

# Cognitive Mechanisms in Loan Marketing: Insights from Concept Mappings

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## Abstract

Understanding the cognitive mechanisms of loan borrowers at peer-to-peer (P2P) loan platforms is helpful for improving communication strategies during loan marketing. Recent research studies the cognition of loans based on field studies or interviews with limited research samples, which cannot gain comprehensive cognitive insights in real-world context. In this work, we use a concept mapping-driven method and a large amount of real-world data for loan cognitive analysis. We find that there are statistical differences between the concept mappings of loan borrowers who received lenders' support and those who did not. We also found the representative conceptual factors of borrowers that impact the lenders' decision-making. For example, lenders are more inclined to support borrowers who present a mindset focused on stability, adaptability, and purposeful transformation, whereas non-recipients often express uncertainty, lack of readiness, or superficial changes in their loan requests. Applicants with an abstract cognitive orientation tend to request loans with higher interest rates, in contrast to those with a more concrete conceptualization. In practice, loan borrowers and lenders can refer to the cognitive findings to support their marketing and decision-making.

**Keywords:** Loan; Marketing; Communication; Metaphor; Concept mapping; MetaPro

## Introduction

Peer-to-peer (P2P) loan platforms have emerged as a significant innovation in the financial sector, providing individuals with an alternative means of securing loans outside traditional banking institutions. They have the potential to improve financial inclusion and empower individuals to pursue personal goals. Studying the cognitive mechanisms of loan applicants through their loan requests is crucial for understanding the psychological and conceptual factors that influence their likelihood of securing loans.

Traditional cognitive analysis typically uses a top-down approach, where interviewers design questions to probe individuals' cognitive states. A common method, such as word association tests (Pranoto & Afrilita, 2019), seeks to uncover cognitive frameworks by analyzing individuals' concept mapping patterns. However, due to the great costs associated with interviewing a large population, it becomes challenging to obtain an extensive dataset of concept mapping samples (Rajagopal, Cambria, Olsher, & Kwok, 2013).

Metaphors, as a linguistic phenomenon, reflect how humans understand target concepts (the core ideas that people want to express) by drawing analogies to different source concepts (the ideas used to explain the target concepts metaphorically). Conceptual Metaphor Theory argues that our cognition is framed by metaphors (Lakoff & Johnson, 2008). Given that metaphors are prevalent in everyday language, we explore the cognitive mechanisms of loan applicants by applying data mining techniques in a bottom-up approach. This allows us to uncover cognitive mechanisms directly from the language expressions of a large number of applicants in a real-world scenario, rather than interview-based tests. We investigate the following Research Questions (RQs):

- 1) Is marketing cognition different between loan borrowers who receive support from lenders and those who do not?
- 2) What perceptive factors influence lenders' willingness to provide support and to allocate higher funding amounts?
- 3) What cognitive factors differentiate borrowers with high versus low sensitivity to interest rates?

By analyzing a public corpus (Li & Ching, 2024) of 59,249 loan requests using MetaPro (Mao, He, Ong, Liu, & Cambria, 2024), we discovered a statistically significant difference in the marketing cognition between applicants who received lenders' support and those who did not\*. Lender support recipients typically present a mindset focused on stability, adaptability, and purposeful transformation, whereas non-recipients often express uncertainty, lack of readiness, or superficial changes in their loan requests. Applicants with an abstract cognitive orientation tend to request loans with higher interest rates, in contrast to those with a more concrete conceptualization. However, when borrowers frame their requests around shared themes such as "commerce", "exchange", and "economic value", they are more likely to receive lenders' support with lower interest rates. This suggests that aligning the narrative with the interests and priorities of lenders can lead to more favorable loan terms.

\*Lenders' support is measured by the amount of funding they provide to borrowers. Borrowers who receive funding are considered recipients of lender support, while those who receive none are classified as lacking support. Crucially, borrowers are not categorized based on whether they ultimately secure loans, as the platform requires at least 70% of the requested amount for a loan to be fully funded. This platform-specific rule introduces a confounding factor unrelated to our goal of analyzing lenders' perceptions of borrowers, rather than the platform's operational constraints.

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Table 1: Loan request text statistics. CM denotes concept mappings; TC is target concepts; SC is source concepts; #MPR is the number of metaphors per request.

