

金融科技



Tamkang
University
淡江大學

FinTech: Financial Technology

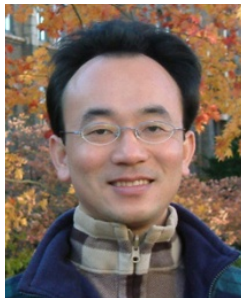
金融服務消費者心理與行為

(Consumer Psychology and Behavior
on Financial Services)

1052FinTech06

MIS EMBA (M2263) (8595)

Fri, 12,13,14 (19:20-22:10) (D409)



Min-Yuh Day

戴敏育

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<http://mail.tku.edu.tw/myday/>

2017-03-31



課程大綱 (Syllabus)

| 週次 (Week) | 日期 (Date) | 內容 (Subject/Topics) |
|-----------|------------|---|
| 1 | 2017/02/17 | Fintech 金融科技課程介紹 (Course Orientation for Fintech: Financial Technology) |
| 2 | 2017/02/24 | Fintech 金融科技的演進：貨幣與金融服務 (Evolution of Fintech: Money and Financial Services) |
| 3 | 2017/03/03 | Fintech 金融科技：金融服務科技創新 (Fintech: Technology Innovation in Financial Services) |
| 4 | 2017/03/10 | Fintech 金融科技與金融服務價值鏈 (Fintech and Financial Services Value Chain) |
| 5 | 2017/03/17 | Fintech 金融科技商業模式創新 (Fintech Business Models Innovation) |
| 6 | 2017/03/24 | Fintech 金融科技個案研究 I (Case Study on Fintech I) |

課程大綱 (Syllabus)

| 週次 (Week) | 日期 (Date) | 內容 (Subject/Topics) |
|-----------|------------|--|
| 7 | 2017/03/31 | 金融服務消費者心理與行為 (Consumer Psychology and Behavior on Financial Services) |
| 8 | 2017/04/07 | 教學行政觀摩日 (Off-campus study) |
| 9 | 2017/04/14 | 區塊鏈技術 (Blockchain Technology) [Invited Speaker: Dr. Raymund Lin, IBM (林俊叡 博士，IBM)] |
| 10 | 2017/04/21 | 期中報告 (Midterm Project Report) |
| 11 | 2017/04/28 | Python Pandas財務大數據分析 (Finance Big Data Analytics with Pandas in Python) |
| 12 | 2017/05/05 | 人工智慧與深度學習金融科技 (Artificial Intelligence and Deep Learning for Fintech) |

課程大綱 (Syllabus)

| 週次 (Week) | 日期 (Date) | 內容 (Subject/Topics) |
|-----------|------------|--|
| 13 | 2017/05/12 | Fintech 金融科技個案研究 II (Case Study on Fintech II) |
| 14 | 2017/05/19 | 金融科技財富管理：機器人理財顧問 (Robo-Advisors for Wealth Management in Fintech) |
| 15 | 2017/05/26 | 投資組合最佳化與程式交易 (Portfolio Optimization and Algorithmic Trading) |
| 16 | 2017/06/02 | 金融科技智慧問答系統 (Intelligent Question Answering System for Fintech) |
| 17 | 2017/06/09 | 期末報告 I (Final Project Presentation I) |
| 18 | 2017/06/16 | 期末報告 II (Final Project Presentation II) |

**Consumer
Psychology and
Behavior
on
Financial Services**

Consumer Psychology and Behavior

How consumers think, feel, and act

**Fintech:
Technology
Innovation in
Financial Services**

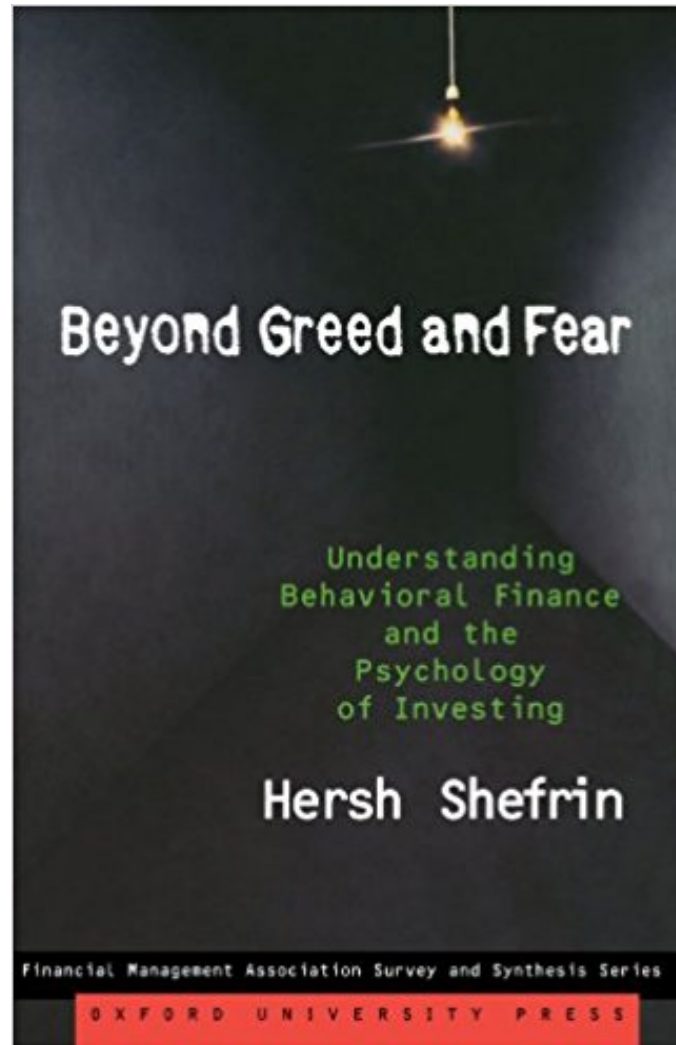
Fintech Impact on Consumer Behavior



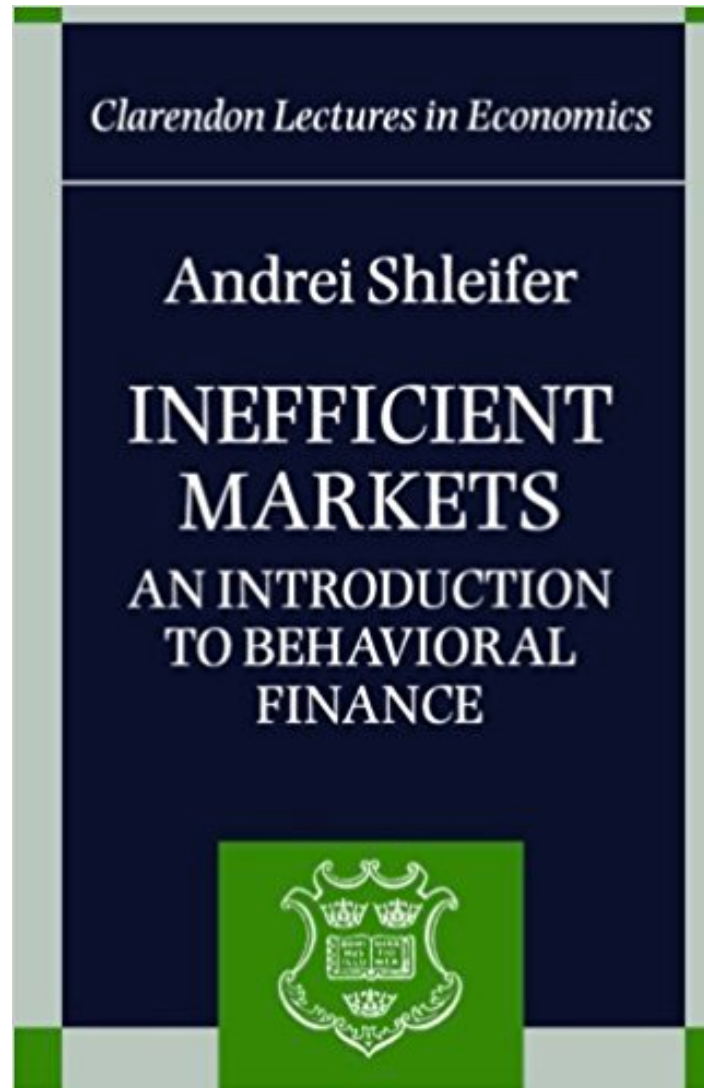
Source: <http://bitcoinist.com/fintech-impact-consumer-behavior-mobile-payments/>

Behavioral Finance

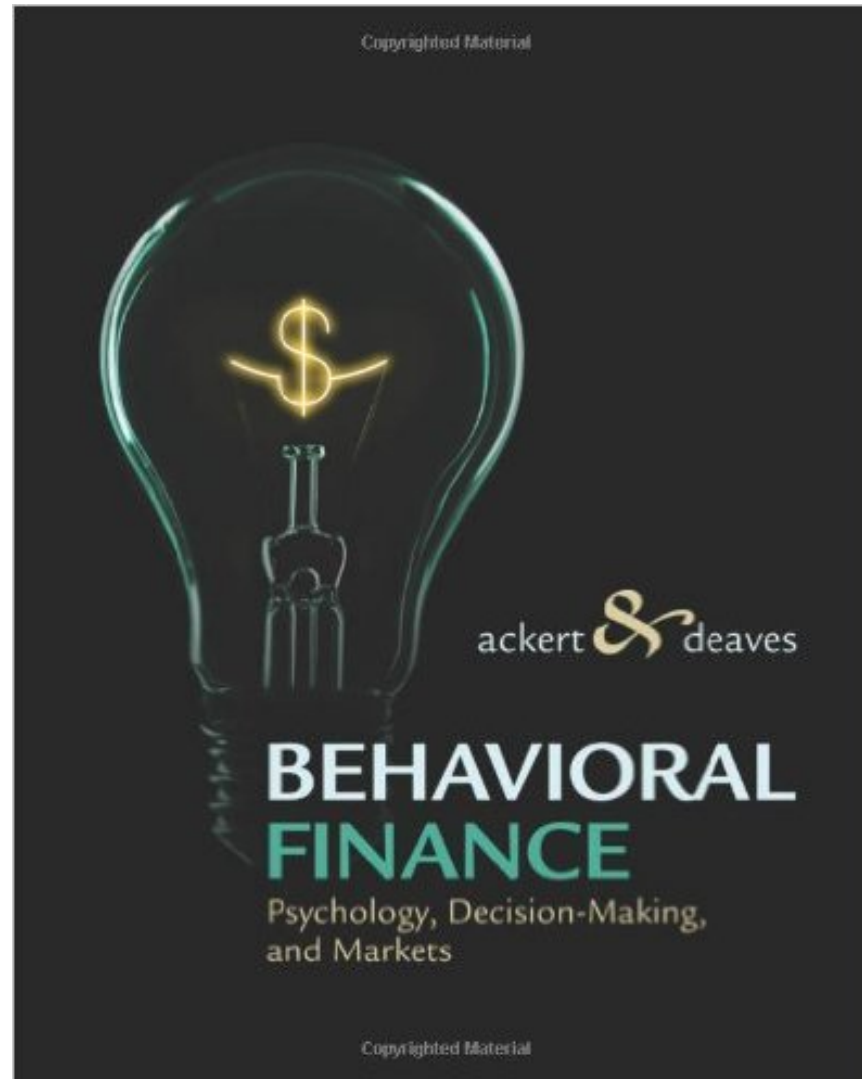
Hersh Shefrin (2007),
Beyond Greed and Fear:
Understanding Behavioral Finance and the Psychology of Investing,
Oxford University Press



