

# **Can Prospect Theory Help Us Help People Make Decisions That Are Better for Them?**

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## 1. What is Prospect Theory?

Daniel Kahneman and Amos Tversky's (1979) prospect theory contradicted expected utility theory using different features of psychological theory. The theory attempted to capture and explain human decision-making that falls under risk (Kahneman & Tversky, 1979).

### Reference Points

The introduction of reference points by prospect theory challenged and expanded prior economic ideology. A reference point in prospect theory is a point at which an individual is concerning their current asset point (Kahneman & Tversky, 1979). The point corresponds with emotions towards the gains or losses an individual would receive in a risky gamble—for example, two individuals who do not have equal current assets. Person A has €10,000 and Person B has €20,000 each to play the lottery. As a result of the lottery, Person A and B have €15,000 in current assets. The initial economic theories would indicate the equal utility of final assets without regarding current wealth before the decision occurred (Newell et al., 2022). This reference point feature provides a foundation for how individuals perceive gains and losses for the value function of prospect theory.

### The Value Function

The value function of prospect theory conveys three main characteristics that collectively explain human decision-making under risk. The features are a reference point, discussed in the previous section, sensitivity to increased/decreased wins and losses under risk, and impact of losses and gains (Kahneman & Tversky, 1979). The function is displayed in the theory by an S-shaped graph comparing value and outcome. The steepest part of the slope in the middle of the graph is at the reference point (Levy, 1992). The losses are illustrated on the S-graph with sharply decreased values and the shallow part of the curve is the gains with a slow increase in value. Moving farther away from the reference point is where risk aversion and risk seeking begin.

### Risk Aversion versus Risk Seeking

The value function articulates the variation in sensitivity for winning more and losing more. Consider the hypothetical situation if an individual has an option between choosing €50 guaranteed or a 50% chance of winning €100. The individual will choose the guaranteed €50 as a risk-averse attempt to protect current wealth (Trepel et al., 2005). This increase in sensitivity in decision-making due to risk aversion creates the concave portion of the value function graph (Kahneman & Tversky, 1979).

On the contrary, if an individual has the option between losing €50 with full certainty or gambling between having a 50% chance of losing €100, according to prospect theory, the individual will choose the gamble in a risk-seeking approach. The risk seeker would rather gamble the ability to lose twice the amount of money to avoid feeling the pain of losing €50 (Trepel et al., 2005). The risk seeker behavior is illustrated on the value function graph as convex, outlining the diminishing impact of losses as overall value decreases (Grewal et al., 2016). The frame-shifting decision-making in these scenarios describes the effect attributed towards wins and losses and how each impacts the decision made. The decisions are not only affected by how the individual reacts to a win or lose but there is a shift in the individual's emotions about the outcome.

### Loss Aversion

Loss aversion refers to how individuals feel the pain of losing more than the happiness of a win (Levy, 1992). In prospect theory, loss aversion describes the impact of losses ‘looming’ larger than gains (Kahneman & Tversky, 1979). This concept, combined with a principle of behavioral psychology – the endowment effect, can describe consumer decision-making in price setting.

The price an individual sets on an item increases when the person has said item in their possession, the endowment effect (Kahneman et al., 1990). The change in price when the object was in the individual’s possession, demonstrated in the study by Kahneman (1990), provides an example of how losing (selling) an object is weighted heavier than gaining (buying) an item regardless of true value. Overweighting and underweighting in risk decisions is a characteristic of prospect theory noted by the probability-weighting function.

### Probability-weighting Function

The probability-weighting function at the core is the weight a decision is allocated to adapt and change the value function. This decision weight leaves individuals perceiving the impact of overweighting or underweighting probabilities of risky outcomes (Kahneman & Tversky, 1979). More specifically, individuals will be overweight events that are less probable and underweight events that are more probable. Furthermore, indicating the relationship between decision weight and stated probability is non-linear.