Statistic	Value	Statistic	Value
Total requests	59,249	Total CM	541,492
Requests with loans	22,516	Unique CM	9,883
Requests without loans	36,733	Unique TC	1,432
Funding rate	38.0%	Unique SC	1,720
Requests with metaphors	95.11%	Avg #MPR	9.14

The contributions of this study are as follows: 1) We introduce a practical cognitive analysis method for examining the cognitive mechanisms underlying loan marketing, employing a bottom-up approach based on data mining techniques. 2) We provide valuable insights into the cognitive differences between borrowers who received lender support and those who did not, as well as between interest-rate-sensitive and non-sensitive borrowers. These findings have the potential to guide the design of more effective communication strategies aimed at positively influencing lenders’ decisions.

### Related Works

Cognitive analysis in loan markets was studied from various perspectives, revealing the influence of human judgment and decision-making processes on loan outcomes. Decision-making between experienced loan officers and MBA students was compared, demonstrating that data-driven approaches outperformed conceptual ones in accuracy (Rodgers & Housel, 1987). Another research highlighted the reliance of loan officers on intuition or “gut feelings” during credit decisions, which sometimes surpassed financial data in predictive accuracy, especially when facing diverse client profiles and uncertainties (Lipshitz & Shulimovitz, 2007). Cognitive processing analysis and financial evaluations found that cost-benefit associations significantly shaped consumers’ loan perceptions, with stronger associations reducing the perceived financial burden (Kamleitner, Hoelzl, & Kirchler, 2010).

Similarly, a field experiment with payday loan customers was conducted, showing how targeted information treatments reduced borrowing frequency and amounts, emphasizing the role of cognitive framing in influencing borrowing behavior (Bertrand & Morse, 2011). Researchers explored the effects of cognitive resource depletion during the mortgage decision-making process, finding that depleted participants were more likely to choose high-risk options, underlining the cognitive strain of complex financial choices (Perry & Lee, 2012). “Last Hurrah Effect” was found (Shah & Li, 2024), where end-of-period temporal landmarks trigger cognitive biases, increasing optimism and leading to riskier investment decisions with poorer returns. Evidence of the constraints imposed by cognitive limitations on the processing of soft information in loan decisions was discovered, showing that even well-structured organizations struggle to fully extract valuable insights due to inherent biases (Vashishtha, 2019).

Despite the valuable insights provided by cognitive analyses in loan markets, several limitations remain. First, these

Table 2: Loan statistics. AF denotes the amount funded by lenders; AR is the amount requested from borrowers; BMR is the borrower’s maximum acceptable interest rate. “All” and “funded” indicate that statistics are calculated across all loan requests and only funded requests, respectively.

Statistic	Mean	Median	Std. Dev.	Min	Max
AF <sub>all</sub>	489	0.00	1,952	0.00	25,000
AR <sub>all</sub>	6,214	4,000	5,757	1,000	25,000
BMR <sub>all</sub>	0.17	0.17	0.07	0.00	0.50
AF <sub>funded</sub>	1,288	152	3,000	50	25,000
AR <sub>funded</sub>	6,291	4,000	5,901	1,000	25,000
BMR <sub>funded</sub>	0.19	0.20	0.07	0.00	0.50

Table 3: Correlation coefficient analysis for numerical variables. IRF denotes if an applicant received funds from lenders, expressed as a binary variable. #Meta denotes the number of metaphors in a loan request.

	Variables	Correlation	Coef.	p
All	AF, AR	Pearson	0.189	0.000
	AF, BMR	Pearson	0.083	0.000
	AR, BMR	Pearson	-0.092	0.000
	AR, IRF	Point-Biserial	0.010	0.011
	BMR, IRF	Point-Biserial	0.241	0.000
	AF, #Meta	Pearson	0.067	0.000
Funded	#Meta, IRF	Point-Biserial	0.103	0.000
	AF, AR	Pearson	0.310	0.000
	AF, BMR	Pearson	0.011	0.104
	AF, #M	Pearson	0.056	0.000

studies often rely on field experiments and interviews, where the limited sample sizes and varying ecological validity may affect the reliability and generalizability of the findings. Second, the relationship between loan applicants’ cognitive frameworks and application outcomes has yet to be explored across a diverse range of conceptual domains. To address these limitations, this study employs a bottom-up approach, leveraging computational metaphor processing techniques to identify cognitive patterns through concept mappings, derived from a large loan request corpus. This method enhances the analytical scope the robustness of the findings.