**Andrei Shleifer (2000),
Inefficient Markets: An Introduction to Behavioral Finance,
Oxford University Press**

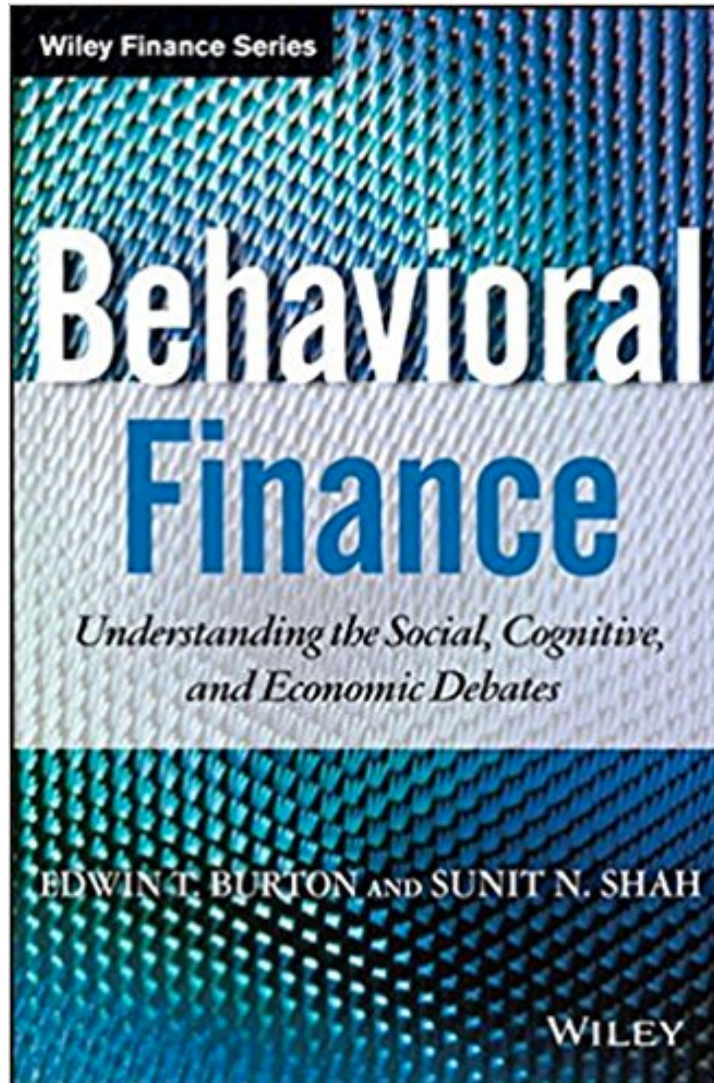


Lucy Ackert and Richard Deaves (2009),
Behavioral Finance: Psychology, Decision-Making, and Markets,
South-Western College Pub

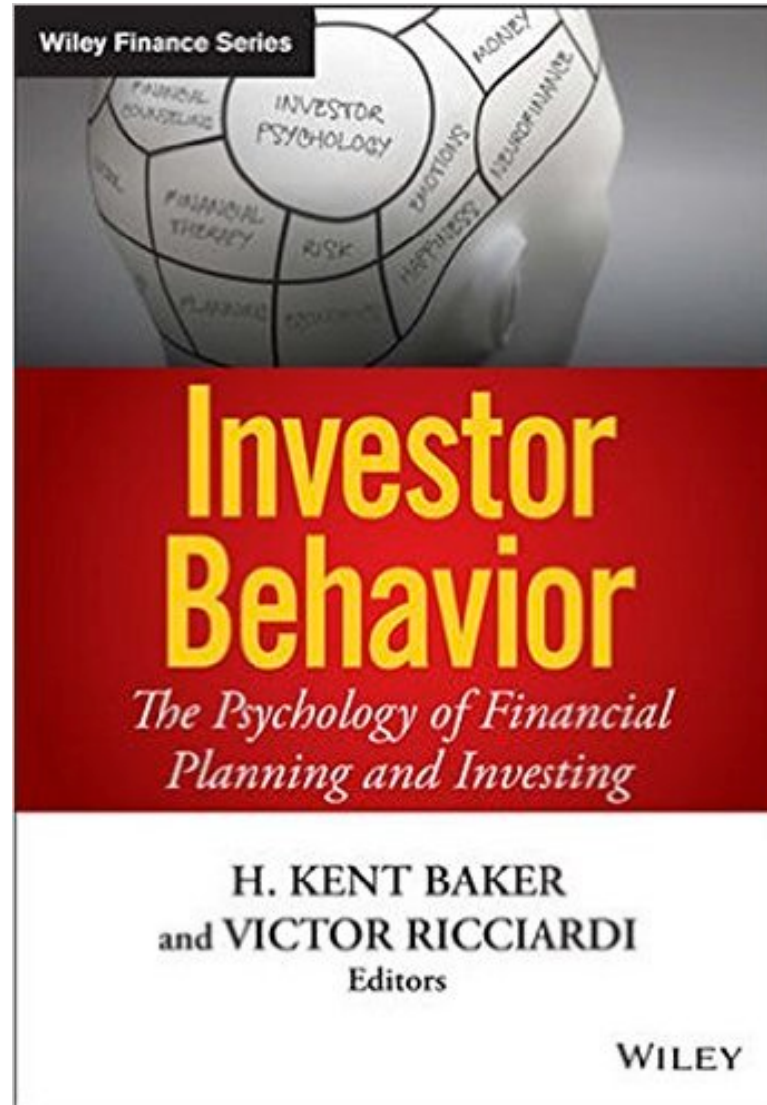


Edwin Burton and Sunit N. Shah (2013)

Behavioral Finance: Understanding the Social, Cognitive, and
Economic Debates, Wiley