Non-linear properties of the graph illustrating decision weight and stated probability make up the S-curve shape. The fixed point in which the decision is overweighted to underweighted lies around  $1/e$  or  $p \approx 0.37$  (Prelec, 1998). Evidence from different studies has concluded that the exact location of the fixed point fluctuates. The point can change depending on if there are one or two parameters in the equation (al-Nowaihi & Dhami, 2010). Framing of the decision is another factor weighing in a choice.

### Framing Effect

The framing effects relate to how information is shared for decision-making from that information. The phrasing of words and phrases of a risky decision in a positive or negative light change alters the decision made by the individual (Kahneman & Tversky, 1979). The “Asian disease problem” studied by Kahneman and Tversky (1979) discusses the choice reversal happening when the question is phrased positively (lives saved) or negatively (lives lost). This finding mirrors the risk aversion to risk-seeking part of the value function in the prospect theory. Positively framed information supports risk aversion to keep what the individual has. Contrarily, when information is negatively framed in a risky scenario, the individual will be more risk-seeking to avoid the loss (Levin et al., 1998). The framing, closely intertwined with prospect theory, relates to the framing effect in risky choice. There are additional framing effects to be conscious of when discussing scenarios more than just the risk involved.

Attribute framing involves framing choices positively or negatively, but the options are not independent of one another. The difference in independence could involve situations of labeling products as 75% lean (positively framed) or 25% fat (negatively framed) (Levin et al., 1998). Both versions of framing share similar outcomes to having the positively framed choice favored leaning into risk aversion whereas the negatively framed result pushes individuals towards risk seeking.

## 2. Compare and contrast Prospect Theory and Expected Utility Theory

### Decision Models

A major difference between prospect theory and expected utility theory is the type of decision models the theories follow. Expected Utility Theory covers a descriptive model. This model depicts how rational humans should make decisions. On the contrary, prospect theory narrows into how realistic individuals make decisions. More specifically, it analyzes decision-making under risk (Schoemaker, 1982). A critique of the expected utility theory is the limitation of predicting decisions for real-life situations, which the prospect theory attempts to solve (Briggs, 2023). The model's focus lays the foundation of the difference in tenets for each model.

### Utility

Another difference in the theories is the discussion of how the utility of an outcome is viewed. Expected Utility Theory is defined by the final wealth of the individual from the result of the decision (Lewandowski, 2017). Evaluating by final wealth position indicates that individuals winning €100 have the same value as someone with €1,000 or €10,000 in final wealth. In contrast, prospect theory is explained using a reference point based on net assets and then evaluating gains and losses (Kahneman & Tversky, 1979). The analysis of deviations from the reference point in prospect theory stemmed from human differences regarding choices under risk (Sebora & Cornwall, 1995). Reference points change people's emotions towards different behaviors. This value difference in prospect theory would indicate if an individual won €100, the value would depend on if the person has a reference point of €1,000 or €10,000.

The following are axioms in the descriptive decision-making model of expected utility theory, therein the normative decision-making model of prospect theory contradicts.

### Sure-Thing Principle

The Sure-thing principle in the expected utility theory outlines that when individuals favor A over B then if C happens/or does not, that outcome would not change the favoring of A over B (Savage, 1954). The sure-thing principle displays the independence axiom of decision-making. The Allais and Ellsberg Paradox are two examples violating this principle showing how decisions are not always independently made (Briggs, 2023). This interdependence of decisions aligns more with how prospect theory relies more on the variability of human decision-making.

### Transitivity

The axiom of transitivity in the expected utility theory outlines the order of preference in decision-making. Indicating when individuals like choice A over B, and B over C, then A over C will be preferred (Newell et al., 2022). Evidence has shown minor violations of the axiom of transitivity concerning decisions made in different contexts. For example, decision-making under risk, as in prospect theory, may change the preferences of choices (Loomes et al., 1991).

### Dominance

The dominance axiom of expected utility theory is the assumption that if one thing is better than another in at least one aspect and just as good in every other aspect then the first option will always be chosen (Fishburn, 1981). This axiom is violated in 'probability matching' when an individual spreads out choices when given repeated choices of varying probabilities

(Newell et al., 2022). This change in choice is a portion of the variability prospect theory attempts to address.