### Materials

The data used in this analysis were collected from Prosper\* by (Li & Ching, 2024). Prosper is a P2P platform that enables individuals to request loans, apply for credit cards, or invest in personal loans. The dataset spans loan requests from November 2005 to February 2007, comprising 59,249 loan requests along with associated outcomes such as the requested amount, the amount funded, and the maximum acceptable interest rate for borrowers. Among these 59,249 requests, 38.0% received support from lenders, with the funded amounts\* per request ranging from \$1,000 to \$25,000.

As loan requests are expressed in natural language, this study aims to gain cognitive insights from these requests by analyzing metaphorical expressions and their associated con-

\*<https://www.prosper.com/>

\*Receiving funds from lenders does not necessarily imply that the borrower ultimately obtained the loan, as Prosper platform requires the total funding to reach at least 70% of the requested amount for the loan to be finalized.

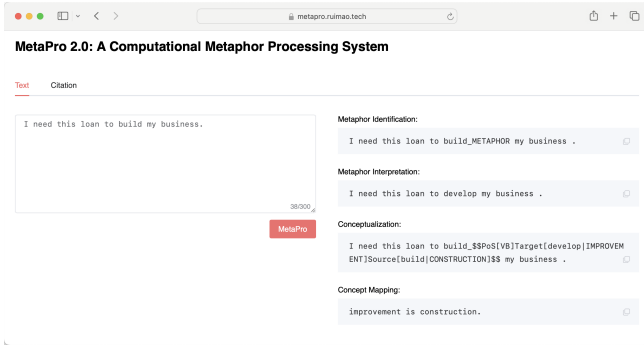


Figure 1: A sample output of MetaPro.

cept mappings. A substantial 95.11% of the requests contain at least one metaphor, with an average of 9.14 metaphors per request. In total, 541,492 concept mappings were extracted from these metaphorical expressions, including 9,883 unique mappings. These concept mappings provide a robust sample for uncovering cognitive patterns within the data. Detailed loan request statistics are shown in Table 1. The numerical variable statistics of loans are shown in Table 2.

We also examine the correlation between numerical variables, such as the pairwise correlation coefficient between the requested and funded loan amounts, as well as the maximum acceptable interest rate offered by loan applicants (borrowers). To facilitate analysis, we convert the labels into a binary format, distinguishing between applicants who successfully received funding offers from lenders and those who did not. (IRF). Person correlation is employed to assess the relationship between two continuous variables, while Point-Biserial correlation is used for the relationship between a continuous variable and the binary label. The results of these analyses are shown in Table 3. As seen in the table, the correlations between different variable pairs are generally weak, with absolute correlation coefficient values ( $r$ ) not exceeding 0.241 across all requests.

This suggests that the numerical variables from the borrowers do not solely determine lender decisions, and that the expressions used in the loan requests also play a role in lender decision-making. Consequently, we focus on analyzing how lenders perceive these requests, particularly in relation to the different loan request outcomes (RQ1 and RQ2). On the other hand, the strongest correlation found among all variables is between the maximum acceptable interest rate (BMR) and the binary label (IRF) ( $r = 0.241$ ), indicating that borrowers' sensitivity to interest rates may influence lenders' decisions. This finding motivates further investigation into the cognitive factors that contribute to varying sensitivity levels to interest rates among borrowers (RQ3).

## Concept Mapping Parsing

MetaPro (Mao, He, et al., 2024) is used in our cognitive analysis for loan marketing. It consists of three modules, namely metaphor identification, metaphor interpretation and concept

mapping generation. Given an input, “I need this loan to build my business” (Figure 1), the identification module detects “build” is a metaphor. The interpretation module shows that the contextual meaning of “build” is “develop”. The concept mapping module generates IMPROVEMENT IS CONSTRUCTION by abstracting the target concept “IMPROVEMENT” from “develop” and the source concept “CONSTRUCTION” from “build”. The concept mapping implies that when someone says they are “building a business”, they are not physically constructing something with bricks and mortar but are instead working on its growth, and enhancement.