H. Kent Baker and Victor Ricciardi (2014)
Investor Behavior: The Psychology of Financial Planning and
Investing, Wiley



Marketing

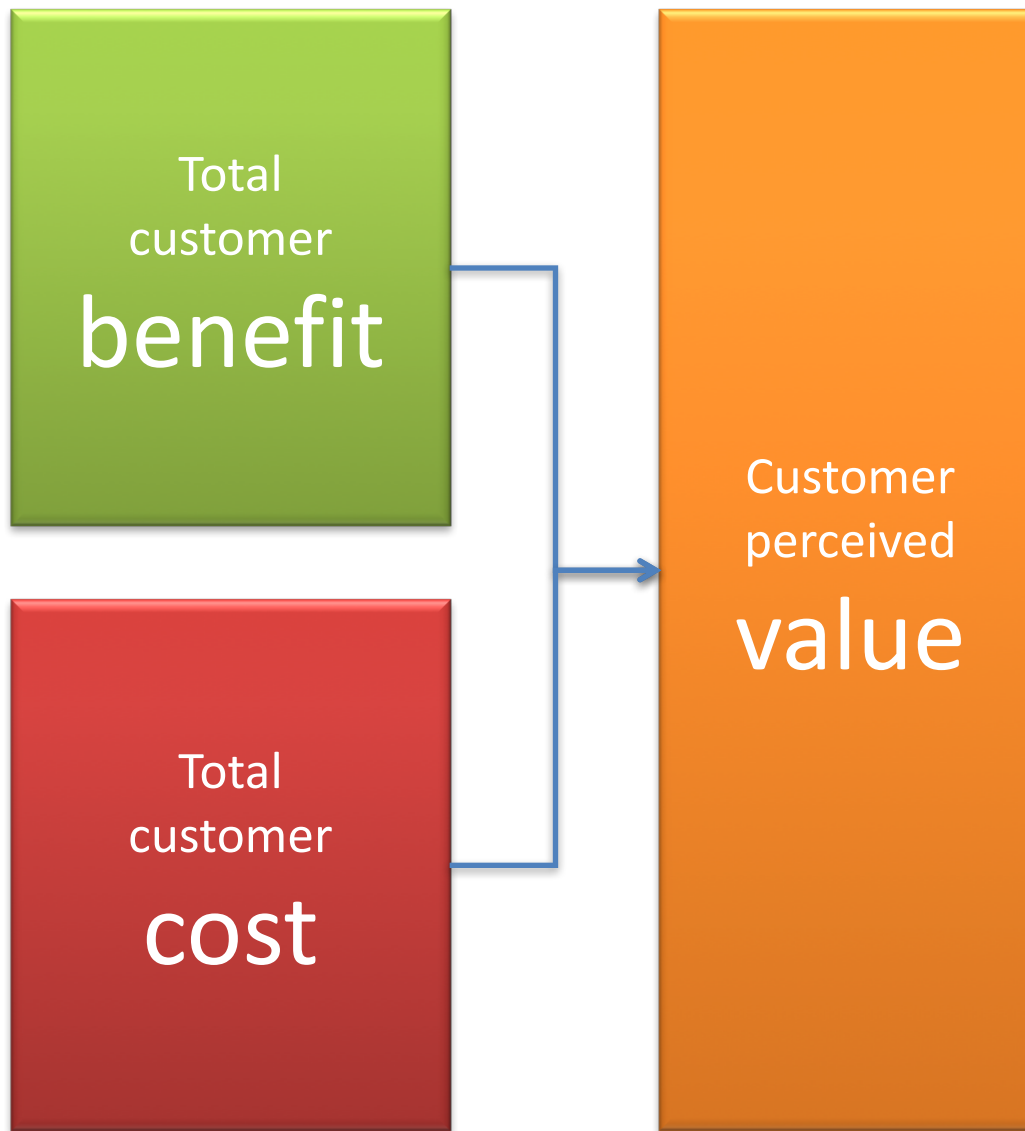
**“Meeting
needs
profitably”**

Value

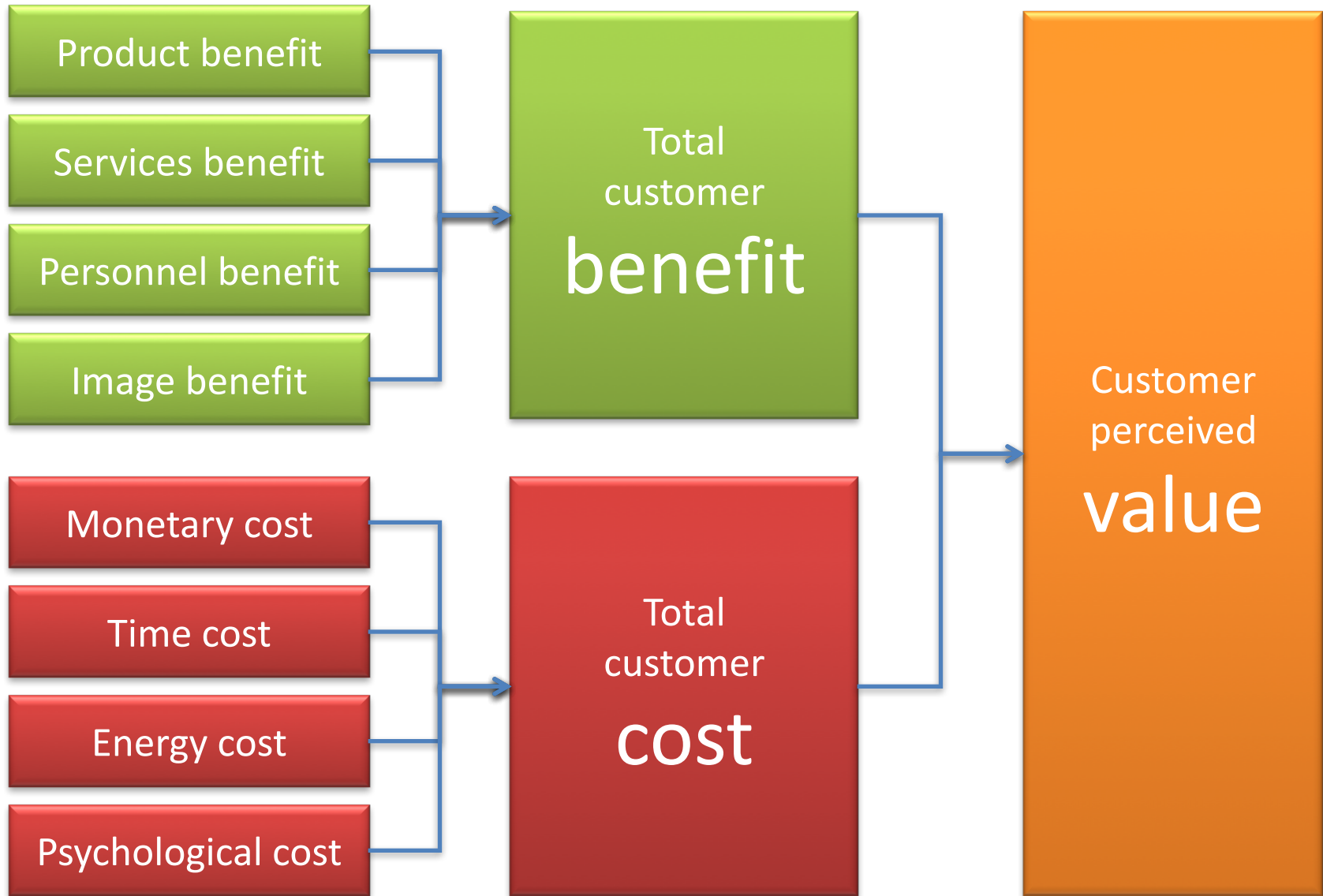
the sum of the
tangible and
intangible

benefits and costs

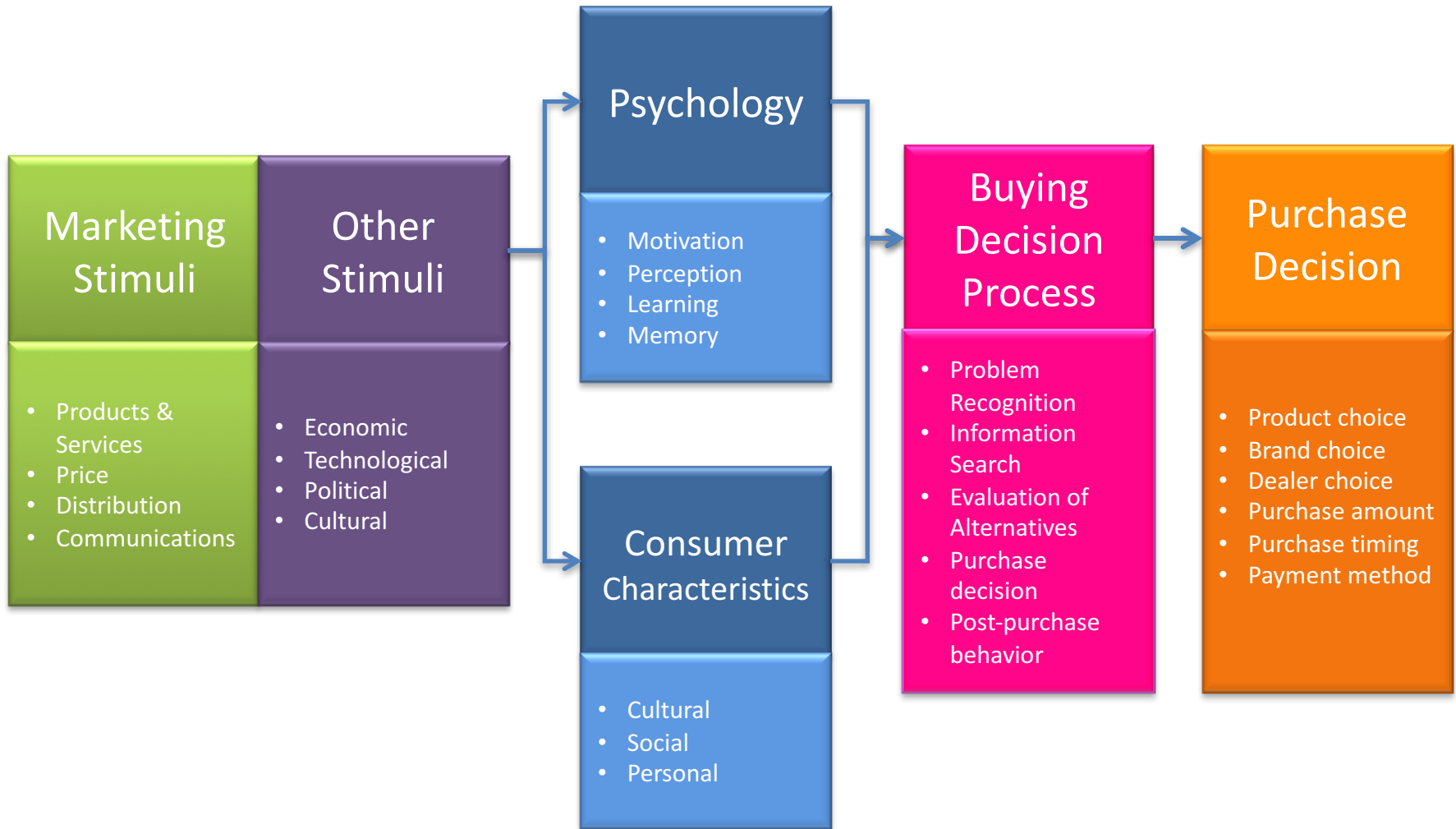
Value



Customer Perceived Value

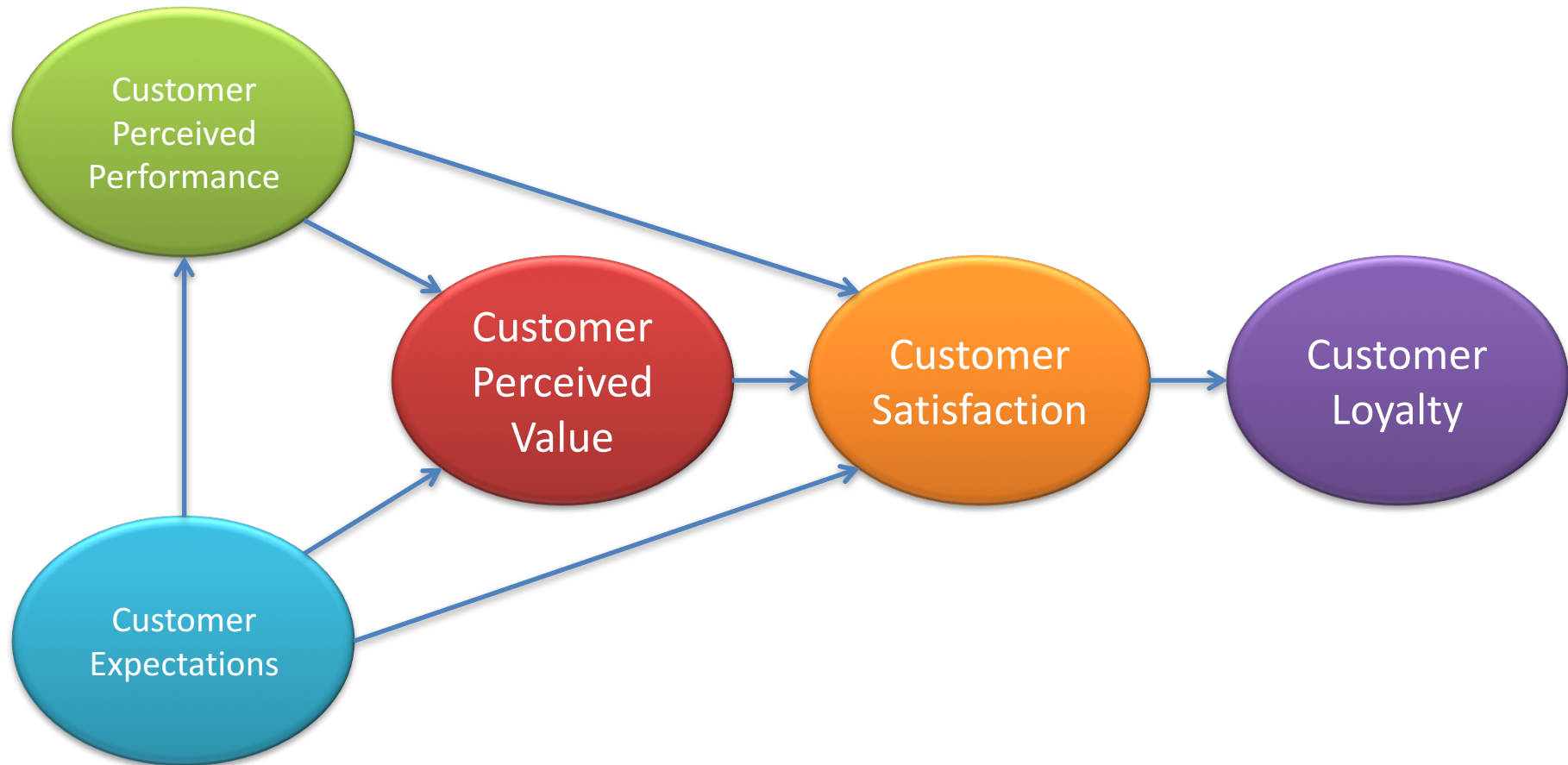


Model of Consumer Behavior



Building
Customer Value,
Satisfaction,
and
Loyalty

Customer Perceived Value, Customer Satisfaction, and Loyalty



Theory of Reasoned Action (TRA)

TRA (1975)

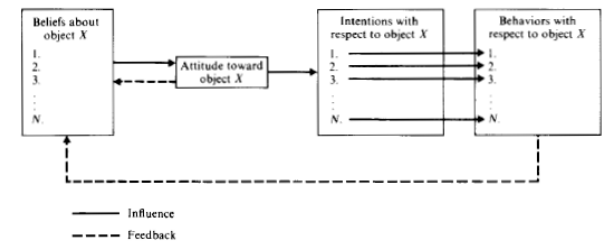


Fig. 1.1 Schematic presentation of conceptual framework relating beliefs, attitudes, intentions, and behaviors with respect to a given object.

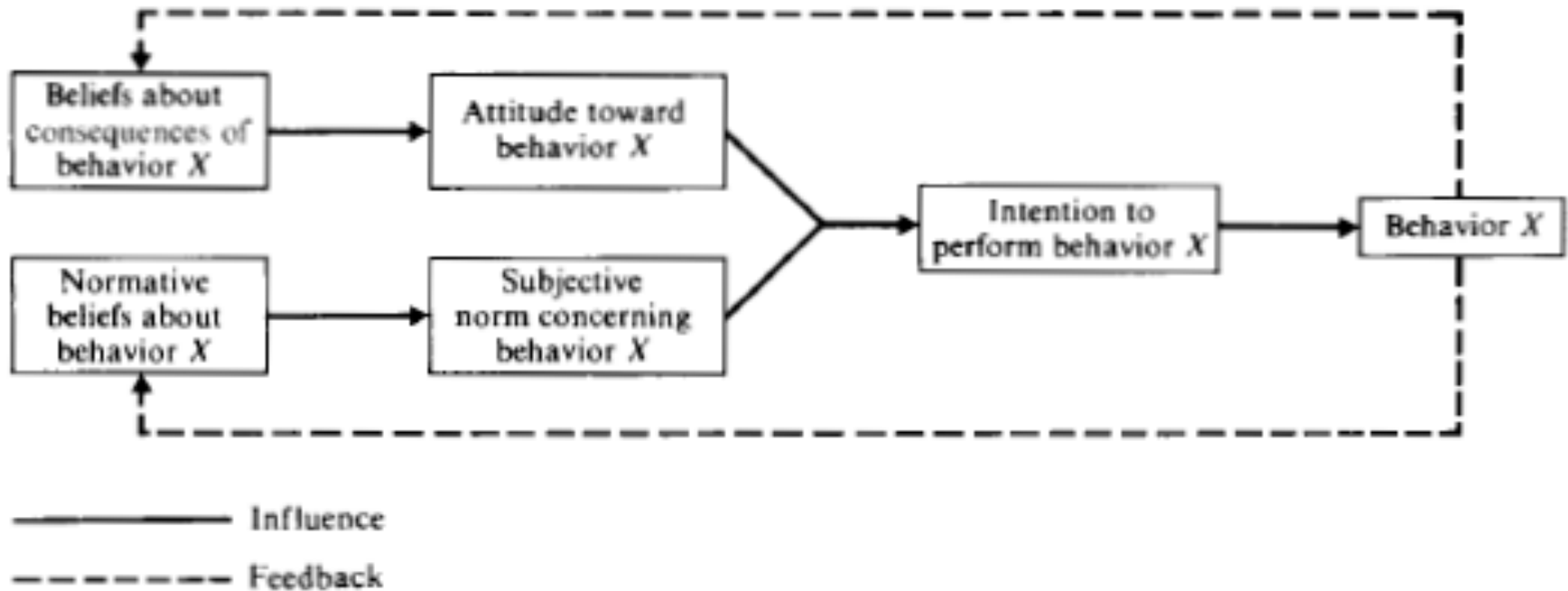


Fig. 1.2 Schematic presentation of conceptual framework for the prediction of specific intentions and behaviors.

TRA (1989)

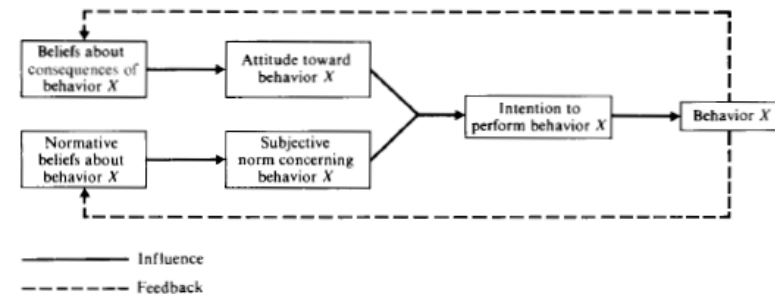


Fig. 1.2 Schematic presentation of conceptual framework for the prediction of specific intentions and behaviors.