### Invariance

The invariance axiom is an assumption that decisions should not be impacted by how different choices are communicated (Newell et al., 2022). This assumption of invariance is violated in many ways from the framing principle in prospect theory.

### **3. Identify a real-world problem that might be meaningfully impacted by a better understanding of prospect theory**

A real-world problem impacted by having a complete understanding of prospect theory is making suboptimal financial saving decisions due to the riskiness of the decisions. In this problem, individuals varying in reference points have differing views of financial gains and losses. Furthermore, the framing of financial saving techniques plays a large implication in the decisions made. These factors of prospect theory explain a couple of factors impacting varying savings levels for individuals. Additionally, other non-prospect theory factors play a role in this problem including financial knowledge, education, income, and age (Fan et al., 2022).

### Reference Points of Problem

One way in which prospect theory plays a role in suboptimal financial savings for individuals relies on the initial saving decision supported by a reference point. Reference points measured by prospect theory are in terms of current assets (Kahneman & Tversky, 1979). The reference point of current assets relates to how much an individual can save, creating a divide between incomes now and in the future. Families with income volatility have difficulty investing money into riskier assets that have the opportunity to be valuable long-term (Weller & Newman, 2020). Furthermore, reference points vary per individual, indicating no set answer for investments per person. To invest money for the long-term future, individuals need to elevate decision-making to future asset aspirations. Planning for the future financially concerning investing needs a “loss” in current assets. Having the individual feel loss aversion is taking place (Barberis, 2012). Combating this perception of loss for investor’s clients can be managed by framing choices of financial outcome information.

### Implications of Framing

Framing information regarding investing income for future benefits can be critical for individuals. When investing information is choice framed as risk-focused, people are less likely to invest, acting risk-averse with their current income. On the other hand, if the information is presented in a positive framing technique, highlighting the ‘continuity of income streams, investments are viewed as a positive risk choice (Zhao, 2022). The ‘Save More Tomorrow’ savings plan provides an example of how firms can nudge employees into savings choices by framing the plan in favor of the individual. For example, minimizing loss aversion by focusing savings on future earnings (Thaler & Sunstein, 2022). A combination of understanding individual reference points and positively framing information will avoid potential human and economic costs of suboptimal financial decision-making.

### Costs of Problem

A cost of suboptimal financial saving decision-making by individuals leads to low retirement savings, contributing to a lower quality of post-retirement life. Retirement provides an opportunity for individuals to have a decline in mental health issues by spending increased time with family and enjoying hobbies (Xie et al., 2021). On the contrary, if suboptimal saving for retirement decisions are made, this can pose a financial stressor for individuals. The financial stress imposed by poor retirement decision-making in the past can have a significant impact on mental health issues (Jung Ju et al., 2017). This individual financial stress can be turned towards government expectations on how to handle the saving issue.

#### **4. Suggest an intervention that would change behavior based on your understanding of the problem.**

Retirement saving decision-making begins with educating people to make adequate saving choices. This education is studied in behavioral economics and as a form of financial decision-making. People have positive attitudes toward saving for retirement yet have a low implementation rate (Gough & Niza, 2011). Nudging individuals using specific framing of company policies for retirement saving plans based on current salary will play a crucial role in changing behavior.

### Making Savings Automatic

Many of the main issues of suboptimal retirement savings can be addressed by making saving decisions automatic. Individuals experience loss aversion when they begin to save. The money they are investing is felt as a reduction (loss) to their take-home pay (Thaler & Benartzi, 2004). To reduce loss aversion saving plans such as Save More Tomorrow by Thaler have been structured to automatically increase simultaneously with salary increases (Thaler & Sunstein, 2022). This increase helps the individual to save more long-term and reduces the effects of loss aversion. Furthermore, this plan meets individuals where they are regarding reference points and is not a one-size-fits-all plan.