Thus, the concept mapping explains the cognitive framework of the speakers and provides insight into how they conceptualize business growth and improvement. Since MetaPro leverages the knowledge from WordNet for metaphor interpretation and concept mapping generation, the concept interpretation in this work also refers to WordNet. The detailed evaluation of MetaPro on metaphor identification (Mao & Li, 2021), interpretation (Mao, Li, Ge, & Cambria, 2022) and concept mapping generation (Ge, Mao, & Cambria, 2022) tasks can be viewed from the respective papers. The experimental results show that MetaPro achieves state-of-the-art performance on these tasks, exceeding large language models (Mao, He, et al., 2024). Empirical studies also demonstrated the utility of MetaPro in a wide range of cognition analysis domains, e.g., financial and political narratives (Mao, Du, Ma, Zhu, & Cambria, 2023; Mao, Zhang, Liu, Hussain, & Cambria, 2024). Thus, it is used to parse concept mappings in this work.

## Results

### Concepts and concept mapping differences between loan recipients and non-recipients.

To investigate the distributional differences of target concepts, source concepts, and concept mappings between fund (lender support) recipients and non-recipients, we first rank these elements within each group. Subsequently, Pearson’s chi-square test is employed to assess these differences. To reduce the potential confounding effects of highly conventional metaphors (expressions commonly used across both groups in everyday languages), we progressively exclude a certain percentage of the presence of the most frequent concepts and concept mappings, ranging from 0% to 90% removals\*. This approach allows us to investigate the distributional differences from a more refined perspective.

As shown in Table 4, at the initial stage, with all concepts included (0% removal), we observe significant differences in the distribution of concept mappings ( $\chi^2 = 4495.1, p = 0.048$ ). This finding suggests that the overall pattern of concept mappings in loan requests differs meaningfully between fund recipients and non-recipients. Therefore, the cognitive

\*0% removal indicates that all concepts and concept mappings are included in the Pearson’s chi-square test, while 90% removal signifies that the top 90% of the most frequently occurring concepts and concept mappings in each group are removed from the analysis.

Table 4: Pearson’s chi-square test results for target concepts, source concepts, and concept mappings, comparing applicants who received funds versus those who did not, after incrementally removing (rm) the most frequent concepts or concept mappings at specified percentages. Significant results ( $p < 0.05$ ) are highlighted in grey, indicating statistically significant differences in the distributions between the two groups (fund recipients and non-recipients).

Rm	Target		Source		Concept Map.	
	$\chi^2$	$p$	$\chi^2$	$p$	$\chi^2$	$p$
0%	953.3	0.055	970.0	0.128	4495.1	0.048
10%	1773.1	0.000	2016.7	0.000	5538.0	0.000
20%	1497.6	0.000	1296.4	0.000	4772.4	0.000
30%	1155.7	0.000	1034.2	0.000	4011.8	0.000
40%	936.5	0.000	862.3	0.000	3389.9	0.011
50%	799.5	0.000	647.2	0.026	2770.5	0.713
60%	586.3	0.000	513.9	0.280	2160.3	0.999
70%	412.1	0.164	364.6	0.869	1635.7	0.998
80%	261.7	0.751	243.7	0.920	1143.3	0.964
90%	136.0	0.650	133.9	0.716	577.2	0.878

frameworks underlying the marketing communication strategies of loan applicants who receive funding appear to differ from those who do not, as reflected in their distinct concept mapping patterns (RQ1). Notably, this significant difference persists even after the removal of the top 50% most frequent concept mappings. This indicates that the cognitive distinction between the two groups remains evident even when the most common metaphorical expressions are excluded, further supporting the robustness of these cognitive differences.

On the other hand, when considering all frequent target and source concepts, no significant differences in concept distribution are observed (target concepts:  $\chi^2 = 953.3, p = 0.055$ ; source concepts:  $\chi^2 = 970.0, p = 0.128$ ). However, once the top 10% of the most frequent target and source concepts are excluded, the distribution of the remaining concepts shows a significant difference (target concepts:  $\chi^2 = 1773.1, p < 0.005$ ; source concepts:  $\chi^2 = 2016.7, p < 0.05$ ), and this significance persists up to the removal of 70% of frequent target concepts and 60% of frequent source concepts. These results suggest that after excluding only the top 10% of the most common concepts, a statistically significant distinction remains in the distribution of concepts using preference between fund recipients and non-recipients. The majority of target and source concepts used by applicants are differentiable between the two groups.