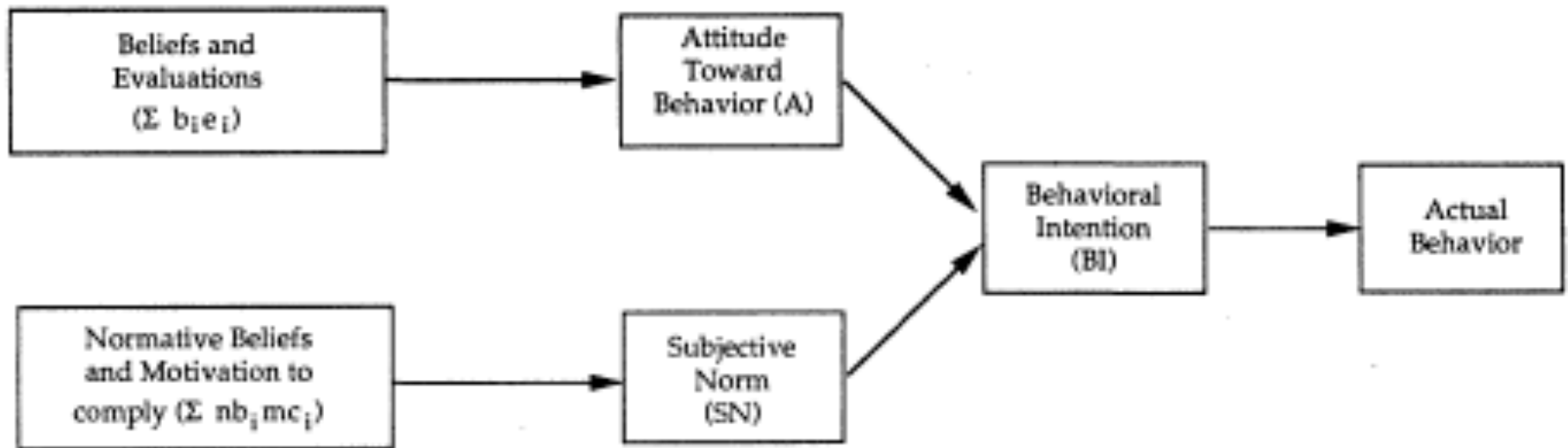


FIGURE 1. Theory of Reasoned Action (TRA).

Theory of Planned Behavior (TPB)

TPB (1985)

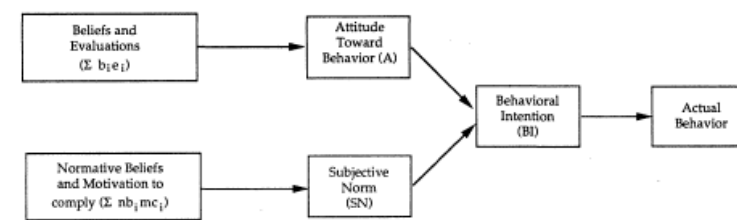


FIGURE 1. Theory of Reasoned Action (TRA).

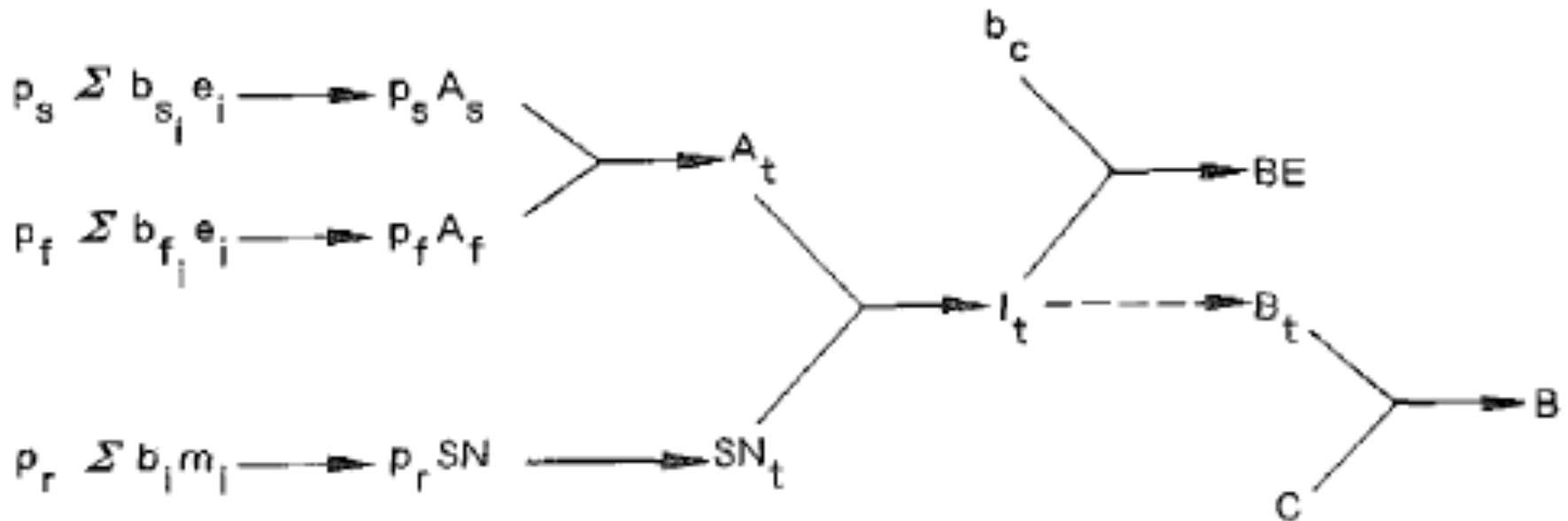


Fig. 2.1. Schematic presentation of the theory of planned behavior

TPB (1989)

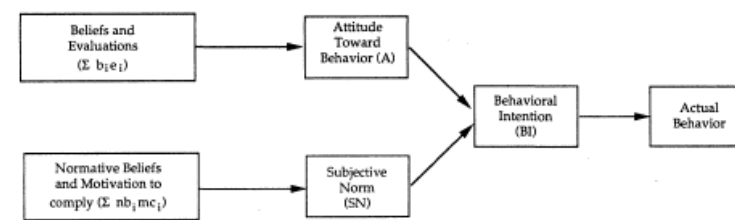


FIGURE 1. Theory of Reasoned Action (TRA).

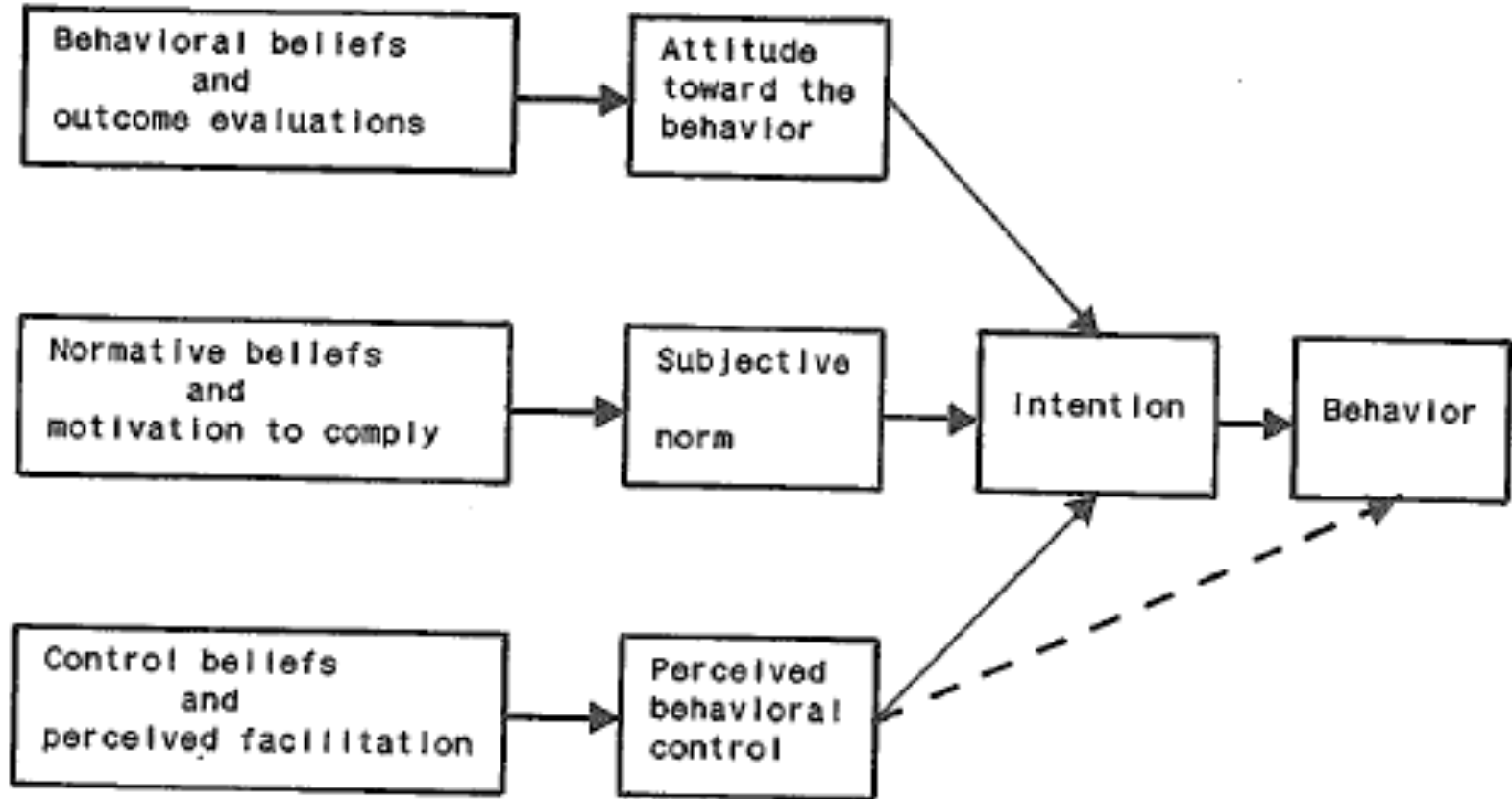


FIG. 10.2. Theory of planned behavior.

Ajzen, I., (1989) "Attitude Structure and Behavior," in A. R. Pratkanis, S. J. Breckler, and A. G. Greenwald(Eds.), Attitude Structure and Function, Lawrence Erlbaum Associates, Hillsdale, NJ, 1989, pp.241-274.

TPB (1991)

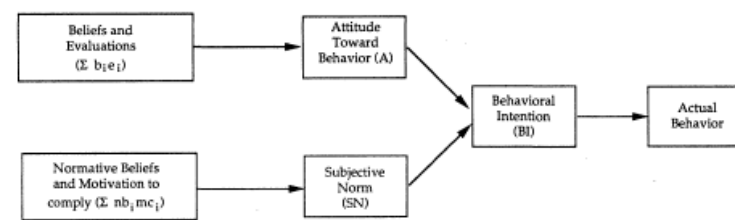


FIGURE 1. Theory of Reasoned Action (TRA).

