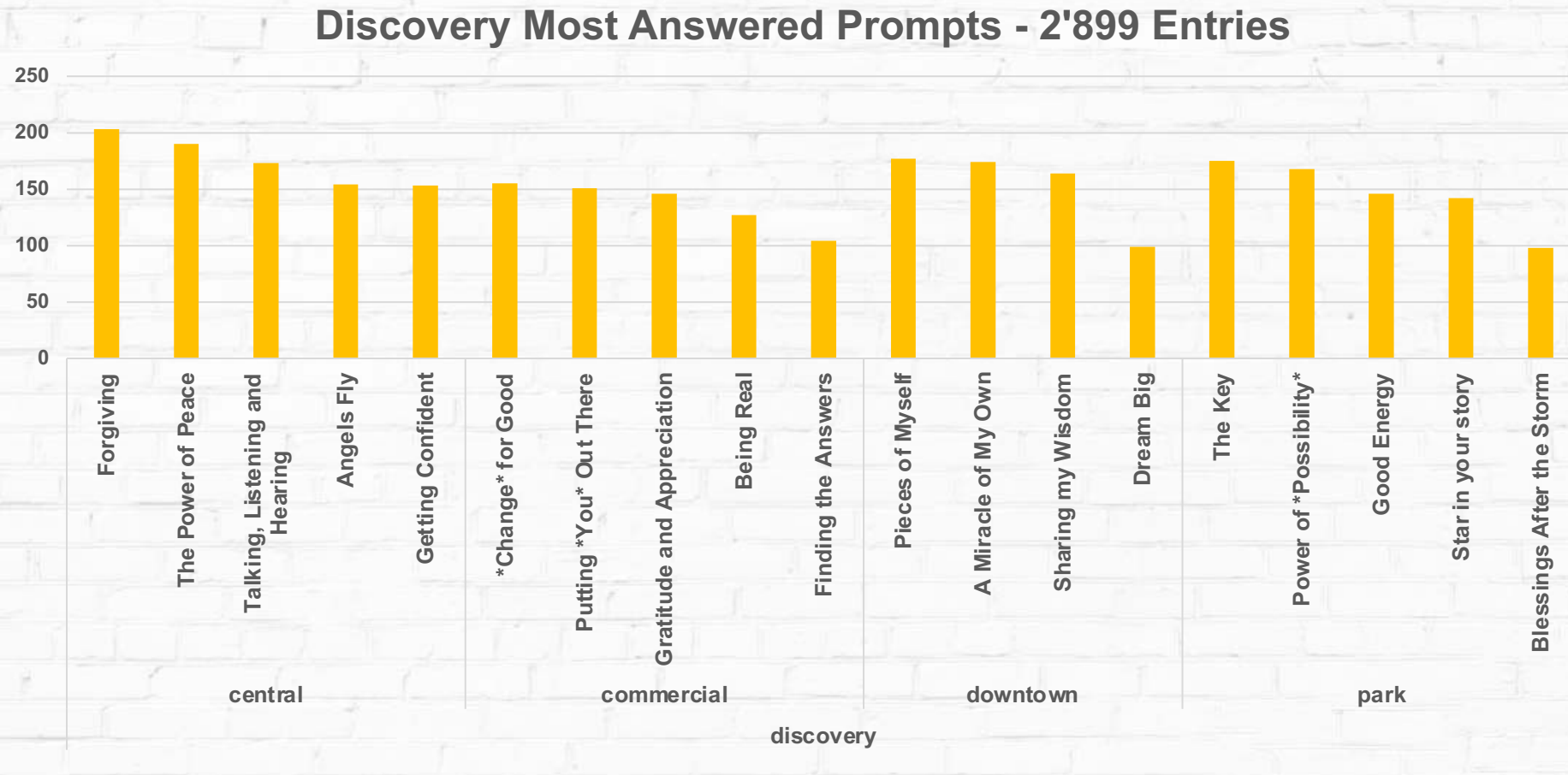
Sentiment Analysis

Automated analysis of sentiment across all journal entries

VADER-NLP

Step One

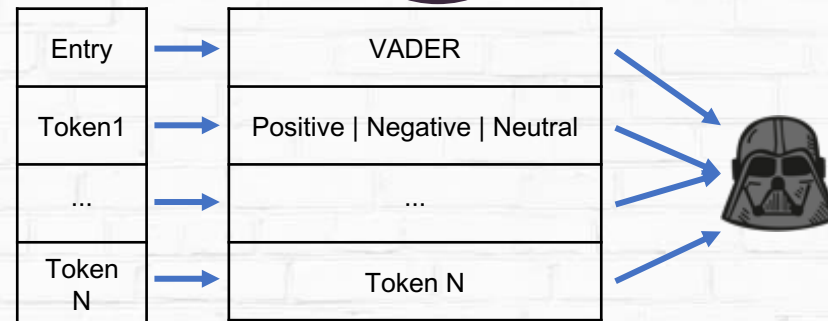Collecting journaling
Data set

Step Two