### Concepts and concept mappings that contribute the most to the loan outcomes.

Logistic regression is used to investigate which concepts or concept mappings are linked to higher funding rates, owing to its ability to model the relationship between a binary outcome variable (e.g., fund receipt status) and a set of predictor variables (e.g., concepts or concept mappings). This method

Table 5: Key concepts and concept mappings that influence lender decision-making, including factors that lead to support (positive factors) and rejection (negative factors). The coefficient (Coef.) represents the impact of each concept or concept mapping in a logistic regression model with a binary target variable, indicating whether the applicant received funding from lenders. SIMILAR. IS ADJUSTMENT means SIMILARITY IS ADJUSTMENT; ENDING IS C.O.I means ENDING IS CHANGE\_OF\_INTEGRITY; DEVICE IS NAT.\_ELEV. means DEVICE IS NATURAL\_ELEVATION; DESCR. IS EXPLAN. means DESCRIPTION IS EXPLANATION; REPRO. IS FIN.\_COND. means REPROBATE IS FINANCIAL\_CONDITION; PHYS.\_COND. IS COMMU. means PHYSICAL\_CONDITION IS COMMUNICATION; TRANS. IS HIST.\_PERIOD means TRANSFORMATION IS HISTORIC\_PERIOD; CREATION IS C.O.S means CREATION IS CHANGE\_OF\_SHAPE.

	Positive factors	Coef.	Negative factors	Coef.	
Target	LOW_EXPLOSIVE	0.112	STEERING	-0.107	
	MARK	0.092	CAPITALIST	-0.107	
	SIMPLETON	0.090	SAMENESS	-0.099	
	PROMOTION	0.090	REPROBATE	-0.098	
	COMPONENT	0.089	COMBAT_ZONE	-0.093	
	NET_INCOME	0.087	COMPENSATION	-0.092	
	FELONY	0.075	DEMEANOR	-0.092	
	ENTHUSIAST	0.069	LOWERCLASSMAN	-0.091	
	LIKING	0.068	CHICKEN	-0.088	
	LARGE_PERSON	0.066	GRASSLAND	-0.087	
	Source	INFECTION	0.134	ROAD	-0.178
		CHANGE_OF_LOCATION	0.105	CARNIVORE	-0.147
GLASS		0.088	FIELD	-0.139	
ERUPTION		0.084	BREAKAGE	-0.127	
COMPLEX		0.084	HUNTING_DOG	-0.117	
SITUATION		0.083	RULE	-0.114	
CALMNESS		0.081	FRUIT	-0.113	
CORRIDOR		0.081	SOLUTION	-0.098	
COMPUTER_OPERATION		0.080	ANIMAL_GROUP	-0.096	
MEDIATION		0.078	POWER_TOOL	-0.095	
Concept mappings	COINAGE IS CURRENCY	0.330	OVUM IS SEED	-0.313	
	CONTAINER IS COVERING	0.309	DEVICE IS NAT._ELEV.	-0.309	
	FEELING IS INFECTION	0.306	REPRO. IS FIN._COND.	-0.286	
	SIMILAR. IS ADJUSTMENT	0.295	DESCR. IS EXPLAN.	-0.278	
	SIMPLETON IS VICTIM	0.291	PHYS._COND. IS COMMU.	-0.263	
	ENDING IS C.O.I	0.277	TRANS. IS HIST._PERIOD	-0.250	
	SECURITY IS HANDLING	0.274	CHANGE IS PERSON	-0.246	
	DEVICE IS SEA_NYPH	0.250	INFORMATION IS RELATION	-0.230	
	EXTENT IS DIMENSION	0.240	DENIAL IS ACTIVITY	-0.229	
	ABILITY IS LOCATION	0.211	CREATION IS C.O.S	-0.225	

produces coefficients that quantify the strength and direction of the relationship between each predictor and the likelihood of fund receipt. A positive coefficient suggests that the presence of a particular concept or concept mapping increases the probability of fund receipt, while a negative coefficient indicates a reduction in this probability.

Table 5 presents the top 10 target concepts, source concepts, and concept mappings identified as key factors influencing the funding outcomes, ranked based on regression analysis coefficients. Interestingly, the lists highlight some contrasting perceptions between positive and negative factors. For example, among the target concepts, SIMPLETON (positive) conveys innocence or straightforwardness, while REPROBATE (negative) suggests moral corruption or a lack of integrity. Similarly, NET\_INCOME (positive) signifies financial achievement, whereas LOWERCLASSMAN (negative) may imply a lower status or diminished capacity in certain contexts. In the source concepts, SITUATION (positive) reflects a condition or context open to interpretation, whereas SOLUTION (negative) implies a definitive resolution, potentially oversimplifying complexities. Likewise, COMPLEX