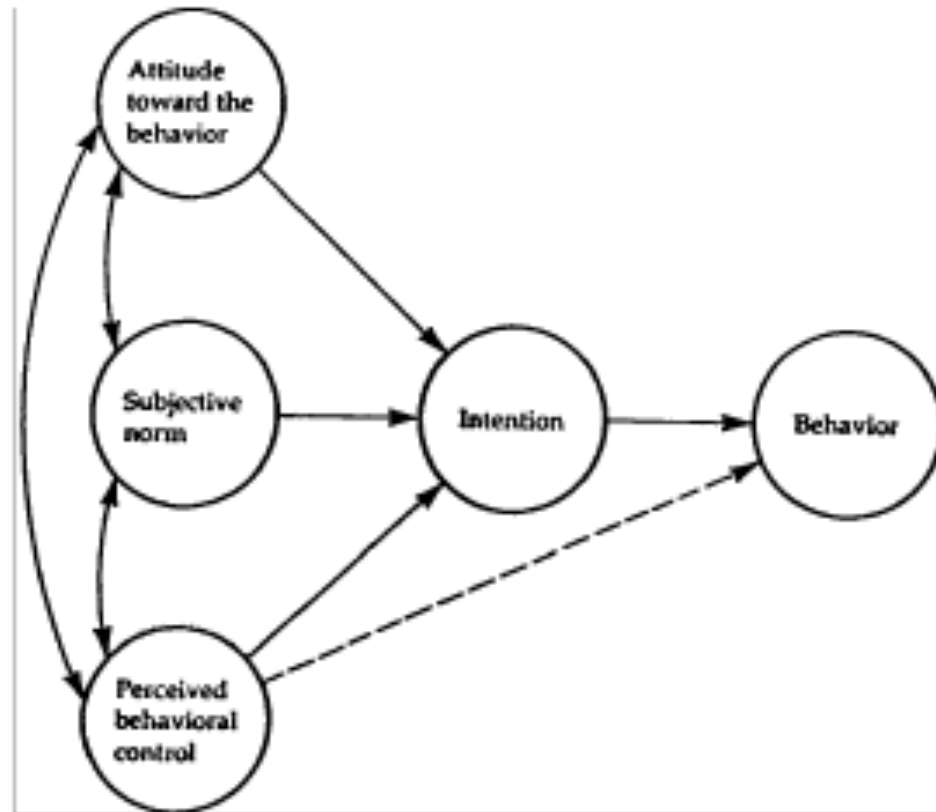
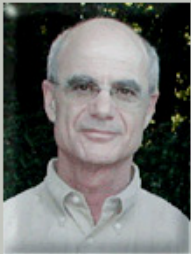


FIG. 1. Theory of planned behavior



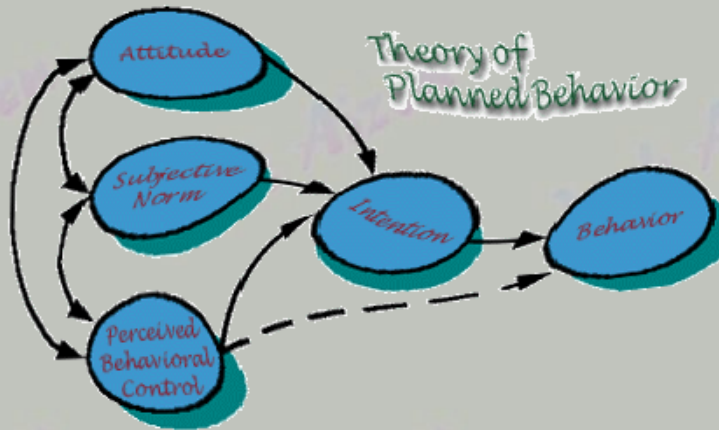
Icek Aizen (Ajzen)

Professor of Psychology
 University of Massachusetts

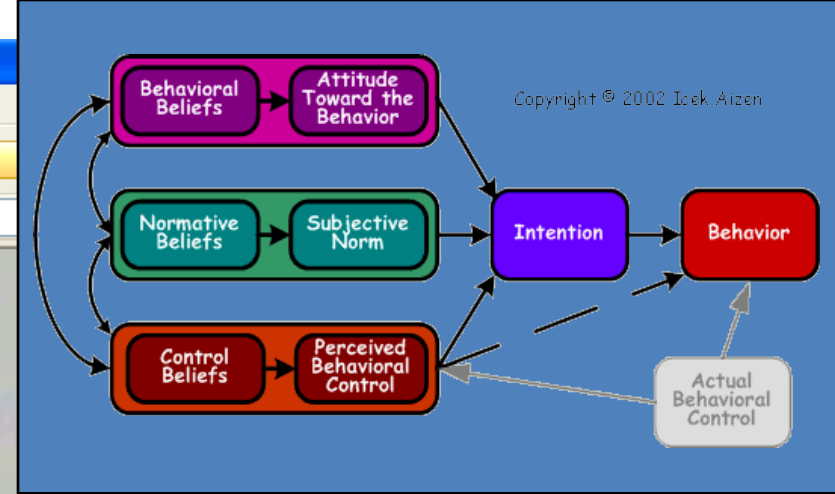
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- [TpB](#)
- [Consulting](#)

Search



Last modified: April 13, 2005



Technology Acceptance Model (TAM)

TAM (1989)

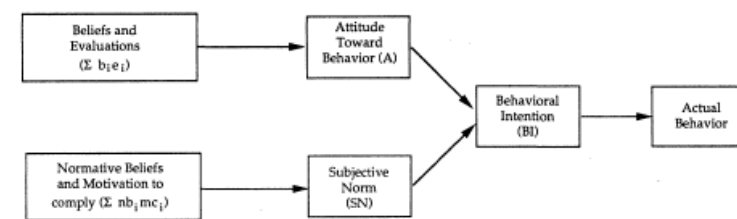


FIGURE 1. Theory of Reasoned Action (TRA).

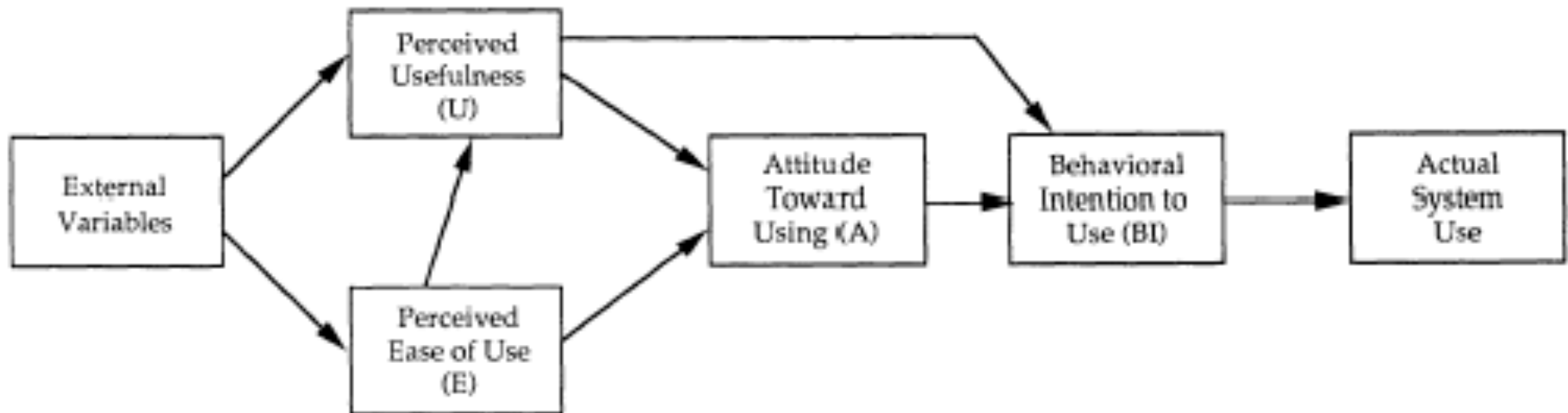


FIGURE 2. Technology Acceptance Model (TAM).

TAM2 (2000)

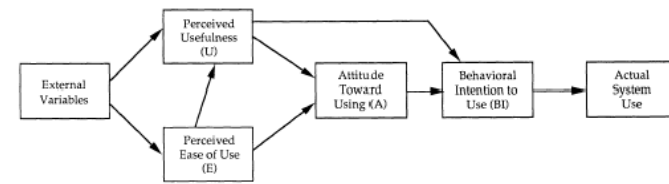
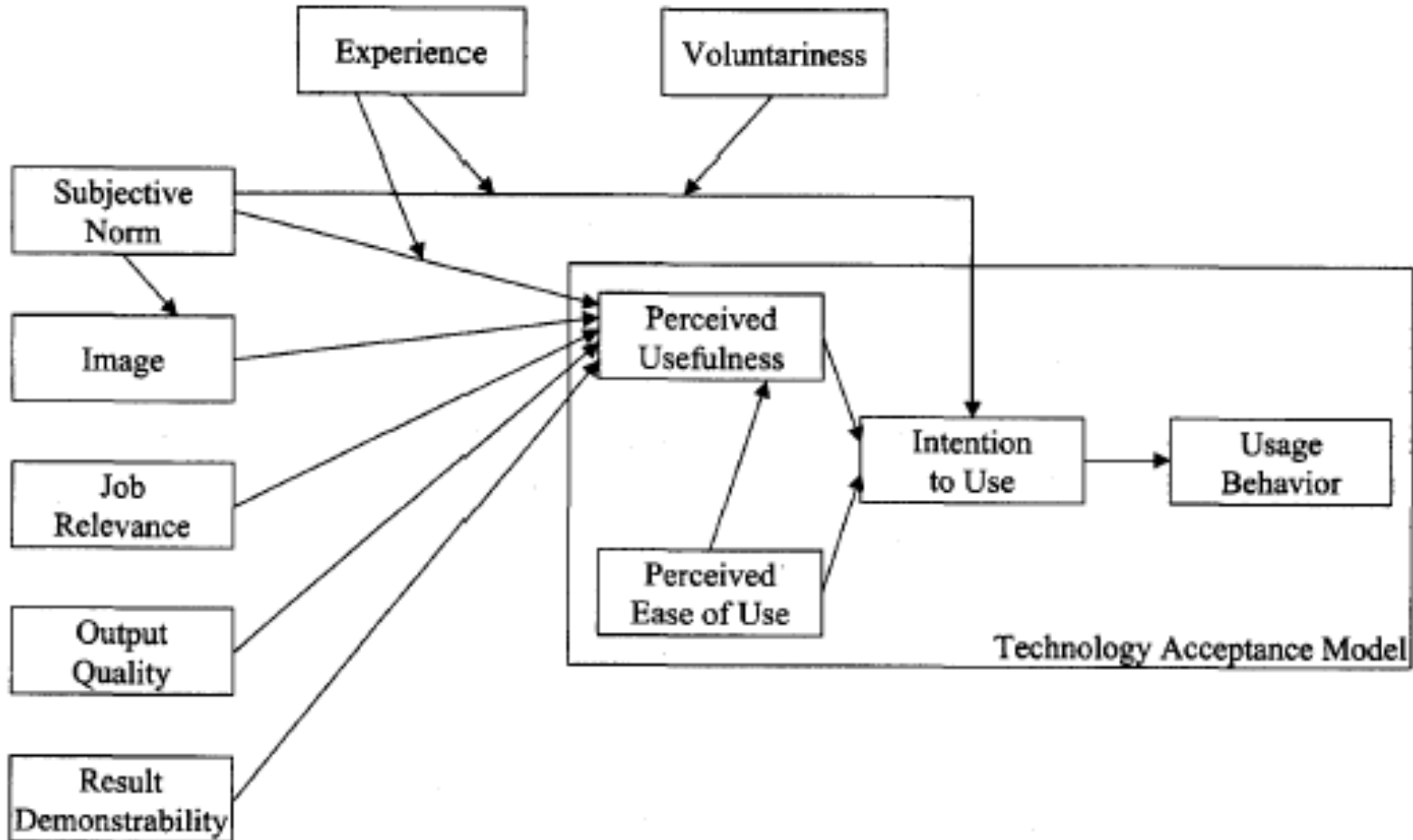


FIGURE 2. Technology Acceptance Model (TAM).

Figure 1 Proposed TAM2—Extension of the Technology Acceptance Model



Venkatesh, V., & Davis, F. D. (2000) "A theoretical extension of the technology acceptance model: Four longitudinal field studies", *Management Science*, 46(2), pp. 186-204.

Behavioral Finance

Rational Behavior

Irrational Behavior

Emotion

Sentiment

Modern Financial Research

- Theoretical Finance
 - study of **logical relationships** among **assets**.
- Empirical Finance
 - study of **data** in order to **infer relationships**.
- **Behavioral Finance**
 - integrates **psychology** into the **investment process**.

Psychology in Behavior Finance

- Beliefs
- Preferences
 - Prospect theory
 - Ambiguity aversion

Behavioral Finance Themes

- Heuristic-Driven Bias
- Framing Dependence
- Inefficient Markets

Efficient Market Hypothesis (EMH)

Expected Utility Theory (EUT)

Prospect theory:

An analysis of decision under risk

Prospect Theory

(Kahneman and Tversky, 1979)

ECONOMETRICA

VOLUME 47

MARCH, 1979

NUMBER 2

PROSPECT THEORY: AN ANALYSIS OF DECISION UNDER RISK

BY DANIEL KAHNEMAN AND AMOS TVERSKY¹

This paper presents a critique of expected utility theory as a descriptive model of decision making under risk, and develops an alternative model, called prospect theory. Choices among risky prospects exhibit several pervasive effects that are inconsistent with the basic tenets of utility theory. In particular, people underweight outcomes that are merely probable in comparison with outcomes that are obtained with certainty. This tendency, called the certainty effect, contributes to risk aversion in choices involving sure gains and to risk seeking in choices involving sure losses. In addition, people generally discard components that are shared by all prospects under consideration. This tendency, called the isolation effect, leads to inconsistent preferences when the same choice is presented in different forms. An alternative theory of choice is developed, in which value is assigned to gains and losses rather than to final assets and in which probabilities are replaced by decision weights. The value function is normally concave for gains, commonly convex for losses, and is generally steeper for losses than for gains. Decision weights are generally lower than the corresponding probabilities, except in the range of low probabilities. Overweighting of low probabilities may contribute to the attractiveness of both insurance and gambling.

