

Analysis of Trader Behavior and Market Sentiment

1. Introduction

This report analyzes the relationship between trader behavior and market sentiment using historical trader data from Hyperliquid and Bitcoin market sentiment data (Fear & Greed Index). The objective is to explore how trading behavior metrics such as profitability (Closed PnL), trade volume (Size USD), and leverage align with or diverge from overall market sentiment, and to identify potential trends or trading signals.

2. Data Overview

The analysis utilized two datasets:

- Historical Trader Data: Contains detailed records of individual trades including execution price, size, PnL, leverage, side, and timestamps (211224 records).
- Bitcoin Market Sentiment Data: Provides daily Fear & Greed Index values and classifications (2644 records).

The datasets were merged based on date to align trader activity with prevailing market sentiment.

3. Analysis of Sentiment and Behavior

Market sentiment was categorized into Extreme Fear, Fear, Neutral, Greed, and Extreme Greed. The distribution of trading activity across these categories was analyzed, showing the frequency of each sentiment classification in the sentiment dataset.

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Descriptive statistics for key trader behavior metrics (Closed PnL and Size USD) were calculated across all trades:

	Closed PnL	Size USD
count	211224.000000	2.112240e+05
mean	48.749001	5.639451e+03
std	919.164828	3.657514e+04
min	-117990.104100	0.000000e+00
25%	0.000000	1.937900e+02
50%	0.000000	5.970450e+02
75%	5.792797	2.058960e+03
max	135329.090100	3.921431e+06

A correlation analysis was performed between the numerical sentiment value and key trader behavior metrics (Closed PnL, Size USD, and leverage). The analysis showed generally weak linear correlations, suggesting that a simple linear relationship is not the primary driver of the interaction between sentiment and these specific trader metrics.

	value	Closed PnL	Size USD	leverage
value	1.000000	0.008121	-0.029843	0.002247
Closed PnL	0.008121	1.000000	0.123589	-0.000977
Size USD	-0.029843	0.123589	1.000000	0.303527
leverage	0.002247	-0.000977	0.303527	1.000000

Average trader behavior metrics (Closed PnL, Size USD, and leverage) were calculated and compared across different market sentiment classifications.

	Closed PnL	Size USD	leverage
classification			
Extreme Fear	34.537862	5349.731843	1.258573e+11

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Extreme Greed	67.892861	3112.251565	2.213076e+11
Fear	54.290400	7816.109931	1.815878e+11
Greed	42.743559	5736.884375	2.267761e+11
Neutral	34.307718	4782.732661	2.499719e+11

Trading outcomes, including win rates, average winning trade PnL, and average losing trade PnL, were analyzed for each sentiment classification.

	classification	win_rate	avg_winning_pnl	avg_losing_pnl
0	Extreme Fear	0.370607	173.424767	-257.099629
1	Extreme Greed	0.464943	160.593269	-119.920289
2	Fear	0.420768	151.840935	-156.662401
3	Greed	0.384828	165.761711	-181.967329
4	Neutral	0.396991	112.439432	-121.727849

The analysis also explored how the trade side ('BUY' or 'SELL') interacts with market sentiment to influence average Closed PnL and average Size USD.

	classification	Side	avg_closed_pnl	avg_size_usd
0	Extreme Fear	BUY	34.114627	5161.502485
1	Extreme Fear	SELL	34.980106	5546.414885
2	Extreme Greed	BUY	10.498927	3363.034672
3	Extreme Greed	SELL	114.584643	2908.231569
4	Fear	BUY	63.927104	8154.666208
5	Fear	SELL	45.049641	7491.463987
6	Greed	BUY	25.002302	6306.490894
7	Greed	SELL	59.691091	5192.761477
8	Neutral	BUY	29.227429	3881.410441
9	Neutral	SELL	39.456408	5696.190011

4. Key Findings and Potential Trading Signals

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Based on the analysis, the key findings and potential trading signals are:

- **Sentiment Distribution:** Trading activity was present across all sentiment classifications, with 'Fear' and 'Greed' being the most frequent.
- **Average Profitability by Sentiment:** Average Closed PnL varied by sentiment, with 'Extreme Greed' showing the highest average profitability.
- **Average Trade Size by Sentiment:** Average trade size (Size USD) was largest during 'Fear' periods.
- **Correlation:** Weak linear correlations were observed between sentiment value and trader behavior metrics.
- **Trading Outcomes by Sentiment:** 'Extreme Greed' periods had the highest win rate, while 'Extreme Fear' had the largest average loss per losing trade.
- **Trading Outcomes by Sentiment and Side:** The average profitability and size of 'BUY' vs. 'SELL' trades differed across sentiment classifications, highlighting potential sentiment- and direction-specific trading opportunities (e.g., 'SELL' trades during 'Extreme Greed' showed higher average PnL).
- **Temporal Analysis:** Visual inspection of rolling averages of trader metrics and sentiment over time suggested potential temporal relationships, but formal lead/lag analysis is needed for confirmation.

Potential Trading Signals identified:

- **Sentiment-Specific Strategies:** Tailoring trading strategies to the prevailing market sentiment, considering the observed differences in outcomes (e.g., focusing on 'SELL' trades during 'Extreme

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Greed').

- **Temporal Dynamics:** Further analyzing the time series data for lead/lag relationships between sentiment shifts and changes in trader behavior metrics could reveal predictive signals.
- **Risk Management:** Analyzing risk metrics within each sentiment classification can inform dynamic risk management strategies.

5. Conclusion

The analysis revealed that while simple linear correlations between market sentiment and key trader behavior metrics are weak, there are distinct differences in average profitability, trade size, win rates, and the performance of 'BUY' vs. 'SELL' trades across various sentiment classifications. These findings suggest that market sentiment is a relevant factor influencing trader behavior and outcomes. Further research, particularly focusing on temporal relationships and interaction effects, is recommended to develop more refined and potentially profitable trading strategies that incorporate market sentiment.