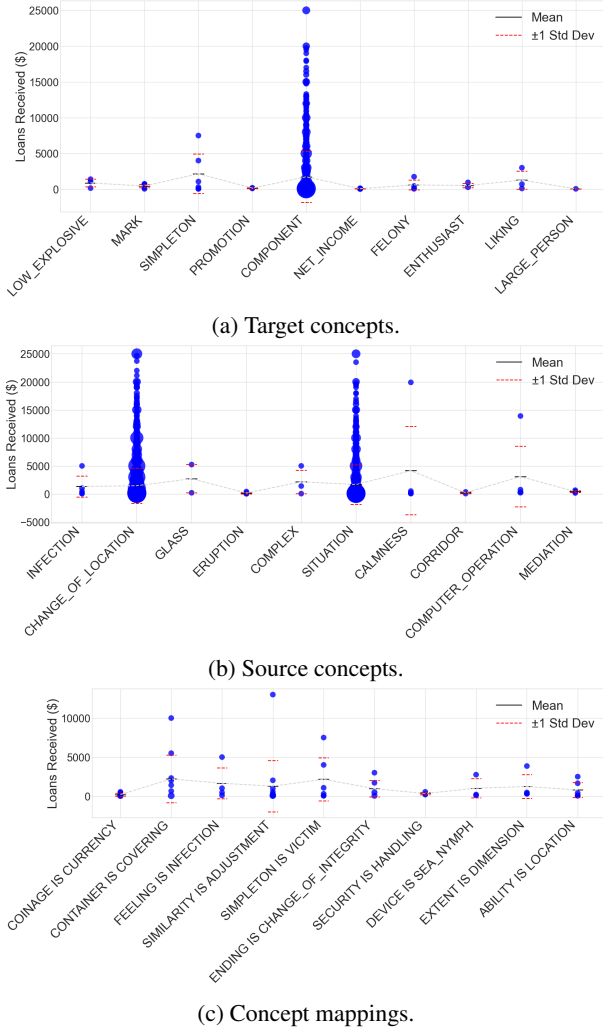


Figure 2: Target concepts, source concepts, concept mappings, and loans received. The size of a scatter indicates the number of requests that receive the same amount of loans.

(positive) denotes sophistication or interconnectedness, while RULE (negative) suggests rigidity or a lack of flexibility.

The contrast in concept mappings shows the divergence in cognitive framing. For example, SECURITY IS HANDLING (positive) emphasizes control, dependability, and trustworthiness in finance, while REPROBATE IS FINANCIAL\_CONDITION (negative) associates financial matters with irresponsibility or moral failing. Similarly, ENDING IS CHANGE\_OF\_INTEGRITY (positive) conveys a sense of purposeful transformation and stability, whereas CREATION IS CHANGE\_OF\_SHAPE (negative) implies a superficial or incomplete transformation, lacking substantive outcomes. These distinctions reflect the cognitive frameworks that influence decision-making in the evaluation of loan applications.

Next, we visualize the loan application outcomes, plotting the amount of loan received by the top-ranked concepts and concept mappings. As seen in Figure 2, target concepts, e.g., SIMPLETON and COMPONENT;

Table 6: Key concepts and concept mappings resulting in higher (low sensitivity) and lower (higher sensitivity) acceptable interest rates for borrowers. The coefficient (Coef.) reflects the influence of each concept or concept mapping in a logistic regression model, predicting whether an applicant is sensitive to paid interest rates on loans. GRAM.\_PLANT IS GRASSL. means GRAMINEOUS\_PLANT IS GRASSLAND; INTE.\_ORGAN IS ACTI. means INTERNAL\_ORGAN IS ACTIVITY; WRIT. IS PERSO.\_CASUA. means WRITING IS PERSONNEL\_CASUALTY; JOURNEY IS C.O.S means JOURNEY IS CHANGE\_OF\_STATE; UNW.\_PERSO. IS HUNT.\_DOG means UNWELCOME\_PERSON IS HUNTING\_DOG; ACTION IS P.O.B means ACTION IS PLACE\_OF\_BUSINESS.