Decision Making under Risk

Which of the following would you prefer?

- A:
 - 50% chance to win 1,000,
 - 50% chance to win nothing;
- B:
 - 450 for sure.

Which of the following would you prefer?

A: 50% chance to win 1,000,

B: 450 for sure.

50% chance to win nothing;

Decision

PROBLEM 1: Choose between

A: 2,500 with probability .33,
2,400 with probability .66,
0 with probability .01;

B: 2,400 with certainty.

Decision

PROBLEM 1: Choose between

A: 2,500 with probability .33, B: 2,400 with certainty.
2,400 with probability .66,
0 with probability .01;

$N = 72$

[18]

[82]*

Decision

PROBLEM 2: Choose between

C: 2,500 with probability .33,
0 with probability .67;

D: 2,400 with probability .34,
0 with probability .66.

Decision

PROBLEM 2: Choose between

C: 2,500 with probability .33, D: 2,400 with probability .34,
0 with probability .67; 0 with probability .66.

$N = 72$

[83]*

[17]

Expected Utility

$$u(2,400) > .33u(2,500) + .66u(2,400) \text{ or } .34u(2,400) > .33u(2,500)$$

Decision

PROBLEM 3:

A: (4,000,.80), or B: (3,000).

Decision

PROBLEM 3:

A: (4,000,.80), or B: (3,000).

$N = 95$ [20] [80]*

Decision

PROBLEM 4:

C: (4,000,.20), or D: (3,000,.25).

Decision

PROBLEM 4:

C: (4,000,.20), or D: (3,000,.25).

$N = 95$ [65]* [35]

Decision

PROBLEM 5:

A: 50% chance to win a three-week tour of England, France, and Italy;

$N = 72$ [22]

B: A one-week tour of England, with certainty.

[78]*

PROBLEM 6:

C: 5% chance to win a three-week tour of England, France, and Italy;

$N = 72$ [67]*

D: 10% chance to win a one-week tour of England.

[33]

Decision

PROBLEM 7:

A: (6,000, .45), B: (3,000, .90).
 $N = 66$ [14] [86]*

PROBLEM 8:

C: (6,000, .001), D: (3,000, .002).
 $N = 66$ [73]* [27]

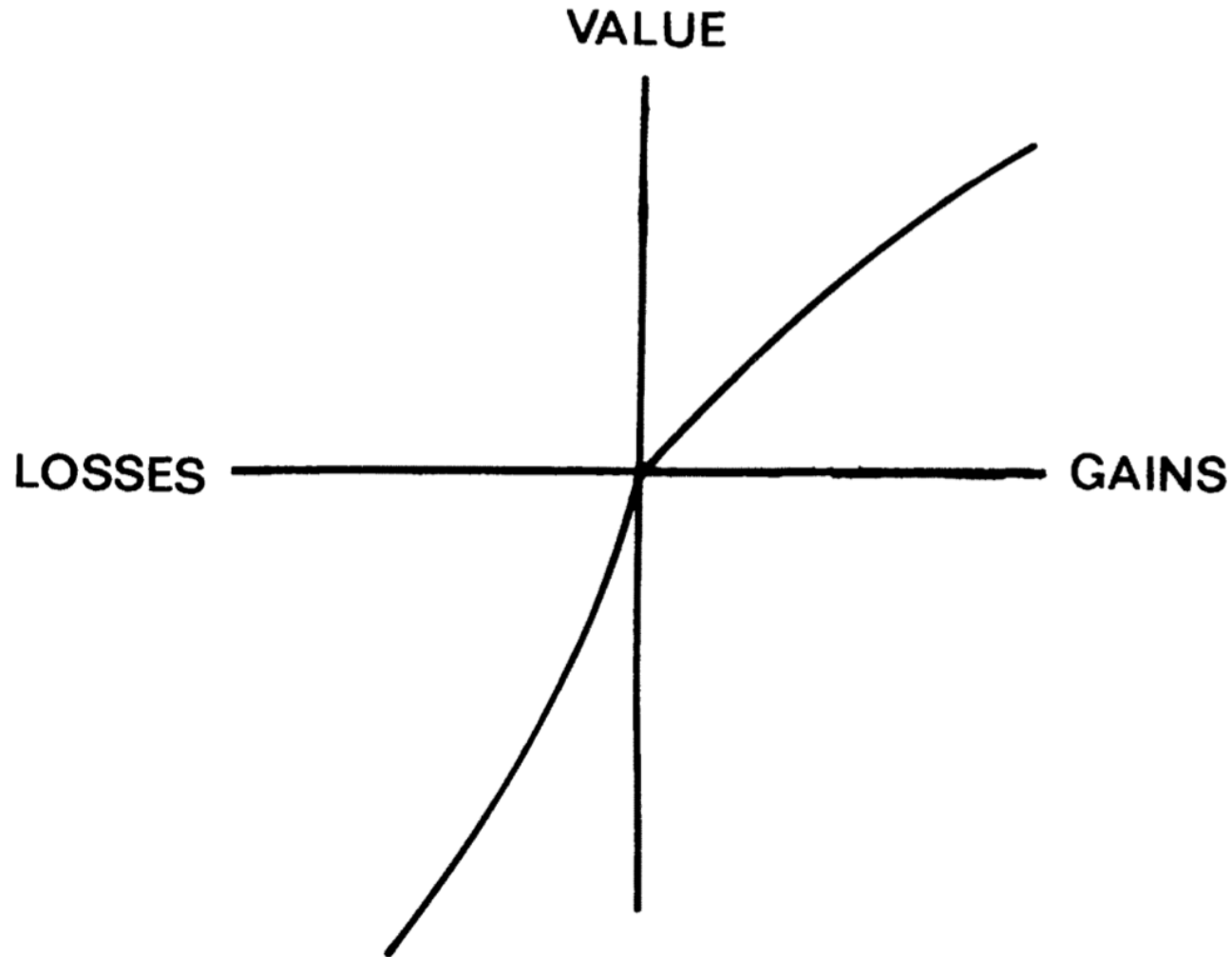
Preferences Between Positive and Negative Prospects

| Positive prospects | | Negative prospects | |
|------------------------|---|-------------------------|---|
| Problem 3: $N = 95$ | $(4,000, .80) < (3,000)$ [20] [80]* | Problem 3': $N = 95$ | $(-4,000, .80) > (-3,000)$ [92]* [8] |
| Problem 4: $N = 95$ | $(4,000, .20) > (3,000, .25)$ [65]* [35] | Problem 4': $N = 95$ | $(-4,000, .20) < (-3,000, .25)$ [42] [58] |
| Problem 7: $N = 66$ | $(3,000, .90) > (6,000, .45)$ [86]* [14] | Problem 7': $N = 66$ | $(-3,000, .90) < (-6,000, .45)$ [8] [92]* |
| Problem 8: $N = 66$ | $(3,000, .002) < (6,000, .001)$ [27] [73]* | Problem 8': $N = 66$ | $(-3,000, .002) > (-6,000, .001)$ [70]* [30] |

Certainty, Probability, and Possibility

Prospect theory

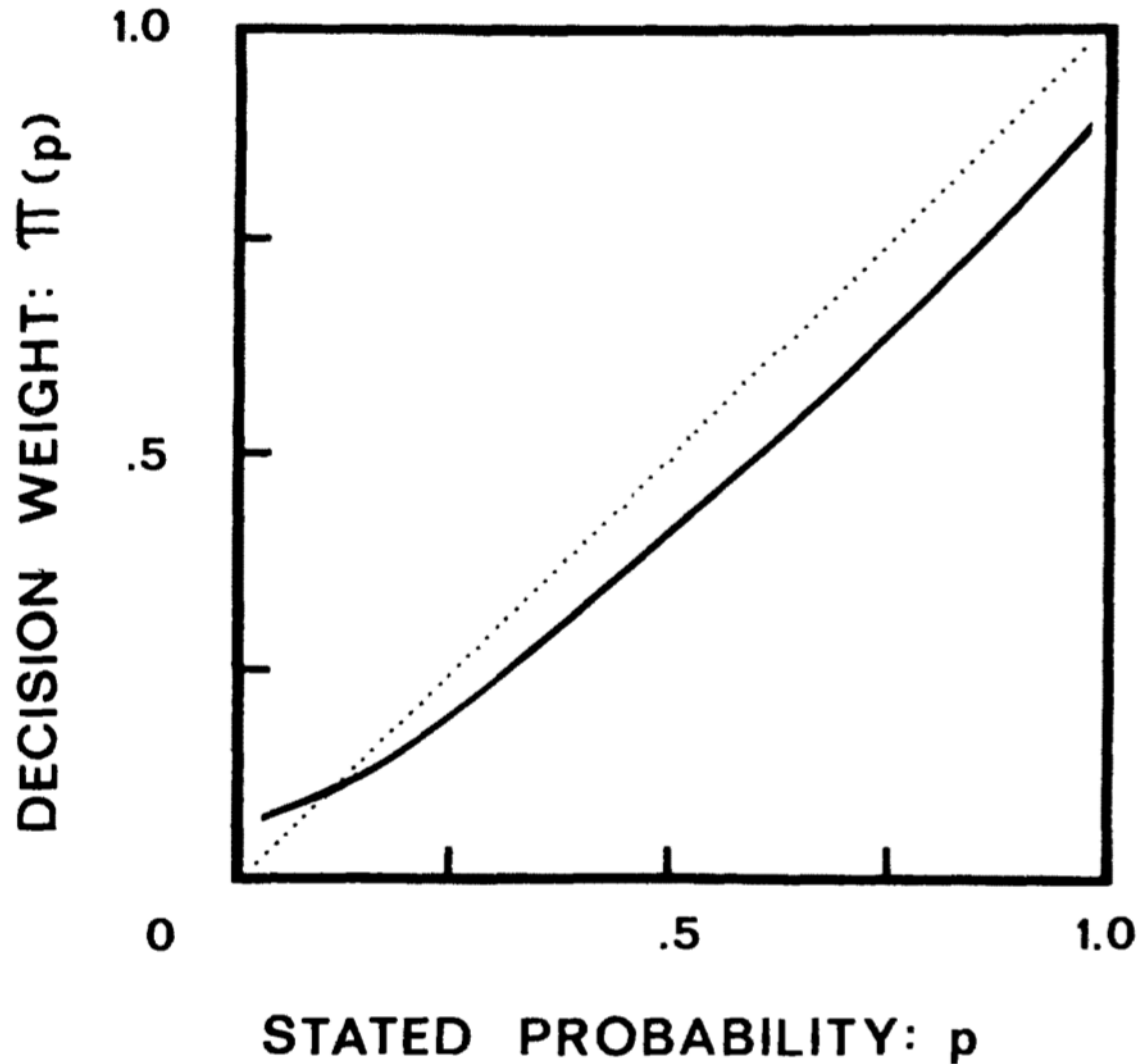
Value Function



Source: Kahneman, Daniel, and Amos Tversky. "Prospect theory: An analysis of decision under risk." *Econometrica: Journal of the econometric society* (1979): 263-291.

