
Munich Personal RePEc Archive

Rationality and Emotions: A Model of Inner Games and Ego Identity

Liu, Fen

JPMorgan Chase Bank

5 January 2021

Online at https://mpra.ub.uni-muenchen.de/105704/
MPRA Paper No. 105704, posted 03 Feb 2021 23:35 UTC

RATIONALITY AND EMOTIONS:

A MODEL OF INNER GAMES AND EGO IDENTITY

Fen Liu[1]

Abstract

This paper develops a framework of Inner Games with Ego Identity to discuss an individual's rationality and emotions in decision making. Following previous efforts of taking psychological insights into economics, this paper dives into the multi-faceted human psychology and proposes a new framework of the decision maker's Inner Games with Ego Identity in the context of a relationship, and integrates the components of beliefs about oneself and the other one in a relationship into the structure. Moreover, I assume that individuals are motivated mainly by their Ego Identity other than by direct pleasure from consumption, and the utility is derived from the inner state at the moment of decision making. As an application, I define and understand emotions in the framework, such as anger, guilt, and disappointment. For example, I distinguish five types of anger, such as healthy anger to protect one's personal boundary, and anger to threaten others for some purpose. I end with a discussion of several directions for future research.

JEL codes: C79, D01, D03

Funding. This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

Declarations of interest: None.

[1] Corresponding Author: Fen Liu, email: fen.liu@chase.com. Office address: JPMorgan Chase Bank, 601 Pennsylvania Ave., Suite 200N, Washington, DC., 20004. Word Count: 10,744.

Keep in mind that other people's actions can never "make" you feel any certain way. Feelings are your warning indicators.

-- Marshall B. Rosenberg

I. Introduction

In 1759, Adam Smith published *The Theory of Moral Sentiments*, which discussed the moral forces that restrain actions of selfishness and bind people together in a society. *Moral Sentiments* opens with a discussion of sympathy that interests us in the welfare of others and makes their opinions or feelings necessary to us, given the fact that we get nothing but the pleasure of perceiving it. The perception or imagination of others' feelings/opinions provides a forcible motive to achieve "mutual sympathy[2]" with them, and such moral sentiments define rules of conduct, limit actions of selfishness, and constitute one's conscience (Smith 1759). To some extent, Smith proposed a psychological theory of multidimensional and realistic human beings, whose behaviors were determined by a struggle between impulsive passions (immediate motivational feelings and forces) and an impartial spectator (who can evaluate one's own conduct as if through another person's eyes) in *Moral Sentiments* (Ashraf, Camerer, and Loewenstein 2005).

Putting aside the opinions in Smith (1759), the past century has viewed the development of the neoclassical economics about decision making which focuses on the decision maker's monetary outcome (or consumption) in economic contexts. Since the late 1970s, the emerging field of behavioral economics started to revolutionize mainstream neoclassical economics as the standard profit maximization axioms fail to explain how people actually behave in daily decision-makings (Kahneman and Thaler 1991). In a complex world, people tend to use rules of thumb heuristics in the daily decision making (Tversky and Kahneman 1974; 2000), or to utilize mental shortcuts to deal with information overload (Thaler and Sunstein 2009).

[2] Smith, *Moral Sentiments*, 4-5. Mutual sympathy is equivalent to the concept of empathy, which refers the capacity to recognize feelings that are being experienced by another being.

Similar to the psychological standpoint in Smith (1759), self-control studies assume that there are one farsighted self and one (or a series of) myopic self in each person, and these two inner roles alternatively take control of behavior (Thaler and Shefrin 1981; Schelling 1984). Under the assumption of dual-self, commitment can be used by decision makers to achieve self-control and implement long-run optimal decisions (Fudenberg and Levine 2006). Another thread of literature explains this kind of phenomenon in quasi-hyperbolic discounting models (Loewenstein and Prelec 1992; Laibson 1997; O'Donoghue and Rabin 1999). Similar to the dual-self models, this paper introduces the framework of Inner Games in an individual's decision making process, and the Nash Equilibrium reached by two inner images "inner Self" and "inner Thou" reflects the psychological state of the individual in decision making, which also determines her utility in the decision.

In economic models, an individual is usually assumed to retrieve all her past experiences as well as publicly available statistical information in decision making. Gilboa and Schmeidler (1995) proposed a model of case-based decision making, whose decision rule is to adopt an optimal choice from its past performances in similar cases. Mullainathan (2002) developed a model to study the impact of limited memory on consumption decisions, and recommended that memory limitations should be considered in models of bounded rationality. Bordalo, Gennaioli, and Shleifer (2020) integrated a psychological model of associative memory into their model of choice which formalized memory retrieval as a function of the individual's past experiences and environmental cues. They mainly modeled sensory stimuli such as the price and quality of a product and contextual cues such as location and time. This paper also models the individual's past experiences as cues that triggered recall of similar experiences. The main difference from the previous literature is that my focus is about cued recall of similar people in past relationships.

Traditional game theory ignores many psychological or social aspects of motivation and behavior. Geanakoplos, Pearce and Stacchetti (1989) pioneered to develop a framework of psychological game, in which players' utilities depend on their beliefs before or during play, their actions, and the game's outcome. Rabin (1993) focused on the reciprocity motivation and explored the approach of psychological

games by incorporating fairness into it. However, Battigalli and Dufwenberg (2009) pointed out that the psychological game theory ruled out plausible forms of belief-dependent motivation, and proposed a more general framework for analyzing strategic interaction, which incorporated updated higher-order beliefs, beliefs of others, and plans of action to influence the motivation of decision makers. Battigalli, Corrao and Dufwenberg (2019) and Battigalli and Dufwenberg (2020) further developed a framework about belief-dependent utility, in which preferences depend on endogenously determined beliefs about choices and utilities involve both the material payoffs and one's own or others' beliefs. This paper can be viewed as a new exploration in psychological game, and the main difference from the previous literature is to summarize and simplify the individual's beliefs in decision making into four issues: one's own personal boundary, other's personal boundary, the sense of responsibility in reactions to others, and the sense of object constancy in relationships. The four issues are the themes in each of the four Inner Games between two inner images. Similar to the literature of psychological game theory, this paper treats the streams of realized beliefs from an individual's formed Ego Identity as given. Moreover, as it is standard in many economic models, such streams of beliefs are open to be updated (either reinforced or crumbled) given the acquisition of new information about the real Thou-subject and new interactions in a relationship.

Besides, both the traditional game theory and the psychological game theory do not take the relationship between two players into account. Traditional game theory usually assumes that each player tries to maximize her payoff in the game (Nash 1951). However, in the real world, most choices are made in the context of some relationship(s) without a monetary payment, such as parent-child, friends, teacher-student, and husband-wife relationships (Becker 1991). Becker (1974) pointed out that the modern economic literature has overlooked the central role of interactions between individuals and its importance in the structure of personality and utility, while sociologists and psychologists have emphasized such interactions for a long time. In a relationship, each individual has interacted with the other role for many times, and has formed some beliefs about two roles as well. Therefore, when she needs to make a decision in a new choice, her beliefs and her belief-based expectations about the other role in the relationship play

an important role in the decision-making process. Different from directly taking social interactions into the utility functions in Becker (1974), this paper models the internalized relationship in the mind of the I-subject, and uses four inner games to describe the hidden interactions between two inner images.

In another thread of literature, Akerlof and Dickens (1982) translated cognitive dissonance theory into three propositions in economists' terms: "First, persons not only have preferences over states of the world, but also over their beliefs about the state of world. Second, persons have some control over their beliefs; not only are people able to exercise some choice about belief given available information, they can also manipulate their own beliefs by selecting sources of information likely to confirm 'desired' beliefs. Third…beliefs once chosen persist over time." They modified the standard model of rational decision making and expanded the economic applications of cognitive dissonance in analysis of the welfare consequences in a formal model. Bénabou and Tirole (2002) proposed a model to explain why people value their self-image and how they enhance or preserve it through various irrational behaviors such as self-deception through selective memory or awareness management. Bénabou and Tirole (2011) developed a theory of moral behavior, based on a cognitive model of moral identity management. One of their conclusions is that "discordant actions are threatening to a person's self-concept when the individuals involved are similar to him." Golman et al. (2016) discussed the importance of the preference for belief consonance and pointed out that this field had received little attention from economists, and reviewed explanations for why people value belief consonance and why people are made uncomfortable by the awareness that the beliefs of others differ from their own. Following this literature, this paper models an individual's belief consonance or dissonance between two inner images "Inner Self" and "Inner Thou" in decision making and discusses the feelings and emotions triggered by one's own belief dissonance.