	High BMR (Low Sensitivity)	Coef.	Low BMR (High Sensitivity)	Coef.
Target	LOW_EXPLOSIVE	0.147	VASCULAR_PLANT	-0.141
	MUSICIAN	0.121	AVOIRDUPOIS_UNIT	-0.132
	RELATIVE_QUANTITY	0.109	RECOIL	-0.113
	JUMP	0.104	UPPER_SURFACE	-0.103
	DISLIKE	0.100	SELLING	-0.094
	PHASE	0.091	BLOCK	-0.094
	DISCOURSE	0.087	MEAT	-0.092
	GRAMINEOUS_PLANT	0.087	MAMMAL	-0.087
	SEX	0.087	LIMB	-0.086
	SOVEREIGN	0.080	COMPRESSION	-0.085
Source	NEED	0.152	CAKE	-0.182
	EFFORTFULNESS	0.142	STONE	-0.170
	IRREGULARITY	0.124	HEADDRESS	-0.134
	STEERING	0.109	FIELD	-0.108
	WEAPON	0.108	CITY_DISTRICT	-0.096
	PLANNER	0.107	SALE	-0.095
	VENTURE	0.104	HUNTING_DOG	-0.094
	POWER_TOOL	0.101	DANCE	-0.093
	SAFETY	0.100	SPORTS_EQUIPMENT	-0.091
	TOLERANCE	0.099	BUSINESSPERSON	-0.089
Concept mapping	INTE._ORGAN IS ACTI.	0.570	JOURNEY IS C.O.S	-0.422
	GRAM._PLANT IS GRASSL.	0.337	UNW._PERSO. IS HUNT._DOG	-0.337
	DECREASE IS INDENTATION	0.309	COLLECTION IS INCOME	-0.319
	ASSOCIATE IS CONTESTANT	0.267	ACTION IS P.O.B	-0.296
	GOAL IS REFERENCE_POINT	0.263	PAUSE IS ACCIDENT	-0.294
	TERMINATION IS STATE	0.254	BEGINNING IS HAPPENING	-0.288
	COMMERCE IS CURRENCY	0.251	REGION IS LOCATION	-0.268
	AIR_TRAVEL IS FLIGHT	0.249	ARTIFACT IS PROMINENCE	-0.253
	WRIT. IS PERSO._CASUA.	0.243	BODILY_PROCESS IS EATER	-0.248
	EFFORT IS SPASM	0.238	NEED IS NECESSITY	-0.239

CHANGE\_OF\_LOCATION and SITUATION; and concept mappings, e.g., CONTAINER IS COVERING and SIMPLETON IS VICTIM likely receiving more funding. These factors likely convey perceptions to lenders that align with qualities such as reliability, openness, or clear intent, thereby influencing favorable decisions. For example, concept mappings such as CONTAINER IS COVERING might evoke associations with safety, protection, and responsibility, suggesting that the applicant is seen as someone who can manage and fulfill their financial obligations. Similarly, SIMPLETON IS VICTIM might inadvertently portray the applicant as someone who is perceived as vulnerable or in need of assistance, potentially triggering a sense of empathy and a desire to help.

### Featured concepts and concept mappings between high and low interest rate sensitivities of borrowers.

We observed that the correlation between loan application status and the maximum acceptable interest rate for borrowers is relatively stronger than other numerical variables ( $r = 0.241$ ) in Table 3. This shows the need to explore the cognitive factors that distinguish borrowers in terms of their sensitivity to interest rates (RQ3). In contrast to the analysis of lender perceptions in the previous section, this section focuses on understanding the cognitive frameworks of bor-

rowers. To this end, we categorize borrowers into two groups based on their maximum acceptable interest rate, namely a high-sensitivity group with lower acceptable interest rates and a low-sensitivity group with higher acceptable interest rates. The boundary between these groups is set at 0.17, which represents the average of the maximum offered interest rate across all requests. Logistic regression is used for analysis.

Table 6 shows contrastive concepts between low- and high-sensitive groups. JUMP reflects bold, proactive behavior, while RECOIL suggests cautious, reactive responses—indicating that less sensitive borrowers are more dynamic, whereas highly sensitive ones are more conservative. Similarly, the contrast between SOVEREIGN and COMPRESSION implies that low-sensitive borrowers are associated with aspirations for independence and autonomy, whereas high-sensitive borrowers may feel more constrained by financial obligations. For source concepts, WEAPON suggests aggression and tools, while BUSINESSPERSON reflects professionalism and calculation. Low-interest rate borrowers may approach loans as a tool for growth, whereas high-sensitive borrowers might take a more calculated, weighing the impact of interest rates with greater precision. The source concepts of low-sensitive group, e.g., NEED, STEERING, PLANNER, IRREGULARITY, VENTURE, SAFETY and TOLERANCE are more abstract than those of high-sensitive group, e.g., CAKE, HEADDRESS, HUNTING\_DOG, CITY\_DISTRICT, DANCE, SPORTS\_EQUIPMENT and BUSINESSPERSON, suggesting greater openness of the low-sensitive group to uncertainty and the inclination of the high-sensitive group to prioritize tangible, and concrete outcomes.