Pre-processing

English only
Stop words
single words

Step Three

VADER scoring

Entry	→	VADER
Token1	→	Positive | Negative | Neutral
...	→	...
Token N	→	Token N

Step Four

Sentiment
classification

Compound score

Sign – polarity
Value - intensity
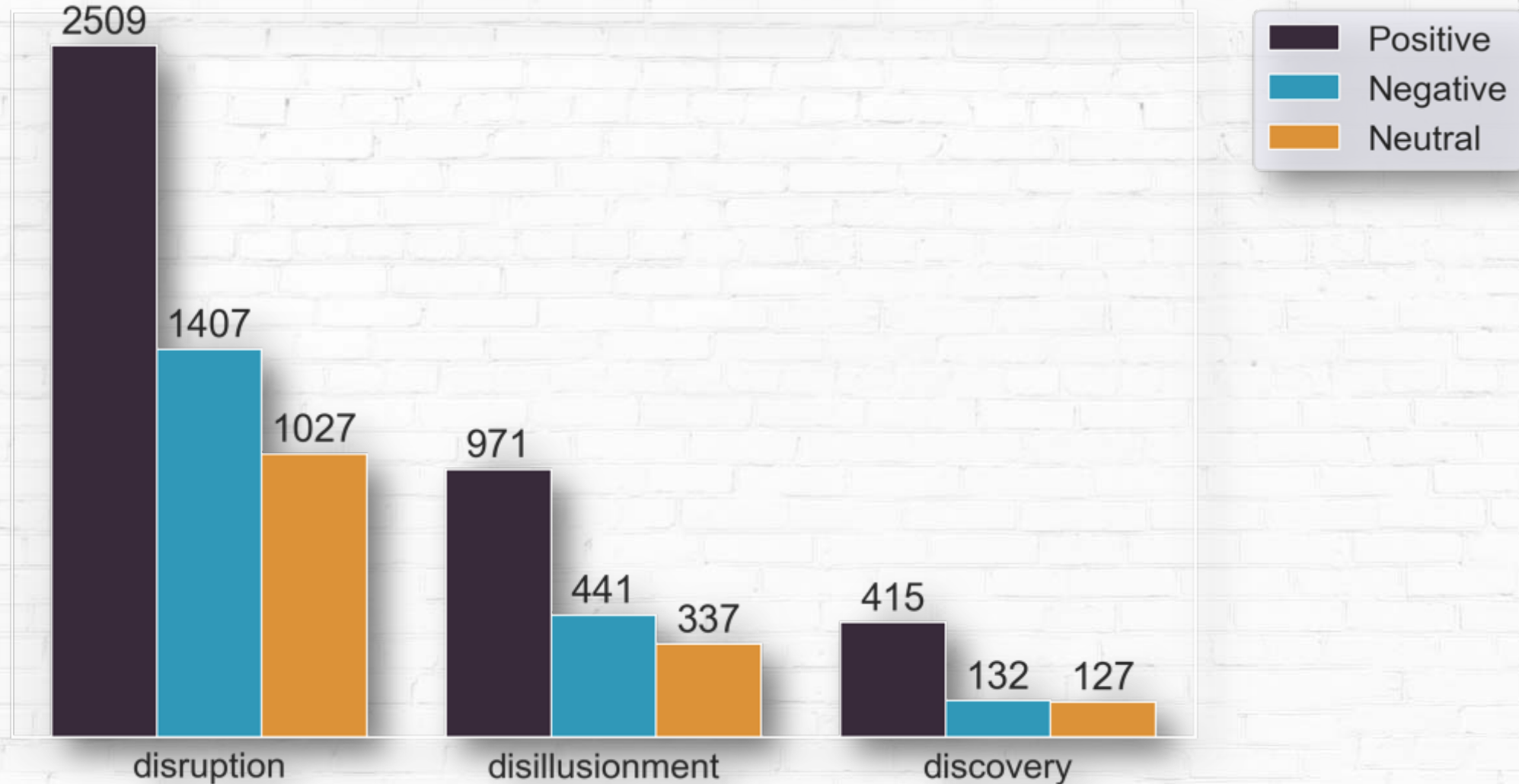
Overall intensity of positive and negative sentiments
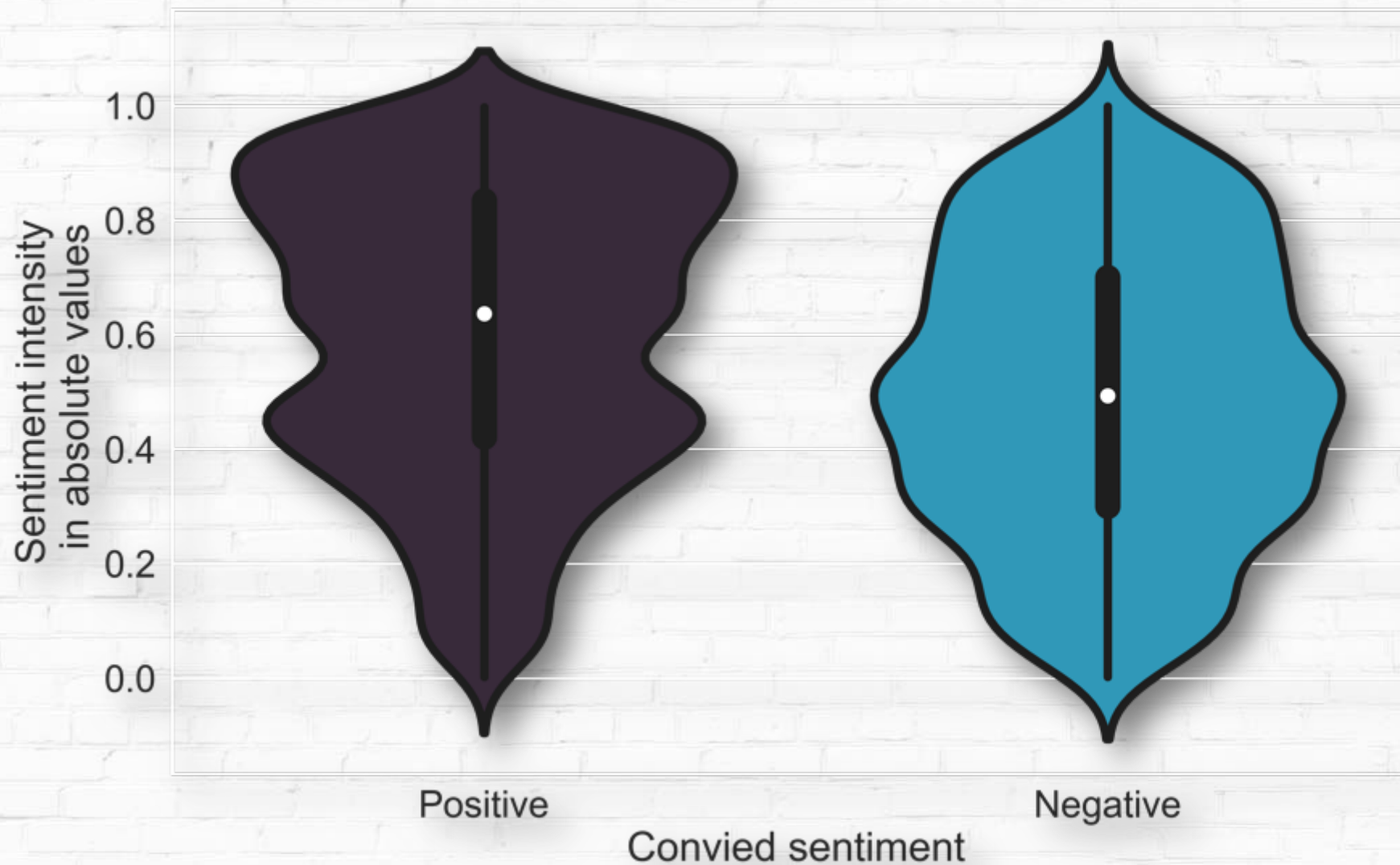
Overall positive sentiments had stronger intensity.