Moreover, this paper introduces two new concepts which are analog of Nash Equilibrium under the same kind of conditions as it does in traditional game theory. The first one is Inner Game Nash Equilibrium (I.G.N.E.), which refers to the individual's psychological state in which she makes the choice,

in the framework of Inner Games with Ego Identity. The second one is Natural Nash Equilibrium (Natural N.E.), which refers to the I.G.N.E. for a rational I-subject in the framework of Inner Games with intact Ego Identity. The model of Inner Games with Ego Identity is parsimonious and is suggestive for further studies, both theoretically and experimentally in economics and psychology.

This paper is organized as follows. The next section describes four Inner Games and the Natural N.E. in each Inner Game. It introduces the vocabulary and the theoretical framework used in the following analysis. Section III introduces the Ego Identity into the framework, and summarizes the conditions for each result to be the I.G.N.E. in the corresponding Inner Game. Section IV applies the framework in a two-round Prisoner's Dilemma to specify the utility functions in the game and show the difficulty in communication. Section V discusses emotions and distinguishes five types of anger in the framework. The final section concludes and discusses future work themes.

II. The Formal Framework

This paper assumes that each individual makes decisions/choices in the context of the most relevant or important I-Thou relationship. The I-subject's choices can be sorted into two categories: my business and your business. There are two types of my business: My Direct Choice, and My Reaction to Your Choice. Here, the reaction can be behavior(s) or attitude[3]. Similarly, there are two types of your business: Your Direct Choices, and Your Reaction to My Choice. Therefore, there are four types of choices in total, and there is one inner game for each type of choice.

The four Inner Games are between two inner images "Inner Self" and "Inner Thou" in the I-subject's mind, and one or more Inner Games may be relevant to the choice at hand depending on the I-

[3] The attitude can be either expressed or hidden.

subject's perception. The Inner Self is the inner image of the I-subject. The Inner Thou[4] is the inner image of the Thou-subject who represents either the real Thou-subject who is involved in the choice or the most important person (such as the I-subject's parent) for the I-subject. If the I-subject has no information about the newly encountered Thou-subject in a newly initiated relationship, the I-subject is assumed to first project a general Thou-subject to the new Thou-subject based on the I-subject's past experiences and then gradually update her beliefs about the Thou-subject in interactions. The following subsections will describe the four Inner Games in four types of choices.

(1) Inner Game for My Direct Choice

Table **1** presents the I-subject's Inner Game for My Direct Choice between the inner (Self, Thou) pair. For simplicity, we use two options "I am the Boss vs. You are the Boss", which can be replaced by other options depending on what the I-subject cares about in the choice. Note that, the "I" in "I am the Boss" refers to the I-subject, and the "You" in "You are the Boss" refers to the Thou-subject[5]. The utility for each cell has two utility components: the utility for the Inner Self, and the utility for the Inner Thou. Specifically, $\{P_i, R_i, T_i, S_i\}$ are utility parameters for the Inner Self in each cell, and $\{P_j, R_j, T_j, S_j\}$ are for the Inner Thou in each cell. The total utility for the I-subject is assumed to be the sum of two components when two inner images have the same belief in the Inner Game, or the difference[6] of two components when two inner images have different beliefs. For example, in the cell of (I am the Boss, I am the Boss), the total utility is the sum of two utility parameters ($P_i + P_j$); but in the cell of (I am the Boss, You are the Boss), the total utility is the Inner Self's utility minus the Inner Thou's utility ($T_i - S_j$).

[4] We use "Inner Thou" instead of "Inner You" to call the inner image that represents the other individual, in the hope to avoid confusion in understanding the Inner Games.

[5] Here, we assume that "You" in "You are the Boss" refers to the Thou-subject involved in the choice. Note that the I-subject's belief about the Thou-subject could be far away from the real Thou-subject in the current relationship but be closer to someone else in the I-subject's past experiences, such as one of the I-subject's parents. The Thou-subject may change the I-subject's perception in multiple rounds of interactions with communications, if the Thou-subject stays conscious and is not to be changed by the I-subject's projections onto her in their interactions.

[6] In this situation, the I-subject will end up with the utility component of the Inner Self minus the utility component of the Inner Thou.

Table 1: The Inner Game for My Direct Choice

My Direct Choice		Inner Thou	
		You are the Boss	I am the Boss
Inner Self	You are the Boss	R_i, R_j	S_i, T_j
	I am the Boss	T_i, S_j	P_i, P_j

This paper focuses on the control-power and responsibility concerns in daily choices, and uses the options accordingly in each Inner Game. However, when the individual has image concerns or self-esteem issue, the options for her Inner Games should change accordingly. For example, for someone who wants others to believe that she is smart, the two options can be replaced by "I am smart" and "You are smart" in her Inner Games. For someone who wants others to believe that she is competent, the two options can be replaced by "I am capable" and "You are capable" in her Inner Games. Some other possible options are listed in Table 2 but options are not limited to them.

Table 2: Alternative Options in the I-subject's Inner Games

Alternative for "I am the Boss"	Alternative for "You are the Boss"
I am Responsible	You are Responsible
I am the Judge	You are the Judge
I am first	You are first
I am right	You are right
I am capable	You are capable
I am smart	You are smart
I am better	You are better
I have more …	You have more …

In the example of a two-round Prisoner's Dilemma, Player A has two perceptions about her own choice in {Cooperate, Non-Cooperate} in the first round: a perception about how the Inner Self thinks whom is the Boss in the choice, and a perception about how the Inner Thou thinks whom is the Boss in the choice. It is natural and rational for both the Inner Self and the Inner Thou in Player A think that "I am the Boss" in her own choice and make a choice in the first round. However, Player A may feel that she has to choose one option over the other for some reason, and I will discuss deviations in Section III.

Assumption 1: *In the Inner Game of My Direct Choice, the following conditions hold:*

$$P_i > S_i > 1 \,\&\, T_i > R_i > 1, \quad P_j > S_j > 1 \,\&\, T_j > R_j > 1$$

Proposition 1: *For a rational I-subject, the* ***Natural Nash Equilibrium*** *(Natural N.E.) in the Inner Game of My Direct Choice is (I am the Boss, I am the Boss) for the inner (Self, Thou) pair.*

Proposition 1 describes the situation for the I-subject with no inner conflicts in the inner (Self, Thou) pair in My Direct Choice, since both inner images think that the I-subject is "the Boss" in the I-subject's business.

In the realm of My Direct Choice, the theme is about the I-subject's personal boundary: whether I can protect and defend my personal boundary; whether my perception is that the Thou-subject will challenge or even invade my personal boundary; and whether my personal boundary is blurry in some I-Thou relationships. I will discuss the situations when the Nash Equilibrium in the Inner Game deviates from the Natural N.E. in the Section III.

(2) Inner Game for My Reaction to Your Choice

Table 3 presents the Inner Game for My Reaction to Your Choice between the inner (Self, Thou) pair. Since My Reaction to Your Choice is often in the form of attitude in reality, we use two options "I am Responsible" vs. "You are Responsible" in the Inner Games about reactions. In order to distinguish reactions from direct choices, we use the capital letters for utility parameters in the Inner Games for direct choices, and use the small letters in the Inner Games for reactions.

Table 3: The Inner Game for My Reaction to Your Choice

My Reaction to Your Choice		Inner Thou	
		I am Responsible	You are Responsible
Inner Self	I am Responsible	p_i, p_j	t_i, s_j
	You are Responsible	s_i, t_j	r_i, r_j

In the example of a two-round Prisoner's Dilemma, assume that Player A chose to cooperate and Player B chose not to cooperate in the first round. Each player has her own attitude toward the first round's result. Before Player A makes a choice/reaction in the second round[7], Player A's inner (Self, Thou) images have perceptions about who is responsible for Player A's attitude and choice. Ideally, Player A would like to take the responsibility of Player A's reaction, if Player A admits that her feeling is determined by how she interprets Player B's choice instead of directly by Player B.