Additionally, automatic enrollment into prospective retirement savings plans can eliminate suboptimal savings mistakes. Automatic enrolment when individuals join a company with an opt-out option accessible can help increase the adoption of savings programs (Eckert & McCoy, 2024; Thaler & Sunstein, 2022). The automatic enrollment methods have been further supported by the United States Government through the SECURE 2.0 Act. This act requires employers to automatically enroll employees into retirement savings plans (*SECURE 2.0 Act Impacts How Businesses Complete Forms W-2*, 2024). Acts like the SECURE 2.0 Act allow the government to create an intervention to solve the issue.

### Implications of Automatics in Saving

An implication of automatic enrollment is choice architects can not accurately predict reference points for all individuals' current assets (Selinger & Whyte, 2011). Individualistic planning is an aspect companies will need to consider to ensure that automatic enrolment in saving plans can be adapted to everyone. Even though nudging individuals into decision-making can help reduce disparities (Mrkva et al., 2021). This concept connects to prospect theory regarding individuals having various emotions towards loss and gains in risky decisions due to

the reference points. Remaining conscious of discrepancies when using automatic enrolment is critical for success.

Another potential implication of this intervention is the size of the company. Supporting the retirement plan. Smaller companies have fewer resources than larger firms and have the potential to impact adoption rates into retirement plans (Maloney & McCarthy, 2019). To successfully introduce the intervention of automatic savings, these implications will need to be considered.

## References

- al-Nowaihi, A., & Dhami, S. (2010). *Probability Weighting Functions*. University of Leicester.  
10.1002/9780470400531.eorms0681
- Barberis, N. C. (2012). THIRTY YEARS OF PROSPECT THEORY IN ECONOMICS: A REVIEW AND ASSESSMENT. *Journal of Economic Perspectives*, 27.  
<https://doi.org/10.1257/jep.27.1.173>
- Briggs, R. (2023). Normative Theories of Rational Choice: Expected Utility. *The Stanford Encyclopedia of Philosophy*.  
<https://plato.stanford.edu/archives/win2023/entries/rationality-normative-utility/>
- Eckert, S. J., & McCoy, M. (2024). The Benefits of Behavioral Nudges: Using Choice Architecture to Improve Decisions and Shape Outcomes in Retirement Savings Programs. *Journal of Financial Planning*, 37(3), 72–86.
- Fan, L., Stebbins, R., & Kyoung, T. K. (2022). Skint: Retirement? Financial Hardship and Retirement Planning Behaviors. *Journal of Family and Economic Issues*, 43(2), 354–367.  
<https://doi.org/10.1007/s10834-021-09779-z>
- Fishburn, P. C. (1981). *Subjective expected utility: A review of normative theories*. 13, 139–199.  
<https://doi.org/10.1007/BF00134215>
- Gough, O., & Niza, C. (2011). Retirement Saving Choices: Review of the Literature and Policy Implications. *Journal of Population Aging*, 4, 97–117. <https://doi.org/10.1007/s12062-011-9046-4>
- Grewal, N., Sparks, J., Reiter, J., & Moses, E. (2016). Behavioral Economics. In *Encyclopedia of Mental Health* (Second).



- Jung Ju, Y., Kim, W., Lee, S. A. L., Lee, J. E., Yoon, H., & Park, E.-C. (2017). Lack of Retirement Preparation is Associated with Increased Depressive Symptoms in the Elderly: Findings from the Korean Retirement and Income Panel Study. *JKMS*.  
<https://doi.org/10.3346/jkms.2017.32.9.1516>
- Kahneman, D., Knetsch, J. L., & Thaler, R. H. (1990). Experimental Tests of the Endowment Effect and the Coase Theorem. *Journal of Political Economy*, 98(6), 1325–1348.  
<https://doi.org/10.1086/261737>
- Kahneman, D., & Tversky, A. (1979). Prospect Theory: An analysis of Decision under Risk. *Econometrica*, 47(2). <http://hassler-j.iies.su.se/COURSES/NewPrefs/Papers/KahnemanTversky%20Ec%2079.pdf>
- Levin, I., Schneider, S. L., & Gaeth, G. J. (1998). All Frames Are Not Created Equal: A Typology and Critical Analysis of Framing Effects. *ORGANIZATIONAL BEHAVIOR AND HUMAN DECISION PROCESSES*, 76(2), 149–188. <https://doi.org/10.1006/obhd.1998.2804>
- Levy, J. (1992). An Introduction to Prospect Theory. *Political Psychology*, 13(Prospect Theory and Political), 171–186.
- Lewandowski, M. (2017). Prospect Theory Versus Expected Utility Theory: Assumptions, Predictions, Intuition and Modelling of Risk Attitudes. *Central European Journal of Economic Modelling and Econometrics*.
- Loomes, G., Starmer, C., & Sugden, R. (1991). OBSERVING VIOLATIONS OF TRANSITIVITY BY EXPERIMENTAL METHODS. *Econometrica*, 59(2), 425–439.
- Maloney, M., & McCarthy, A. (2019). Automatic enrolment to pension plans in small organisations: A research agenda. *Employee Relations*, 41(1), 142–157.  
<https://doi.org/10.1108/ER-06-2017-0138>