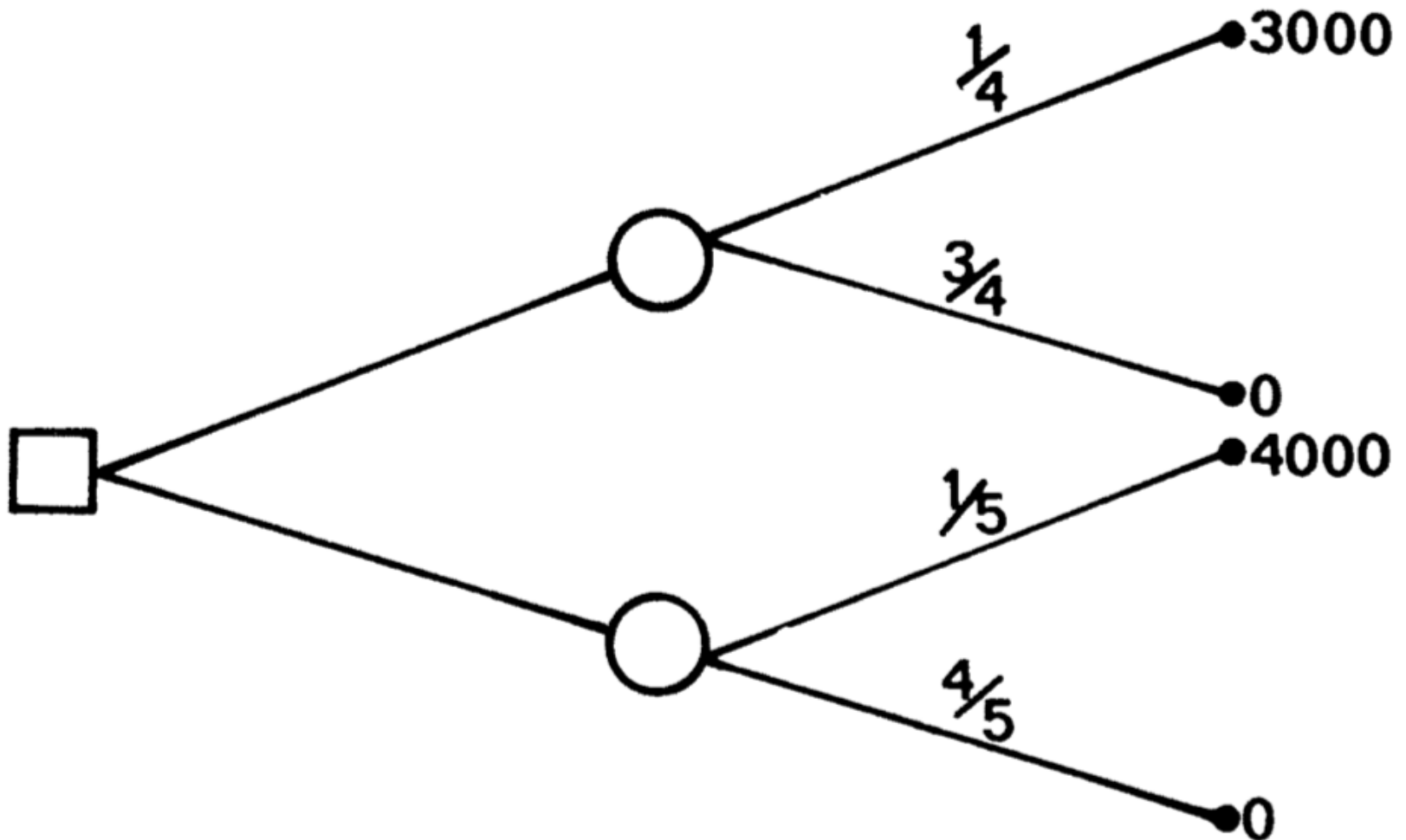
Prospect theory

Weighting Function

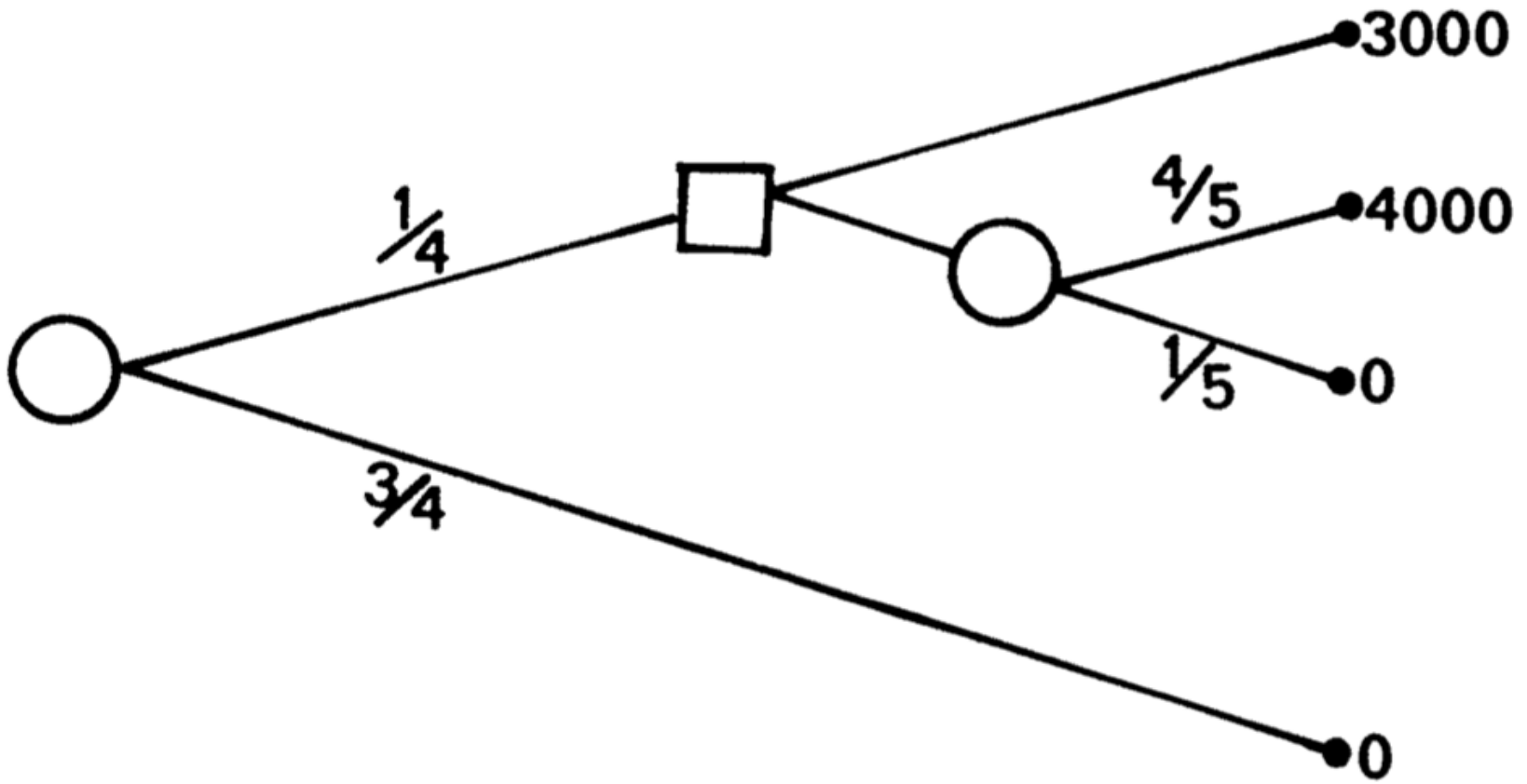


Source: Kahneman, Daniel, and Amos Tversky. "Prospect theory: An analysis of decision under risk." *Econometrica: Journal of the econometric society* (1979): 263-291.

Problem 4 as a decision tree (standard formulation)



Problem 10 as a decision tree (sequential formulation)



Decision

PROBLEM 11: In addition to whatever you own, you have been given 1,000. You are now asked to choose between

A: (1,000, .50), and B: (500).

$N = 70$ [16] [84]*

PROBLEM 12: In addition to whatever you own, you have been given 2,000. You are now asked to choose between

C: (-1,000, .50), and D: (-500).

$N = 68$ [69*] [31]

Decision

PROBLEM 13:

$(6,000, .25),$ or $(4,000, .25; 2,000, .25).$
 $N = 68$ $[18]$ $[82]^*$

PROBLEM 13':

$(-6,000, .25),$ or $(-4,000, .25; -2,000, .25).$
 $N = 64$ $[70]^*$ $[30]$

Decision

PROBLEM 14:

$(5,000, .001),$ or $(5).$
 $N = 72$ $[72]^*$ $[28]$

PROBLEM 14':

$(-5,000, .001),$ or $(-5).$
 $N = 72$ $[17]$ $[83]^*$

Prospect theory

- People underweight outcomes that are merely probable in comparison with outcomes that are obtained with certainty.
 - This tendency, called the **certainty effect**, contributes to **risk aversion** in choices involving **sure gains** and to **risk seeking** in choices involving **sure losses**.

Prospect theory

- People generally discard components that are shared by all prospects under consideration.
 - This tendency, called the **isolation effect**, leads to **inconsistent preferences** when the **same choice** is presented in **different form** .

Prospect theory

- People generally discard components that are shared by all prospects under consideration.
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Prospect theory

- **Value** is assigned to **gains and losses** rather than to **final assets** and in which **probabilities** are replaced by **decision weights**.
- The value function is normally concave for gains, commonly convex for losses, and is generally steeper for losses than for gains.

Prospect theory

- Decision weights are generally lower than the corresponding probabilities, except in the range of low probabilities.
- **Overweighting** of low probabilities may contribute to the attractiveness of both insurance and gambling.

Behavioral Heuristics and Biases in Decision Making

Behavioral Finance Anomalies

- The Rational Man
 - Consumer Choice with Certainty
 - Consumer Choice with Uncertainty
 - The Allais Paradox

Prospect Theory

- The Reference Point
- The S-Curve
- Loss Aversion

Behavioral Finance Anomalies

- Perception Biases
- Inertial Effects
- Causality and Statistics
- Illusions

Perception Biases

- Saliency
- Framing
- Anchoring
- Sunk Cost Bias

Inertial Effects

- Endowment Effect
- Status Quo Effect
- Disposition Effect

Causality and Statistics

- Representativeness
- Conjunction Fallacy
- Reading into Randomness
- Small Sample Bias
- Probability Neglect

Illusions

- Illusion of Talent
- Illusion of Skill
- Illusion of Superiority
- Illusion of Validity

Behavioral Finance: Two Major Foundations

- Investor Sentiment
 - creates disturbances to efficient prices.
- Limited arbitrage
 - arbitrage is never riskfree, hence it does not counter irrational disturbances.
 - Prices may not react to information by the “right” amount.
 - Prices may react to non-information.
 - Markets may remain efficient.

Arbitrage

RICHARD GERE

"A CRACKLING THRILLER."
ENTERTAINMENT WEEKLY

"OSCAR-CALIBER RICHARD GERE FIRING ON ALL CYLINDERS."
ROLLING STONE

SUSAN SARANDON TIM ROTH BRIT MARLING

ARBITRAGE

POWER IS THE BEST ALIBI

A FILM BY NICHOLAS JARECKI

GREEN ROOM FILMS and TREEHOUSE PICTURES present a co-production in PARLAY FILMS, LB PRODUCTIONS, ARTINA FILMS in association with ALVENIA STUDIOS, LUCKY MONKEY PICTURES
a film by NICHOLAS JARECKI, RICHARD GERE, SUSAN SARANDON, TIM ROTH, BRIT MARLING, LAETITIA CASTA, NATE PARKER "ARBITRAGE" COSTUME DESIGNER LAURA ROSENTHAL, MUSIC SUPERVISOR MICHAEL PERLMUTTER, MUSIC BY CLIFF MARTINEZ
EXECUTIVE PRODUCERS JOSEPH G. ABLES, TIM CANNON, DOUGLAS CRISP, PRODUCTION DESIGNER BETH MICKEL, DIRECTOR OF PHOTOGRAPHY VICTOR LE SARKIS, EXECUTIVE PRODUCERS MICHAEL BELETSMAN, MICHAEL FELLER, MARIE CASPI ZEISS, ANNA RUDASKA
EXECUTIVE PRODUCERS BRIAN YOUNG, MOHAMMED AL TURKI, LISA WILSON, STANISLAV TYZINSKI, LAUREN KESSEL, MARIA TERESA ARUDA, RION CURTIS, PRODUCED BY LAURA DICKFORD, KEVIN TURNER, JUSTIN NAPPI, ROBERT SALERNO
WRITTEN AND DIRECTED BY NICHOLAS JARECKI © 2012 ARBITRAGE LLC. ALL RIGHTS RESERVED.