Assumption 2*: In the Inner Game of My Reaction to Your Choice, the following conditions hold:*

$$p_i > s_i > 1 \,\&\, t_i > r_i > 1,\ p_j > s_j > 1 \,\&\, t_j > r_j > 1$$

Proposition 2: *For a rational I-subject, the Natural Nash Equilibrium (Natural N.E.) in the Inner Game of My Reaction to Your Choice is (I am Responsible, I am Responsible) for the inner (Self, Thou) pair.*

Proposition 2 describes the situation for the I-subject with no inner conflict in the inner (Self, Thou) pair in my response to your choice, since both inner images think that the I-subject is "responsible" in the I-subject's business.

In the realm of My Reaction to Your Choice, the theme is about the I-subject's sense of responsibility in reactions to others: whether I am conscious to take the responsibility of my own reaction/attitude to your choice; whether my perception is that the Thou-subject should be responsible for my reaction; and whether I expect that the Thou-subject thinks that she is responsible for my reaction.

(3) Inner Game for Your Direct Choice

Table 4 presents the I-subject's Inner Game for Your Direct Choice between the inner (Thou, Self) pair. The Inner Game of "Your Direct Choice" mirrors the Inner Game of "My Direct Choice" by exchanging the positions of "Inner Self" and "Inner Thou" in the structure. Moreover, I use α to represent the relative importance of "Your Business" comparing to "My Business" in the eyes of the I-subject. For

[7] In the second round, Player A may view it as a new direct choice or a reaction to the first round's result. Here, we adopt the situation that Player A views the second round as a reaction to the first round's result.

a normal relationship, the model assumes that $\alpha \in (0, +\infty)$, and higher value means higher importance to the I-subject. For strangers' business, the value of α generally approaches to zero for the I-subject. The parameter β represents the significance of the relationship to the I-subject, with $\beta \in (0, +\infty)$.

Table 4: The Inner Game for Your Direct Choice

Your Direct Choice		Inner Self	
		You are the Boss	I am the Boss
Inner Thou	You are the Boss	$\alpha\beta R_j, \alpha\beta R_i$	$\alpha\beta T_j, \alpha\beta S_i$
	I am the Boss	$\alpha\beta S_j, \alpha\beta T_i$	$\alpha\beta P_j, \alpha\beta P_i$

In the example of Prisoner's Dilemma, Player A has two perceptions about Player B's choice in {Cooperate, Non-Cooperate}: a perception about how the Inner Self thinks whom is the Boss in Player B's choice, and a perception about how the Inner Thou thinks whom is the Boss in Player B's choice. It is natural for both the Inner Self and the Inner Thou in Player A think that "You are the Boss" in Player B's choice.

Assumption 3*: In the Inner Game of Your Direct Choice, the following conditions hold:*

$$R_i > S_i > 1 \,\&\, T_i > P_i > 1,\ R_j > S_j > 1 \,\&\, T_j > P_j > 1$$

Proposition 3: *For a rational I-subject, the Natural Nash Equilibrium (Natural N.E.) in the Inner Game of Your Direct Choice is (You are the Boss, You are the Boss) for the inner (Thou, Self) pair.*

Proposition 3 describes the situation for the I-subject with no inner conflicts in the inner (Thou, Self) pair in Your Direct Choice, since both inner images think that the Thou-subject is "the Boss" in the Thou-subject's business.

In the realm of Your Direct Choice, the theme is about how the I-subject perceives the Thou-subject's personal boundary: whether I can stay conscious that this is your choice instead of mine; whether I respect your freedom in Your Direct Choice; whether I want/try to challenge your personal boundary in your choice; and whether I think that you want to rely on me in your choice.

(4) Inner Game for Your Reaction to My Choice

Table 5 presents the I-subject's Inner Game for Your Reaction to My Choice between the inner (Thou, Self) pair. The Inner Game of "Your Reaction to My Choice" mirrors the Inner Game of "My Reaction to Your Choice" by exchanging the positions of "Inner Self" and "Inner Thou" in the structure. Similarly, the parameter α represents the relative importance of "Your Business" comparing to "My Business" for the I-subject, and the parameter β represents the significance of the relationship to the I-subject.

Table 5: The Inner Game for Your Reaction to My Choice

Your Reaction to My Choice		Inner Self	
		I am Responsible	You are Responsible
Inner Thou	I am Responsible	$\alpha\beta p_j, \alpha\beta p_i$	$\alpha\beta s_j, \alpha\beta t_i$
	You are Responsible	$\alpha\beta t_j, \alpha\beta s_i$	$\alpha\beta r_j, \alpha\beta r_i$

In the example of a two-round Prisoner's Dilemma, assume that Player A chose to cooperate and Player B chose not to cooperate in the first round. Each player has her own attitude toward the first round's result. Before Player B makes a choice/reaction in the second round, Player A's inner (Self, Thou) images have perceptions about who is responsible for Player B's reaction in the second round. Ideally, Player A does not expect that Player A's choice in the first round can influence Player B's reaction, if Player A admits that Player B's choice/reaction is determined by how Player B interprets the first round's result.

Assumption 4*: In the Inner Game of Your Reaction to My Choice, the following conditions hold:*

$$r_i > s_i > 1 \;\&\; t_i > p_i > 1, r_j > s_j > 1 \;\&\; t_j > p_j > 1$$

Proposition 4: *For a rational I-subject, the Natural Nash Equilibrium (Natural N.E.) in the Inner Game of Your Reaction to My Choice is (You are Responsible, You are Responsible) for the inner (Thou, Self) pair.*

Proposition 4 describes the situation for the I-subject with no inner conflicts in the inner (Thou, Self) pair in your response to my choice, since both inner images thinks that the Thou-subject is "responsible" in the Thou-subject's business.

In the realm of Your Reaction to My Choice, the theme is about the I-subject's sense of Object Constancy[8] in the relationship: whether I am conscious about your responsibility in your reaction/attitude to my choice; whether my perception is that I should be responsible for your reaction; whether I feel free to refuse the responsibility for your reaction in the relationship; whether I feel that I have to take the responsibility for your reaction in order to keep the relationship with you; whether I treat you as a separate and capable individual who can take the responsibility of your own reactions and feelings.

We can summarize the four assumptions in four Inner Games for the I-subject in Table 6.

Table 6: Conditions of Natural N.E. in Four Inner Games for the I-Subject

Whose Business	Type of Choice	Natural Nash Equilibrium	Conditions for Natural N.E.
My Business	My Direct Choice	(I am the Boss, I am the Boss)	$P_i > S_i > 1 \,\&\, T_i > R_i > 1,$ $P_j > S_j > 1 \,\&\, T_j > R_j > 1$
	My Reaction to Your Choice	(I am Responsible, I am Responsible)	$p_i > s_i > 1 \,\&\, t_i > r_i > 1,$ $p_j > s_j > 1 \,\&\, t_j > r_j > 1$
Your Business	Your Direct Choice	(You are the Boss, You are the Boss)	$R_i > S_i > 1 \,\&\, T_i > P_i > 1,$ $R_j > S_j > 1 \,\&\, T_j > P_j > 1$
	Your Reaction to My Choice	(You are Responsible, You are Responsible)	$r_i > s_i > 1 \,\&\, t_i > p_i > 1,$ $r_j > s_j > 1 \,\&\, t_j > p_j > 1$

(5) A Special Example of Rational Individuals

In order to make it easier to understand the framework of Inner Games, we can replace sixteen utility parameters with numbers that satisfy the four assumptions in four Inner Games in Table 6. The absolute values in each Inner Game have no meanings and only the relative orders matter in Table 7.

[8] In Psychology, Object Constancy refers to an individual's ability to believe that her relationship with the other one can remain intact in interactions, even in the occurrence of disagreements, arguments, or conflicts.