Finally, for concept mappings, the low-sensitive mapping frames commerce abstractly (e.g., COMMERCE IS CURRENCY), focusing on fluid transactions, while the high-sensitive mapping emphasizes accumulation and tangible returns (e.g., COLLECTION IS INCOME). The contrast of GOAL IS REFERENCE\_POINT (low sensitivity) and JOURNEY IS CHANGE\_OF\_STATE (high sensitivity) suggests that insensitive borrowers view objectives as flexible markers to navigate toward, adapting to changing circumstances, while sensitive borrowers interpret changes in geographical location as a change of state, expecting disruptive transformations. The contrasts also imply that the low-sensitive group is characterized by flexibility and adaptability, while the high-sensitive group is goal-oriented.

## Discussion

Statistically, the cognitive patterns, manifested in the target concepts, source concepts, and concept mappings of metaphorical expressions present significant differences between fund recipients and non-recipients. It shows that the cognition of the loan applicants impacts the decision of lenders. The concepts and concept mappings of the fund recipients reflect stability, adaptability, and purposeful transformation, e.g., NET\_INCOME, SITUATION, SECURITY IS HANDLING, ENDING IS CHANGE\_OF\_INTEGRITY.

They often highlight utility, trustworthiness, and alignment with lenders' goals of risk mitigation and repayment assurance (Sonenshein, Herzenstein, & Dholakia, 2011). In contrast, those of the non-recipients frequently imply uncertainty, lack of readiness, or superficial change, e.g., LOWER\_CLASSMAN, REPROBATE IS FINANCIAL\_CONDITION, CREATION IS CHANGE\_OF\_SHAPE. They can reflect rigidity, instability, or negative associations that might dissuade lenders from approving the application (Kreiner, Leth-Petersen, & Willerslev-Olsen, 2020). These findings suggest that in P2P loan applications, applicants should maintain a clear and positive narrative in their communication to lenders, emphasizing traits like reliability, responsibility, and alignment with the lender's priorities. This could involve framing financial decisions as deliberate, demonstrating adaptability to changing circumstances, and conveying a readiness to meet repayment obligations without hesitation or doubt.

On the other hand, higher interest rates, paying to lenders can increase the chance of receiving funds. The borrowers with lower interest rate sensitivities tend to be flexible and adaptable in their abstract concept preference, while high-sensitive borrowers are more practical, using concrete concepts in their marketing communications. This distinction between abstract and concrete conceptualizations aligns with the construal-level theory (Trope & Liberman, 2010), where abstract thinkers are more likely to consider potential opportunities and long-term benefits, while concrete thinkers emphasize immediate outcomes and practical constraints. The preference for abstract concepts among low-sensitive borrowers may indicate that they view loans as enablers of progress or tools for achieving ambitious goals, placing less emphasis on the short-term costs of interest rates. Conversely, the high-sensitive borrowers' focus on concrete concepts may signal a heightened sensitivity to the direct financial impact of loans, driving cautious, detail-oriented decision-making.

When comparing Tables 5 and 6, a notable overlap in concepts emerges between lender-supported requests and applicants offered lower interest rates (high interest rate sensitivity). Specifically, concepts such as COINAGE IS CURRENCY and PROMOTION are prevalent among funded requests, while SELLING, COLLECTION IS INCOME, and SALE are associated with applicants seeking reduced interest rates. These shared concepts are tied to "commerce", "exchange", and "economic value", suggesting that both groups align their mental frameworks with transactional efficiency and financial utility.

From a psychological perspective, this alignment may reflect the principle of cognitive framing, where individuals present themselves or their requests in ways that resonate with the decision-maker's goals and expectations (Tversky & Kahneman, 1981). Applicants who emphasize commercial and exchange-related concepts likely tap into lenders' implicit prioritization of financial prudence and profitability. This alignment fosters a perception of the applicant as not only financially competent but also trustworthy and capable of using the loan for economically productive purposes.

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