- Mrkva, K., Posner, N. A., Reeck, C., & Johnson, E. J. (2021). Do Nudges Reduce Disparities? Choice Architecture Compensates for Low Consumer Knowledge. *Journal of Marketing*, 85(4). <https://doi.org/10.1177/0022242921993186>
- Newell, B. R., Lagnado, D. A., & Shanks, D. R. (2022). Analysing Decisions I: A General Framework. In *Straight Choices: The Psychology of Decision Making* (pp. 112–124).
- Prelec, D. (1998). The Probability Weighting Function. *Econometrica*, 66(3), 497–527. <https://doi.org/10.2307/2998573>
- Savage, L. J. (1954). The Sure-Thing Principle. In *The Foundations of Statistics*. Dover Publications Inc.
- Schoemaker, P. J. H. (1982). The Expected Utility Model: Its Variants, Purposes, Evidence and Limitations. *Journal of Economic Literature*, 20(2), 529–563.
- Seбора, T. C., & Cornwall, J. R. (1995). Expected Utility Theory Vs. Prospect Theory: Implications For Strategic Decision Maker. *Journal of Managerial Issues*, 7, 41–61.
- SECURE 2.0 Act impacts how businesses complete Forms W-2. (2024, August). [SECURE 2.0 Act]. IRS. <https://www.irs.gov/newsroom/secure-2-point-0-act-impacts-how-businesses-complete-forms-w-2#:~:text=The%20SECURE%202.0%20Act%20made,in%20these%20retirement%20savings%20arrangements.>
- Selinger, E., & Whyte, K. (2011). Is There a Right Way to Nudge? The Practice and Ethics of Choice Architecture. *Sociology Compass*, 5(10), 923–935. <https://doi.org/10.1111/j.1751-9020.2011.00413.x>

- Thaler, R. H., & Benartzi, S. (2004). Save More Tomorrow™: Using Behavioral Economics to Increase Employee Saving. *Journal of Political Economy*, 112(S1), S164–S18.  
<https://doi.org/10.1086/380085>
- Thaler, R. H., & Sunstein, C. R. (2022). Save More Tomorrow. In *Nudge: The Final Edition*.
- Trepel, C., Fox, C. R., & Poldrack, R. A. (2005). Prospect theory on the brain? Toward a cognitive neuroscience of decision under risk. *Multiple Perspectives on Decision Making*, 23(1), 34–50. <https://doi.org/10.1016/j.cogbrainres.2005.01.016>
- Weller, C. E., & Newman, K. (2020). Increasing Risk, Costs, and Retirement Income Inequality. In *Annual Review of Gerontology and Geriatrics* (Vol. 40). Springer Publishing Company.
- Xie, L., Shen, Y., Wu, Y., & Yang, H. (2021). The impact of retirement on mental health. *The International Journal of Health Planning and Management*.  
<https://doi.org/10.1002/hpm.3240>
- Zhao, R. (2022). A Holistic Review of Framing Effect: Theories and Applications. *Advances in Social Science, Education and Humanities Research*. [https://doi.org/10.2991/978-2-494069-31-2\\_192](https://doi.org/10.2991/978-2-494069-31-2_192)