Table 7: An Example of Four Inner Games with Assumed Utility Parameters

My Direct Choice

Inner Self	Inner Thou: You are the Boss	Inner Thou: I am the Boss
You are the Boss	3000, 3000	2000, 4000
I am the Boss	4000, 2000	3500, 3500

My Reaction to Your Choice

Inner Self	Inner Thou: I am Responsible	Inner Thou: You are Responsible
I am Responsible	350, 350	400, 200
You are Responsible	200, 400	300, 300

Your Direct Choice

Inner Thou	Inner Self: You are the Boss	Inner Self: I am the Boss
You are the Boss	30, 30	40, 20
I am the Boss	20, 40	35, 35

Your Reaction to My Choice

Inner Thou	Inner Self: I am Responsible	Inner Self: You are Responsible
I am Responsible	3, 3	2, 4
You are Responsible	4, 2	3.5, 3.5

With

$T_i = T_j = 4000,$ $R_i = R_j = 3000,$ $P_i = P_j = 3500,$ $S_i = S_j = 2000,$

$t_i = t_j = 400,$ $r_i = r_j = 300,$ $p_i = p_j = 350,$ $s_i = s_j = 200,$

$\alpha = 0.1,$ $\beta = 0.1$

III. Introduce the Ego Identity into the Framework

The economics literature has discussed the importance of identity in decision making. Akerlof and Kranton (2000) included identity – a person's sense of self – into a general model of behavior and demonstrated how identity influences economic outcomes. They assume that people have identity-based utilities derived from both their own and others' actions. Köszegi (2006) incorporated beliefs about the self into the payoff space and proposed a model of behavior with ego utility, in which the individual derives "ego utility" from positive views about the self, to explain the psychological phenomenon that people often care more about feeling capable than about reality. Bénabou and Tirole (2016) adopted a cognitive approach, distinguished personal identity (a set of beliefs about one's preferences, moral values, skills, etc.) from group identity (feelings of belonging in family, community, culture, etc.), and explicitly modeled identity as beliefs about one's values.

In psychosocial stage theory, Erikson (1956; 1968) explained Ego Identity as the conscious sense of self and pointed out that an individual's Ego Identity can constantly change by acquiring new information and experiences in daily interactions with others throughout life. In the practice of person-centered counseling, Rogers (1951; 1967) realized that each individual lives as the center of her own perceptions and experiences, and developed his personality theory which emphasizes that each person is an active, creative, and experiencing being who reacts to subjective perceptions in relationships.

This paper tries to introduce the concept of Ego Identity – similar to both Erikson's and Rogers' theories – into the framework of Inner Games, in order to describe how an individual's set of perceptions and beliefs about oneself and others can result in deviations from the Natural N.E. in Inner Games. Assume that the impact of Ego Identity on the four Inner Games is through its exponential factors on utility parameters. Table 8 presents the framework of four Inner Games with Ego Identity. Specifically, the impact of an individual's Ego Identity can be described by the sixteen exponential factors in four Inner Games, with eight of them in Direct Choices and eight of them in Reactions. When the exponential

factors change, the Nash Equilibrium in Inner Games with Ego Identity can deviate from the Natural N.E., and it is necessary to introduce a new concept that is analog of Nash Equilibrium for further analysis.

Definition: ***Inner Game Nash Equilibrium*** *(I.G.N.E.) is the Nash Equilibrium in one Inner Game with Ego Identity.*

With the dominant effects of exponential factors, any cell can be the Nash Equilibrium in each Inner Game. For example, when some exponential factors are small enough, the I.G.N.E. will deviate from the Natural N.E. as a result. When the I.G.N.E. is not the Natural N.E. in the related Inner Game(s) of the I-subject's choice, the I-subject is **Bounded Rational** in the decision. Only when the I.G.N.E. is the Natural N.E. in all related Inner Game(s), the I-subject is **Full Rational** in the choice. Moreover, the framework of Inner Games with intact Ego Identity is the special case when all the exponential factors are equal to one.

Table 9 presents the conditions for each cell to be the I.G.N.E. in the corresponding Inner Game. Since a full rational I-subject is the most desirable, it is necessary to summarize the conditions for the Natural N.E. as the I.G.N.E. in each Inner Game in Table 10. Moreover, the special example in Table 7 can be used to redo the conditions for a full rational I-subject in Table 11.

Table 12 presents the sixteen combinations of I.G.N.E. in two direct choices (My & Your Direct Choice) and their conditions. Similarly, readers can get the sixteen combinations of I.G.N.E. in two reaction choices (My Reaction to Your Choice, Your Reaction to My Choice) and their conditions.

Table 8: Four Inner Games for the I-Subject with Ego Identity

My Direct Choice

Inner Self	Inner Thou: You are the Boss	Inner Thou: I am the Boss
You are the Boss	$(R_i)^{E_{Di}^{TT}}, (R_j)^{E_{Dj}^{TT}}$	$(S_i)^{E_{Di}^{TI}}, (T_j)^{E_{Dj}^{TI}}$
I am the Boss	$(T_i)^{E_{Di}^{IT}}, (S_j)^{E_{Dj}^{IT}}$	$(P_i)^{E_{Di}^{II}}, (P_j)^{E_{Dj}^{II}}$

My Reaction to Your Choice

Inner Self	Inner Thou: I am Responsible	Inner Thou: You are Responsible
I am Responsible	$(p_i)^{E_{Ri}^{II}}, (p_j)^{E_{Rj}^{II}}$	$(t_i)^{E_{Ri}^{IT}}, (s_j)^{E_{Rj}^{IT}}$
You are Responsible	$(s_i)^{E_{Ri}^{TI}}, (t_j)^{E_{Rj}^{TI}}$	$(r_i)^{E_{Ri}^{TT}}, (r_j)^{E_{Rj}^{TT}}$

Your Direct Choice

Inner Thou	Inner Self: You are the Boss	Inner Self: I am the Boss
You are the Boss	$\alpha\beta(R_j)^{E_{Di}^{TT}}, \alpha\beta(R_i)^{E_{Dj}^{TT}}$	$\alpha\beta(T_j)^{E_{Di}^{TI}}, \alpha\beta(S_i)^{E_{Dj}^{TI}}$
I am the Boss	$\alpha\beta(S_j)^{E_{Di}^{IT}}, \alpha\beta(T_i)^{E_{Dj}^{IT}}$	$\alpha\beta(P_j)^{E_{Di}^{II}}, \alpha\beta(P_i)^{E_{Dj}^{II}}$

Your Reaction to My Choice

Inner Thou	Inner Self: I am Responsible	Inner Self: You are Responsible
I am Responsible	$\alpha\beta(p_j)^{E_{Ri}^{II}}, \alpha\beta(p_i)^{E_{Rj}^{II}}$	$\alpha\beta(s_j)^{E_{Ri}^{IT}}, \alpha\beta(t_i)^{E_{Rj}^{IT}}$
You are Responsible	$\alpha\beta(t_j)^{E_{Ri}^{TI}}, \alpha\beta(s_i)^{E_{Rj}^{TI}}$	$\alpha\beta(r_j)^{E_{Ri}^{TT}}, \alpha\beta(r_i)^{E_{Rj}^{TT}}$

With $\alpha > 0; \beta > 0;\ P_i > S_i > 1\ \&\ T_i > R_i > 1,\quad P_j > S_j > 1\ \&\ T_j > R_j > 1\ ; p_i > s_i > 1\ \&\ t_i > r_i > 1,\ p_j > s_j > 1\ \&\ t_j > r_j > 1;$

$R_i > S_i > 1\ \&\ T_i > P_i > 1,\ R_j > S_j > 1\ \&\ T_j > P_j > 1;\ r_i > s_i > 1\ \&\ t_i > p_i > 1, r_j > s_j > 1\ \&\ t_j > p_j > 1;$

$\{E_{Di}^{TT}, E_{Dj}^{TT}, E_{Di}^{TI}, E_{Dj}^{TI}, E_{Di}^{IT}, E_{Dj}^{IT}, E_{Di}^{II}, E_{Dj}^{II}\} \in R^8$,

$\{E_{Ri}^{TT}, E_{Rj}^{TT}, E_{Ri}^{TI}, E_{Rj}^{TI}, E_{Ri}^{IT}, E_{Rj}^{IT}, E_{Ri}^{II}, E_{Rj}^{II}\} \in R^8$

Table 9: Conditions for each Cell as the Inner Game Nash Equilibrium in the Corresponding Inner Game