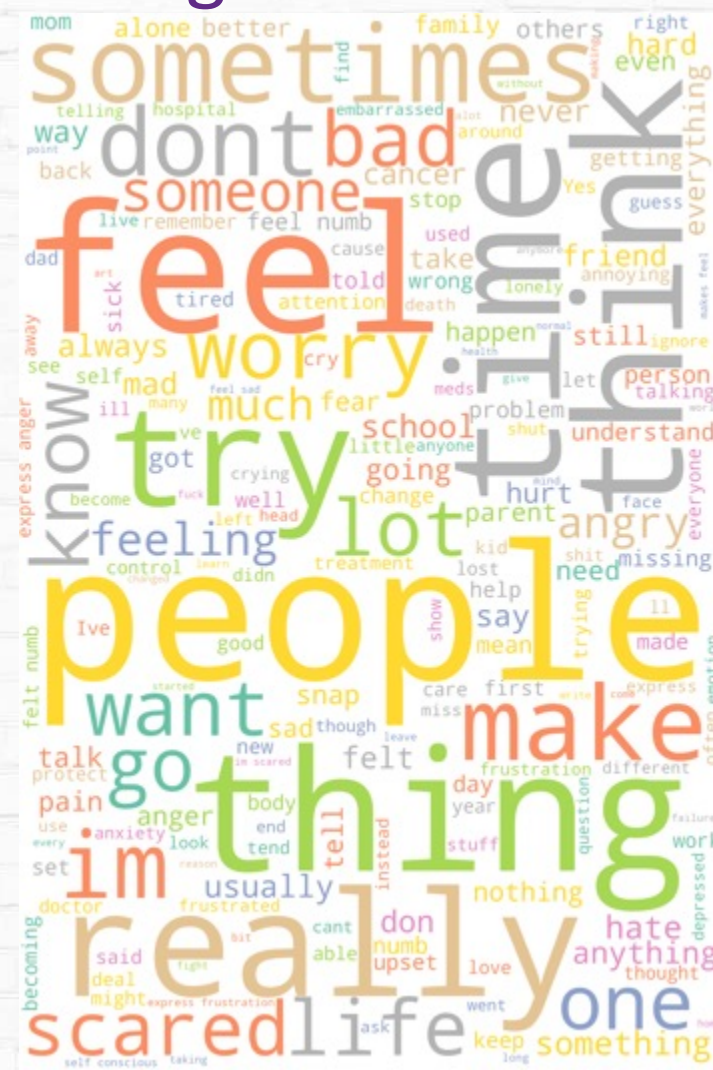# Number of journal entries per sentiment for each phase

Proportion of positive to negative entries increases as players advance in the game

Disruption

Positive entries

Negative entries

Disillusionment

Positive entries

Negative entries

Discovery

Positive entries

Negative entries