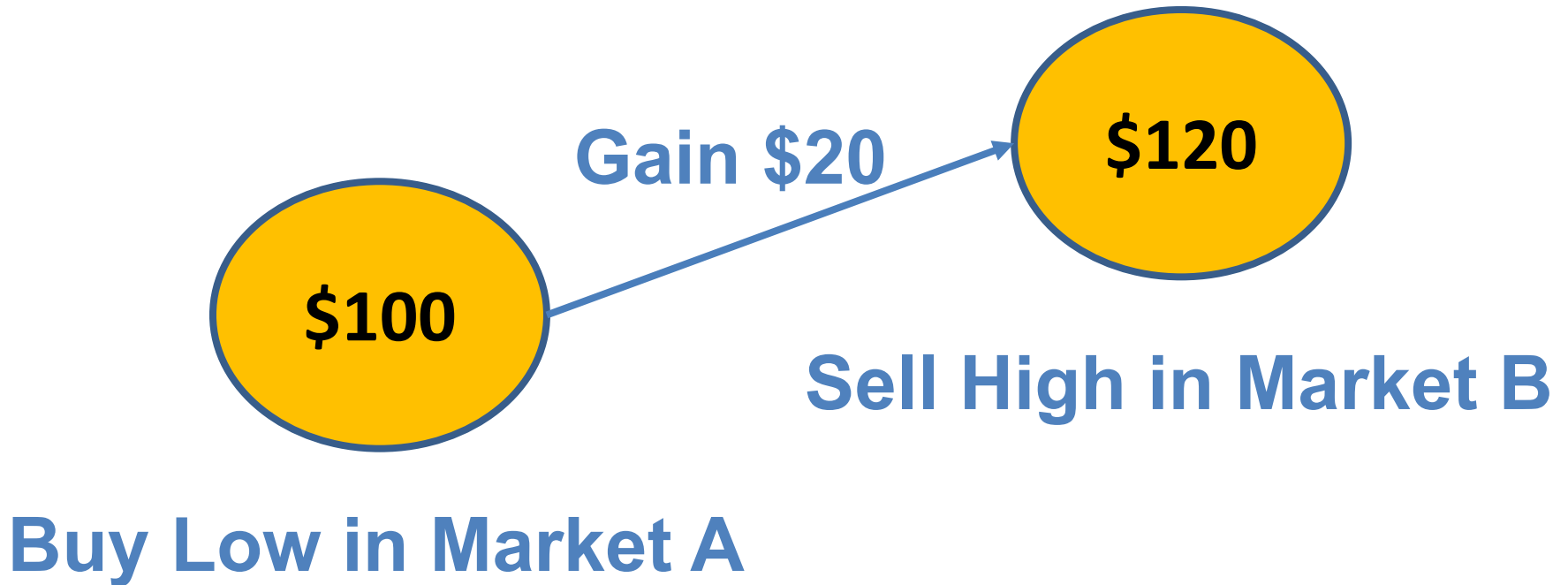
MA 15+ Strong themes and language RESTRICTED

QR CODE

f/madmanfilms @madmanfilms arbitragethemovie.com.au

MADMAN

Arbitrage



Heuristics

- Overconfidence
 - people overestimate the reliability of their knowledge.
- Excessive trading
- Framing Effect

Heuristics

- Regret Aversion
 - anticipation of a future regret can influence current decision.
- Disposition Effect
 - sell winners, hold on to the losers.
- Anchoring and adjustment: can create under-reaction.

Fashions and Fads

- People are influenced by each other. There is a social pressure to conform.
- Herding behavior: “safety-in-numbers”.
- Informational Cascades
- Positive Feedback
- Example: excessive demand for internet IPOs. Extremely high opening day returns.

Social Influences

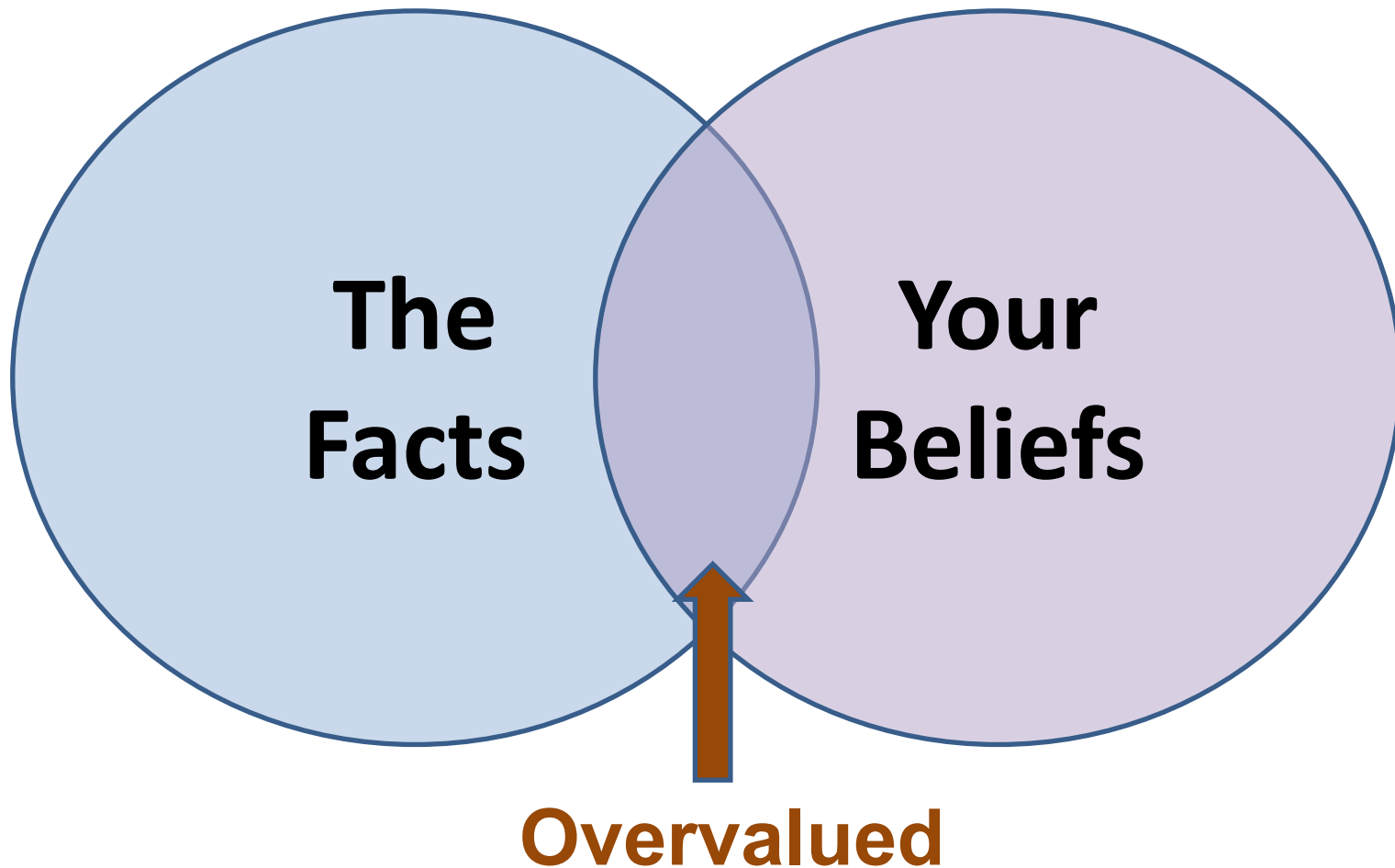
- Social norms
 - The informal opinions, rules, and procedures of a group.
 - Your peers and social groups influence your investment participation
- Herding Behavior
 - The movement into or out of a stock or industry of companies by large groups of investors.

Psychology of Belief

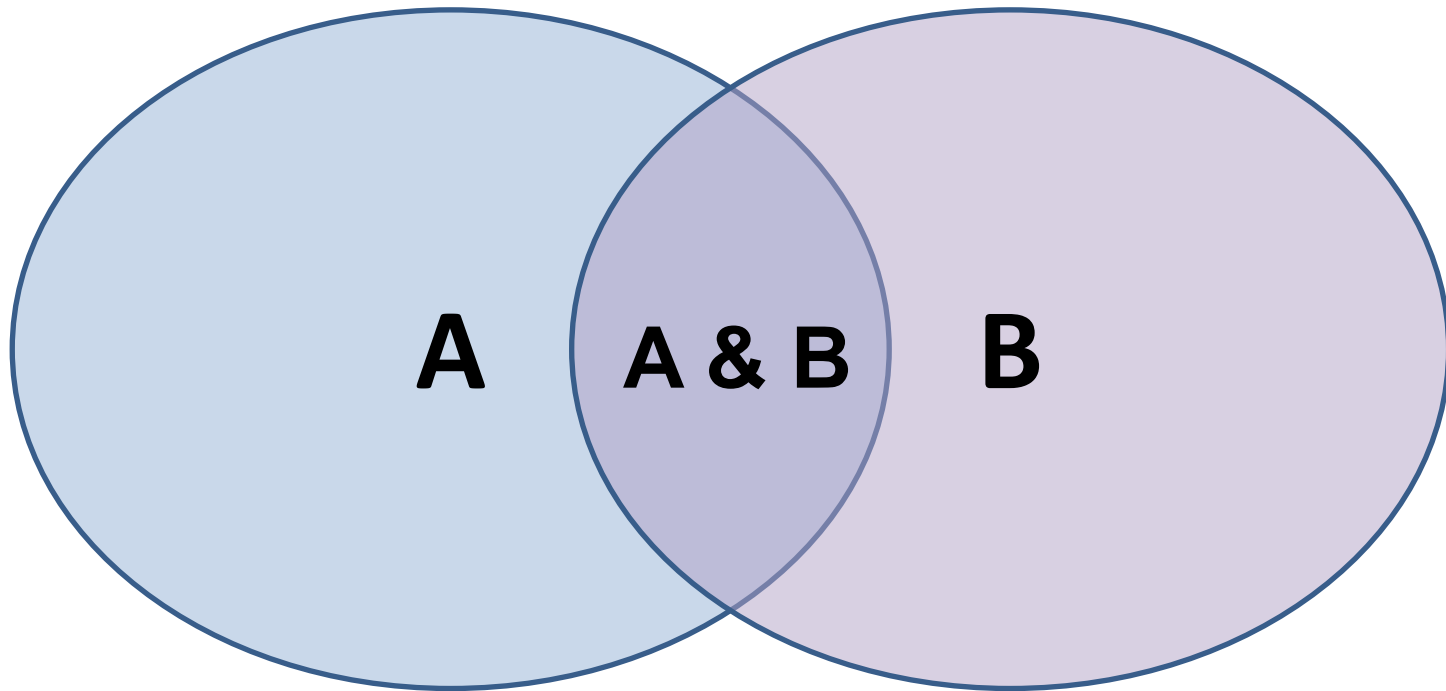
Confirmation Bias



Confirmation Bias



Representativeness Heuristic



$$P (A \& B) < P (A) \text{ or } P (B)$$

Herding Behavior

- Herding refers to the lemming-like behavior of investors and analysts looking around, seeing what each other is doing, and heading in that direction.
- There may not have been safety in numbers, but there probably was some comfort in them.

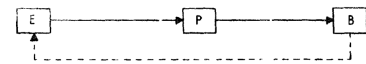
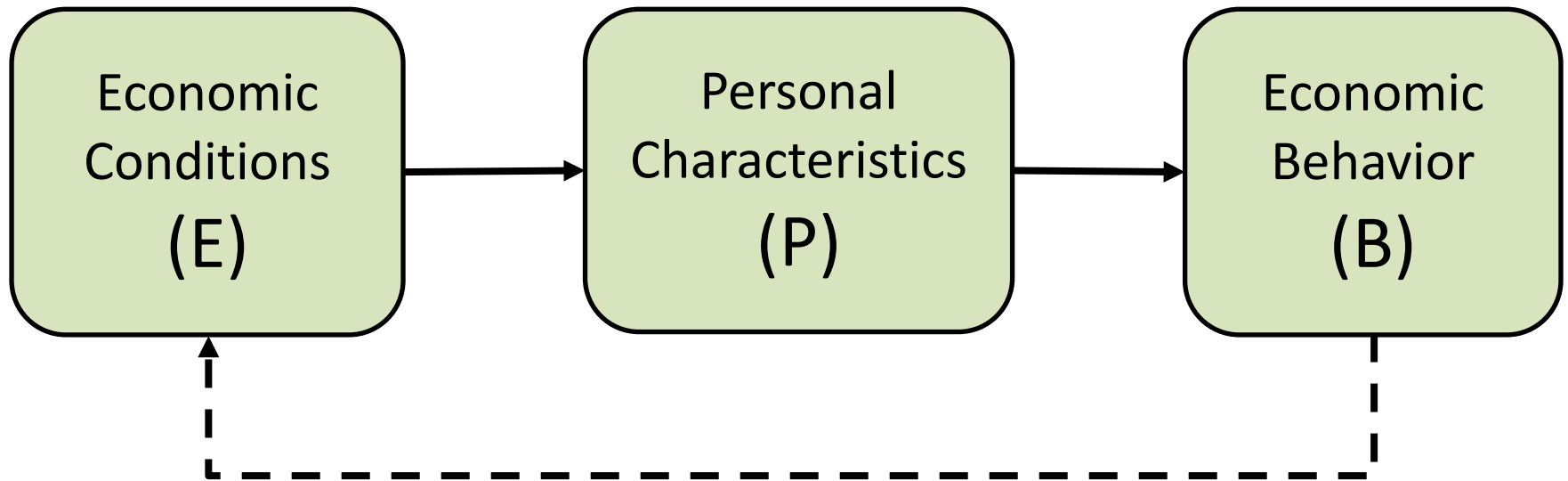


Fig. 1. Katona's model.

Katona's Economic Psychology Model



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