Whose Business	Type of Choice	Inner Game Nash Equilibrium	Conditions for the I.G.N.E.
My Business	My Direct Choice	(I am the Boss, I am the Boss)	$E_{Di}^{IT} > E_{Di}^{TT} \cdot \frac{\ln(R_i)}{\ln(T_i)}, E_{Di}^{II} > E_{Di}^{TI} \cdot \frac{\ln(S_i)}{\ln(P_i)}, E_{Dj}^{TI} > E_{Dj}^{TT} \cdot \frac{\ln(R_j)}{\ln(T_j)}, E_{Dj}^{II} > E_{Dj}^{IT} \cdot \frac{\ln(S_j)}{\ln(P_j)}$
		(I am the Boss, You are the Boss)	$E_{Di}^{IT} > E_{Di}^{TT} \cdot \frac{\ln(R_i)}{\ln(T_i)}, E_{Di}^{II} > E_{Di}^{TI} \cdot \frac{\ln(S_i)}{\ln(P_i)}, E_{Dj}^{TI} < E_{Dj}^{TT} \cdot \frac{\ln(R_j)}{\ln(T_j)}, E_{Dj}^{II} < E_{Dj}^{IT} \cdot \frac{\ln(S_j)}{\ln(P_j)}$
		(You are the Boss, I am the Boss)	$E_{Di}^{IT} < E_{Di}^{TT} \cdot \frac{\ln(R_i)}{\ln(T_i)}, E_{Di}^{II} < E_{Di}^{TI} \cdot \frac{\ln(S_i)}{\ln(P_i)}, E_{Dj}^{TI} > E_{Dj}^{TT} \cdot \frac{\ln(R_j)}{\ln(T_j)}, E_{Dj}^{II} > E_{Dj}^{IT} \cdot \frac{\ln(S_j)}{\ln(P_j)}$
		(You are the Boss, You are the Boss)	$E_{Di}^{IT} < E_{Di}^{TT} \cdot \frac{\ln(R_i)}{\ln(T_i)}, E_{Di}^{II} < E_{Di}^{TI} \cdot \frac{\ln(S_i)}{\ln(P_i)}, E_{Dj}^{TI} < E_{Dj}^{TT} \cdot \frac{\ln(R_j)}{\ln(T_j)}, E_{Dj}^{II} < E_{Dj}^{IT} \cdot \frac{\ln(S_j)}{\ln(P_j)}$
	My Reaction to Your Choice	(I am Responsible, I am Responsible)	$E_{Ri}^{II} > E_{Ri}^{TI} \cdot \frac{\ln(s_i)}{\ln(p_i)}, E_{Ri}^{IT} > E_{Ri}^{TT} \cdot \frac{\ln(r_i)}{\ln(t_i)}, E_{Rj}^{IT} > E_{Rj}^{TT} \cdot \frac{\ln(s_j)}{\ln(p_j)}, E_{Rj}^{TI} > E_{Rj}^{TT} \cdot \frac{\ln(r_j)}{\ln(t_j)}$
		(I am Responsible, You are Responsible)	$E_{Ri}^{II} > E_{Ri}^{TI} \cdot \frac{\ln(s_i)}{\ln(p_i)}, E_{Ri}^{IT} > E_{Ri}^{TT} \cdot \frac{\ln(r_i)}{\ln(t_i)}, E_{Rj}^{II} < E_{Rj}^{IT} \cdot \frac{\ln(s_j)}{\ln(p_j)}, E_{Rj}^{TI} < E_{Rj}^{TT} \cdot \frac{\ln(r_j)}{\ln(t_j)}$
		(You are Responsible, I am Responsible)	$E_{Ri}^{II} < E_{Ri}^{TI} \cdot \frac{\ln(s_i)}{\ln(p_i)}, E_{Ri}^{IT} < E_{Ri}^{TT} \cdot \frac{\ln(r_i)}{\ln(t_i)}, E_{Rj}^{II} > E_{Rj}^{IT} \cdot \frac{\ln(s_j)}{\ln(p_j)}, E_{Rj}^{TI} > E_{Rj}^{TT} \cdot \frac{\ln(r_j)}{\ln(t_j)}$
		(You are Responsible, You are Responsible)	$E_{Ri}^{II} < E_{Ri}^{TI} \cdot \frac{\ln(s_i)}{\ln(p_i)}, E_{Ri}^{IT} < E_{Ri}^{TT} \cdot \frac{\ln(r_i)}{\ln(t_i)}, E_{Rj}^{II} < E_{Rj}^{IT} \cdot \frac{\ln(s_j)}{\ln(p_j)}, E_{Rj}^{TI} < E_{Rj}^{TT} \cdot \frac{\ln(r_j)}{\ln(t_j)}$
Your Business	Your Direct Choice	(You are the Boss, You are the Boss)	$E_{Di}^{IT} < E_{Di}^{TT} \cdot \frac{\ln(R_j)}{\ln(S_j)}, E_{Di}^{II} < E_{Di}^{TI} \cdot \frac{\ln(T_j)}{\ln(P_j)}, E_{Dj}^{TI} < E_{Dj}^{TT} \cdot \frac{\ln(R_i)}{\ln(S_i)}, E_{Dj}^{II} < E_{Dj}^{IT} \cdot \frac{\ln(T_i)}{\ln(P_i)}$
		(I am the Boss, You are the Boss)	$E_{Di}^{IT} > E_{Di}^{TT} \cdot \frac{\ln(R_j)}{\ln(S_j)}, E_{Di}^{II} > E_{Di}^{TI} \cdot \frac{\ln(T_j)}{\ln(P_j)}, E_{Dj}^{TI} < E_{Dj}^{TT} \cdot \frac{\ln(R_i)}{\ln(S_i)}, E_{Dj}^{II} < E_{Dj}^{IT} \cdot \frac{\ln(T_i)}{\ln(P_i)}$
		(You are the Boss, I am the Boss)	$E_{Di}^{IT} < E_{Di}^{TT} \cdot \frac{\ln(R_j)}{\ln(S_j)}, E_{Di}^{II} < E_{Di}^{TI} \cdot \frac{\ln(T_j)}{\ln(P_j)}, E_{Dj}^{TI} > E_{Dj}^{TT} \cdot \frac{\ln(R_i)}{\ln(S_i)}, E_{Dj}^{II} > E_{Dj}^{IT} \cdot \frac{\ln(T_i)}{\ln(P_i)}$
		(I am the Boss, I am the Boss)	$E_{Di}^{IT} > E_{Di}^{TT} \cdot \frac{\ln(R_j)}{\ln(S_j)}, E_{Di}^{II} > E_{Di}^{TI} \cdot \frac{\ln(T_j)}{\ln(P_j)}, E_{Dj}^{TI} > E_{Dj}^{TT} \cdot \frac{\ln(R_i)}{\ln(S_i)}, E_{Dj}^{II} > E_{Dj}^{IT} \cdot \frac{\ln(T_i)}{\ln(P_i)}$
	Your Reaction to My Choice	(You are Responsible, You are Responsible)	$E_{Ri}^{II} < E_{Ri}^{TI} \cdot \frac{\ln(t_j)}{\ln(p_j)}, E_{Ri}^{IT} < E_{Ri}^{TT} \cdot \frac{\ln(r_j)}{\ln(s_j)}, E_{Rj}^{II} < E_{Rj}^{IT} \cdot \frac{\ln(t_i)}{\ln(p_i)}, E_{Rj}^{TI} < E_{Rj}^{TT} \cdot \frac{\ln(r_i)}{\ln(s_i)}$
		(I am Responsible, You are Responsible)	$E_{Ri}^{II} > E_{Ri}^{TI} \cdot \frac{\ln(t_j)}{\ln(p_j)}, E_{Ri}^{IT} > E_{Ri}^{TT} \cdot \frac{\ln(r_j)}{\ln(s_j)}, E_{Rj}^{II} < E_{Rj}^{IT} \cdot \frac{\ln(t_i)}{\ln(p_i)}, E_{Rj}^{TI} < E_{Rj}^{TT} \cdot \frac{\ln(r_i)}{\ln(s_i)}$
		(You are Responsible, I am Responsible)	$E_{Ri}^{II} < E_{Ri}^{TI} \cdot \frac{\ln(t_j)}{\ln(p_j)}, E_{Ri}^{IT} < E_{Ri}^{TT} \cdot \frac{\ln(r_j)}{\ln(s_j)}, E_{Rj}^{II} > E_{Rj}^{IT} \cdot \frac{\ln(t_i)}{\ln(p_i)}, E_{Rj}^{TI} > E_{Rj}^{TT} \cdot \frac{\ln(r_i)}{\ln(s_i)}$
		(I am Responsible, I am Responsible)	$E_{Ri}^{II} > E_{Ri}^{TI} \cdot \frac{\ln(t_j)}{\ln(p_j)}, E_{Ri}^{IT} > E_{Ri}^{TT} \cdot \frac{\ln(r_j)}{\ln(s_j)}, E_{Rj}^{II} > E_{Rj}^{IT} \cdot \frac{\ln(t_i)}{\ln(p_i)}, E_{Rj}^{TI} > E_{Rj}^{TT} \cdot \frac{\ln(r_i)}{\ln(s_i)}$

Table 10: Conditions for the Natural Nash Equilibrium as the Inner Game Nash Equilibrium in Each Inner Game

Whose Business	Type of Choice	Natural N.E.	Conditions for Natural N.E. as the I.G.N.E.
My Business	My Direct Choice	(I am the Boss, I am the Boss)	$E_{Di}^{TT}\cdot\frac{\ln(R_j)}{\ln(S_j)}>E_{Di}^{IT}>E_{Di}^{TT}\cdot\frac{\ln(R_i)}{\ln(T_i)}>0$, $E_{Di}^{TI}\cdot\frac{\ln(T_j)}{\ln(P_j)}>E_{Di}^{II}>E_{Di}^{TI}\cdot\frac{\ln(S_i)}{\ln(P_i)}>0$,
	My Reaction to Your Choice	(I am Responsible, I am Responsible)	$E_{Dj}^{TT}\cdot\frac{\ln(R_i)}{\ln(S_i)}>E_{Dj}^{TI}>E_{Dj}^{TT}\cdot\frac{\ln(R_j)}{\ln(T_j)}>0$, $E_{Dj}^{IT}\cdot\frac{\ln(T_i)}{\ln(P_i)}>E_{Dj}^{II}>E_{Dj}^{IT}\cdot\frac{\ln(S_j)}{\ln(P_j)}>0$,
Your Business	Your Direct Choice	(You are the Boss, You are the Boss)	$E_{Ri}^{TI}\cdot\frac{\ln(t_j)}{\ln(p_j)}>E_{Ri}^{II}>E_{Ri}^{TI}\cdot\frac{\ln(s_i)}{\ln(p_i)}>0$, $E_{Ri}^{TT}\cdot\frac{\ln(r_j)}{\ln(s_j)}>E_{Ri}^{IT}>E_{Ri}^{TT}\cdot\frac{\ln(r_i)}{\ln(t_i)}>0$,
	Your Reaction to My Choice	(You are Responsible, You are Responsible)	$E_{Rj}^{IT}\cdot\frac{\ln(t_i)}{\ln(p_i)}>E_{Rj}^{II}>E_{Rj}^{IT}\cdot\frac{\ln(s_j)}{\ln(p_j)}>0$, $E_{Rj}^{TT}\cdot\frac{\ln(r_i)}{\ln(s_i)}>E_{Rj}^{TI}>E_{Rj}^{TT}\cdot\frac{\ln(r_j)}{\ln(t_j)}>0$

Table 11: Conditions for the Natural N.E. as the I.G.N.E. in Each Inner Game in the Special Example

Whose Business	Type of Choice	Natural N.E.	Conditions for Natural N.E. as the I.G.N.E.
My Business	My Direct Choice	(I am the Boss, I am the Boss)	$1.053E_{Di}^{TT}>E_{Di}^{IT}>0.965E_{Di}^{TT}>0$, $1.016E_{Di}^{TI}>E_{Di}^{II}>0.931E_{Di}^{TI}>0$,
	My Reaction to Your Choice	(I am Responsible, I am Responsible)	$1.053E_{Dj}^{TT}>E_{Dj}^{TI}>0.965E_{Dj}^{TT}>0$, $1.016E_{Dj}^{IT}>E_{Dj}^{II}>0.931E_{Dj}^{IT}>0$,
Your Business	Your Direct Choice	(You are the Boss, You are the Boss)	$1.023E_{Ri}^{TI}>E_{Ri}^{II}>0.904E_{Ri}^{TI}>0$, $1.077E_{Ri}^{TT}>E_{Ri}^{IT}>0.952E_{Ri}^{TT}>0$,
	Your Reaction to My Choice	(You are Responsible, You are Responsible)	$1.023E_{Rj}^{IT}>E_{Rj}^{II}>0.904E_{Rj}^{IT}>0$, $1.077E_{Rj}^{TT}>E_{Rj}^{TI}>0.952E_{Rj}^{TT}>0$

Table 12: Conditions for Sixteen Combinations of I.G.N.E. in Two Direct Choices

I.G.N.E. in My Direct Choice	I.G.N.E. in Your Direct Choice	Conditions for two I.G.N.E. Hold
(I am the Boss, I am the Boss)	(You are the Boss, You are the Boss)	$E_{Di}^{TT}\cdot\frac{\ln(R_j)}{\ln(S_j)}>E_{Di}^{IT}>E_{Di}^{TT}\cdot\frac{\ln(R_i)}{\ln(T_i)}>0$, $E_{Di}^{TI}\cdot\frac{\ln(T_j)}{\ln(P_j)}>E_{Di}^{II}>E_{Di}^{TI}\cdot\frac{\ln(S_i)}{\ln(P_i)}>0$, $E_{Dj}^{TT}\cdot\frac{\ln(R_i)}{\ln(S_i)}>E_{Dj}^{TI}>E_{Dj}^{TT}\cdot\frac{\ln(R_j)}{\ln(T_j)}>0$, $E_{Dj}^{IT}\cdot\frac{\ln(T_i)}{\ln(P_i)}>E_{Dj}^{II}>E_{Dj}^{IT}\cdot\frac{\ln(S_j)}{\ln(P_j)}>0$
	(I am the Boss, You are the Boss)	$E_{Di}^{IT}>\max\{E_{Di}^{TT}\cdot\frac{\ln(R_i)}{\ln(T_i)},E_{Di}^{TT}\cdot\frac{\ln(R_j)}{\ln(S_j)}\}$, $E_{Di}^{II}>\max\{E_{Di}^{TI}\cdot\frac{\ln(T_j)}{\ln(P_j)},E_{Di}^{TI}\cdot\frac{\ln(S_i)}{\ln(P_i)}\}$, $E_{Dj}^{TT}\cdot\frac{\ln(R_i)}{\ln(S_i)}>E_{Dj}^{TI}>E_{Dj}^{TT}\cdot\frac{\ln(R_j)}{\ln(T_j)}>0$, $E_{Dj}^{IT}\cdot\frac{\ln(T_i)}{\ln(P_i)}>E_{Dj}^{II}>E_{Dj}^{IT}\cdot\frac{\ln(S_j)}{\ln(P_j)}>0$
	(You are the Boss, I am the Boss)	$E_{Di}^{TT}\cdot\frac{\ln(R_j)}{\ln(S_j)}>E_{Di}^{IT}>E_{Di}^{TT}\cdot\frac{\ln(R_i)}{\ln(T_i)}>0$, $E_{Di}^{TI}\cdot\frac{\ln(T_j)}{\ln(P_j)}>E_{Di}^{II}>E_{Di}^{TI}\cdot\frac{\ln(S_i)}{\ln(P_i)}>0$, $E_{Dj}^{TI}>\max\{E_{Dj}^{TT}\cdot\frac{\ln(R_i)}{\ln(S_i)},E_{Dj}^{TT}\cdot\frac{\ln(R_j)}{\ln(T_j)}\}$, $E_{Dj}^{II}>\max\{E_{Dj}^{IT}\cdot\frac{\ln(T_i)}{\ln(P_i)},E_{Dj}^{IT}\cdot\frac{\ln(S_j)}{\ln(P_j)}\}$
	(I am the Boss, I am the Boss)	$E_{Di}^{IT}>\max\{E_{Di}^{TT}\cdot\frac{\ln(R_i)}{\ln(T_i)},E_{Di}^{TT}\cdot\frac{\ln(R_j)}{\ln(S_j)}\}$, $E_{Di}^{II}>\max\{E_{Di}^{TI}\cdot\frac{\ln(T_j)}{\ln(P_j)},E_{Di}^{TI}\cdot\frac{\ln(S_i)}{\ln(P_i)}\}$, $E_{Dj}^{TI}>\max\{E_{Dj}^{TT}\cdot\frac{\ln(R_i)}{\ln(S_i)},E_{Dj}^{TT}\cdot\frac{\ln(R_j)}{\ln(T_j)}\}$, $E_{Dj}^{II}>\max\{E_{Dj}^{IT}\cdot\frac{\ln(T_i)}{\ln(P_i)},E_{Dj}^{IT}\cdot\frac{\ln(S_j)}{\ln(P_j)}\}$
(I am the Boss, You are the Boss)	(You are the Boss, You are the Boss)	$E_{Di}^{TT}\cdot\frac{\ln(R_j)}{\ln(S_j)}>E_{Di}^{IT}>E_{Di}^{TT}\cdot\frac{\ln(R_i)}{\ln(T_i)}>0$, $E_{Di}^{TI}\cdot\frac{\ln(T_j)}{\ln(P_j)}>E_{Di}^{II}>E_{Di}^{TI}\cdot\frac{\ln(S_i)}{\ln(P_i)}>0$, $E_{Dj}^{TI}<\min\{E_{Dj}^{TT}\cdot\frac{\ln(R_i)}{\ln(S_i)},E_{Dj}^{TT}\cdot\frac{\ln(R_j)}{\ln(T_j)}\}$, $E_{Dj}^{II}<\min\{E_{Dj}^{IT}\cdot\frac{\ln(T_i)}{\ln(P_i)},E_{Dj}^{IT}\cdot\frac{\ln(S_j)}{\ln(P_j)}\}$
	(I am the Boss, You are the Boss)	$E_{Di}^{IT}>\max\{E_{Di}^{TT}\cdot\frac{\ln(R_i)}{\ln(T_i)},E_{Di}^{TT}\cdot\frac{\ln(R_j)}{\ln(S_j)}\}$, $E_{Di}^{II}>\max\left\{E_{Di}^{TI}\cdot\frac{\ln(T_j)}{\ln(P_j)},E_{Di}^{TI}\cdot\frac{\ln(S_i)}{\ln(P_i)}\right\}$, $E_{Dj}^{TI}<\min\{E_{Dj}^{TT}\cdot\frac{\ln(R_i)}{\ln(S_i)},E_{Dj}^{TT}\cdot\frac{\ln(R_j)}{\ln(T_j)}\}$, $E_{Dj}^{II}<\min\{E_{Dj}^{IT}\cdot\frac{\ln(T_i)}{\ln(P_i)},E_{Dj}^{IT}\cdot\frac{\ln(S_j)}{\ln(P_j)}\}$
	(You are the Boss, I am the Boss)	$E_{Di}^{TT}\cdot\frac{\ln(R_j)}{\ln(S_j)}>E_{Di}^{IT}>E_{Di}^{TT}\cdot\frac{\ln(R_i)}{\ln(T_i)}>0$, $E_{Di}^{TI}\cdot\frac{\ln(T_j)}{\ln(P_j)}>E_{Di}^{II}>E_{Di}^{TI}\cdot\frac{\ln(S_i)}{\ln(P_i)}>0$, $E_{Dj}^{TT}\cdot\frac{\ln(R_i)}{\ln(S_i)}<E_{Dj}^{TI}<E_{Dj}^{TT}\cdot\frac{\ln(R_j)}{\ln(T_j)}<0$, $E_{Dj}^{IT}\cdot\frac{\ln(T_i)}{\ln(P_i)}<E_{Dj}^{II}<E_{Dj}^{IT}\cdot\frac{\ln(S_j)}{\ln(P_j)}<0$
	(I am the Boss, I am the Boss)	$E_{Di}^{IT}>\max\{E_{Di}^{TT}\cdot\frac{\ln(R_i)}{\ln(T_i)},E_{Di}^{TT}\cdot\frac{\ln(R_j)}{\ln(S_j)}\}$, $E_{Di}^{II}>\max\left\{E_{Di}^{TI}\cdot\frac{\ln(T_j)}{\ln(P_j)},E_{Di}^{TI}\cdot\frac{\ln(S_i)}{\ln(P_i)}\right\}$, $E_{Dj}^{TT}\cdot\frac{\ln(R_i)}{\ln(S_i)}<E_{Dj}^{TI}<E_{Dj}^{TT}\cdot\frac{\ln(R_j)}{\ln(T_j)}<0$, $E_{Dj}^{IT}\cdot\frac{\ln(T_i)}{\ln(P_i)}<E_{Dj}^{II}<E_{Dj}^{IT}\cdot\frac{\ln(S_j)}{\ln(P_j)}<0$

I.G.N.E. in My Direct Choice	I.G.N.E. in Your Direct Choice	Conditions for two I.G.N.E. Hold
(You are the Boss, I am the Boss)	(You are the Boss, You are the Boss)	$E_{Di}^{IT} < \min\{E_{Di}^{TT} \cdot \frac{\ln(R_i)}{\ln(T_i)}, E_{Di}^{TT} \cdot \frac{\ln(R_j)}{\ln(S_j)}\}$, $E_{Di}^{II} < \min\left\{E_{Di}^{TI} \cdot \frac{\ln(T_j)}{\ln(P_j)}, E_{Di}^{TI} \cdot \frac{\ln(S_i)}{\ln(P_i)}\right\}$, $E_{Dj}^{TT} \cdot \frac{\ln(R_i)}{\ln(S_i)} > E_{Dj}^{TI} > E_{Dj}^{TT} \cdot \frac{\ln(R_j)}{\ln(T_j)} > 0$, $E_{Dj}^{IT} \cdot \frac{\ln(T_i)}{\ln(P_i)} > E_{Dj}^{II} > E_{Dj}^{IT} \cdot \frac{\ln(S_j)}{\ln(P_j)} > 0$
	(I am the Boss, You are the Boss)	$E_{Di}^{TT} \cdot \frac{\ln(R_j)}{\ln(S_j)} < E_{Di}^{IT} < E_{Di}^{TT} \cdot \frac{\ln(R_i)}{\ln(T_i)} < 0$, $E_{Di}^{TI} \cdot \frac{\ln(T_j)}{\ln(P_j)} < E_{Di}^{II} < E_{Di}^{TI} \cdot \frac{\ln(S_i)}{\ln(P_i)} < 0$, $E_{Dj}^{TT} \cdot \frac{\ln(R_i)}{\ln(S_i)} > E_{Dj}^{TI} > E_{Dj}^{TT} \cdot \frac{\ln(R_j)}{\ln(T_j)} > 0$, $E_{Dj}^{IT} \cdot \frac{\ln(T_i)}{\ln(P_i)} > E_{Dj}^{II} > E_{Dj}^{IT} \cdot \frac{\ln(S_j)}{\ln(P_j)} > 0$
	(You are the Boss, I am the Boss)	$E_{Di}^{IT} < \min\{E_{Di}^{TT} \cdot \frac{\ln(R_i)}{\ln(T_i)}, E_{Di}^{TT} \cdot \frac{\ln(R_j)}{\ln(S_j)}\}$, $E_{Di}^{II} < \min\left\{E_{Di}^{TI} \cdot \frac{\ln(T_j)}{\ln(P_j)}, E_{Di}^{TI} \cdot \frac{\ln(S_i)}{\ln(P_i)}\right\}$, $E_{Dj}^{TI} > \max\{E_{Dj}^{TT} \cdot \frac{\ln(R_i)}{\ln(S_i)}, E_{Dj}^{TT} \cdot \frac{\ln(R_j)}{\ln(T_j)}\}$, $E_{Dj}^{II} > \max\{E_{Dj}^{IT} \cdot \frac{\ln(T_i)}{\ln(P_i)}, E_{Dj}^{IT} \cdot \frac{\ln(S_j)}{\ln(P_j)}\}$
	(I am the Boss, I am the Boss)	$E_{Di}^{TT} \cdot \frac{\ln(R_j)}{\ln(S_j)} < E_{Di}^{IT} < E_{Di}^{TT} \cdot \frac{\ln(R_i)}{\ln(T_i)} < 0$, $E_{Di}^{TI} \cdot \frac{\ln(T_j)}{\ln(P_j)} < E_{Di}^{II} < E_{Di}^{TI} \cdot \frac{\ln(S_i)}{\ln(P_i)} < 0$, $E_{Dj}^{TI} > \max\{E_{Dj}^{TT} \cdot \frac{\ln(R_i)}{\ln(S_i)}, E_{Dj}^{TT} \cdot \frac{\ln(R_j)}{\ln(T_j)}\}$, $E_{Dj}^{II} > \max\{E_{Dj}^{IT} \cdot \frac{\ln(T_i)}{\ln(P_i)}, E_{Dj}^{IT} \cdot \frac{\ln(S_j)}{\ln(P_j)}\}$
(You are the Boss, You are the Boss)	(You are the Boss, You are the Boss)	$E_{Di}^{IT} < \min\{E_{Di}^{TT} \cdot \frac{\ln(R_i)}{\ln(T_i)}, E_{Di}^{TT} \cdot \frac{\ln(R_j)}{\ln(S_j)}\}$, $E_{Di}^{II} < \min\left\{E_{Di}^{TI} \cdot \frac{\ln(T_j)}{\ln(P_j)}, E_{Di}^{TI} \cdot \frac{\ln(S_i)}{\ln(P_i)}\right\}$, $E_{Dj}^{TI} < \min\{E_{Dj}^{TT} \cdot \frac{\ln(R_i)}{\ln(S_i)}, E_{Dj}^{TT} \cdot \frac{\ln(R_j)}{\ln(T_j)}\}$, $E_{Dj}^{II} < \min\{E_{Dj}^{IT} \cdot \frac{\ln(T_i)}{\ln(P_i)}, E_{Dj}^{IT} \cdot \frac{\ln(S_j)}{\ln(P_j)}\}$
	(I am the Boss, You are the Boss)	$E_{Di}^{TT} \cdot \frac{\ln(R_j)}{\ln(S_j)} < E_{Di}^{IT} < E_{Di}^{TT} \cdot \frac{\ln(R_i)}{\ln(T_i)} < 0$, $E_{Di}^{TI} \cdot \frac{\ln(T_j)}{\ln(P_j)} < E_{Di}^{II} < E_{Di}^{TI} \cdot \frac{\ln(S_i)}{\ln(P_i)} < 0$, $E_{Dj}^{TI} < \min\{E_{Dj}^{TT} \cdot \frac{\ln(R_i)}{\ln(S_i)}, E_{Dj}^{TT} \cdot \frac{\ln(R_j)}{\ln(T_j)}\}$, $E_{Dj}^{II} < \min\{E_{Dj}^{IT} \cdot \frac{\ln(T_i)}{\ln(P_i)}, E_{Dj}^{IT} \cdot \frac{\ln(S_j)}{\ln(P_j)}\}$
	(You are the Boss, I am the Boss)	$E_{Di}^{IT} < \min\{E_{Di}^{TT} \cdot \frac{\ln(R_i)}{\ln(T_i)}, E_{Di}^{TT} \cdot \frac{\ln(R_j)}{\ln(S_j)}\}$, $E_{Di}^{II} < \min\left\{E_{Di}^{TI} \cdot \frac{\ln(T_j)}{\ln(P_j)}, E_{Di}^{TI} \cdot \frac{\ln(S_i)}{\ln(P_i)}\right\}$, $E_{Dj}^{TT} \cdot \frac{\ln(R_i)}{\ln(S_i)} < E_{Dj}^{TI} < E_{Dj}^{TT} \cdot \frac{\ln(R_j)}{\ln(T_j)} < 0$, $E_{Dj}^{IT} \cdot \frac{\ln(T_i)}{\ln(P_i)} < E_{Dj}^{II} < E_{Dj}^{IT} \cdot \frac{\ln(S_j)}{\ln(P_j)} < 0$
	(I am the Boss, I am the Boss)	$E_{Di}^{TT} \cdot \frac{\ln(R_j)}{\ln(S_j)} < E_{Di}^{IT} < E_{Di}^{TT} \cdot \frac{\ln(R_i)}{\ln(T_i)} < 0$, $E_{Di}^{TI} \cdot \frac{\ln(T_j)}{\ln(P_j)} < E_{Di}^{II} < E_{Di}^{TI} \cdot \frac{\ln(S_i)}{\ln(P_i)} < 0$, $E_{Dj}^{TT} \cdot \frac{\ln(R_i)}{\ln(S_i)} < E_{Dj}^{TI} < E_{Dj}^{TT} \cdot \frac{\ln(R_j)}{\ln(T_j)} < 0$, $E_{Dj}^{IT} \cdot \frac{\ln(T_i)}{\ln(P_i)} < E_{Dj}^{II} < E_{Dj}^{IT} \cdot \frac{\ln(S_j)}{\ln(P_j)} < 0$

In the example, we can use the yellow-highlighted areas in eight sub-figures in Figure 1 and Figure 2 to describe the conditions for a full rational I-subject.

Figure 1: Conditions for Two Natural N.E. as the I.G.N.E. in Two Direct Choices in the Example

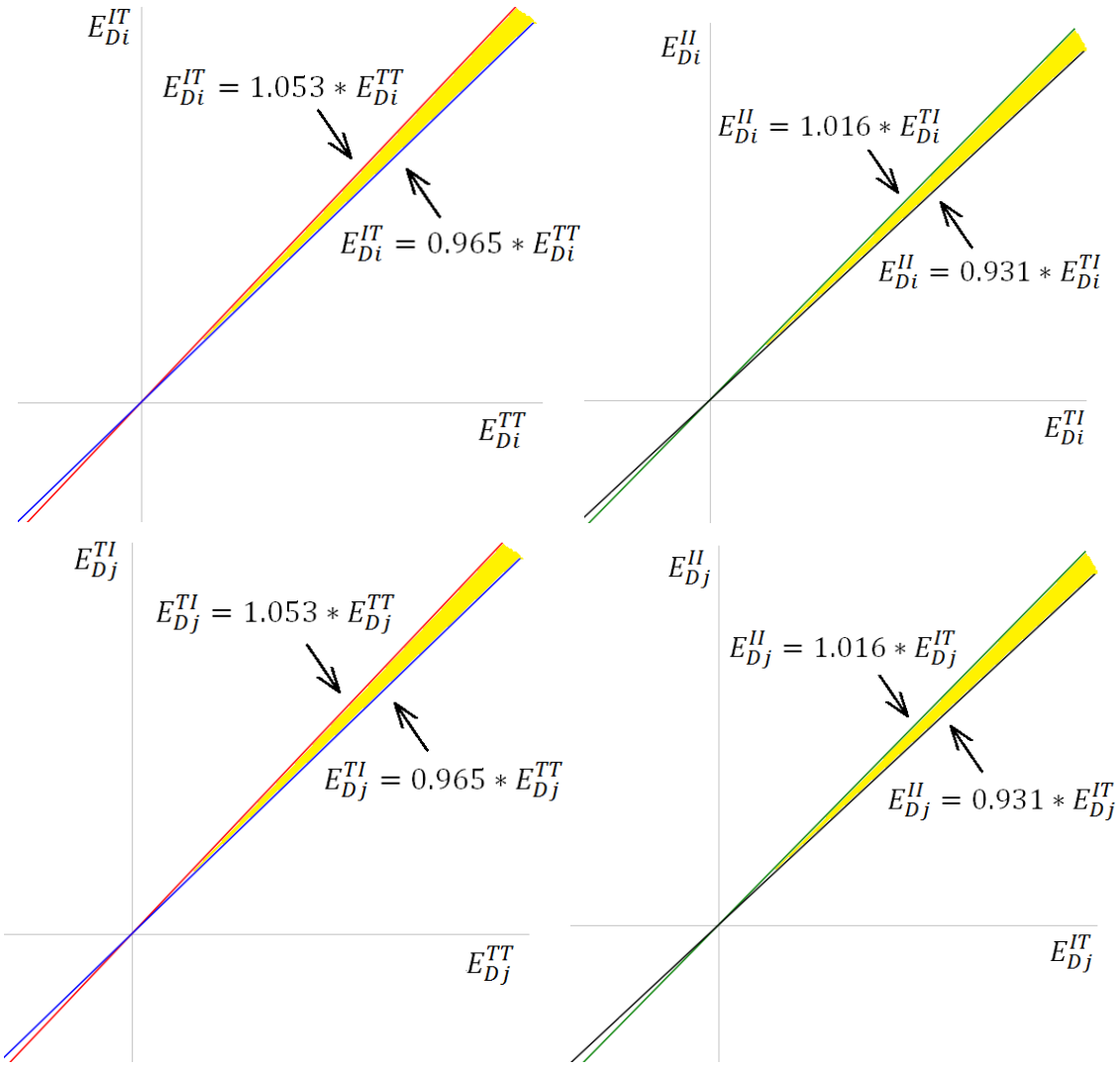
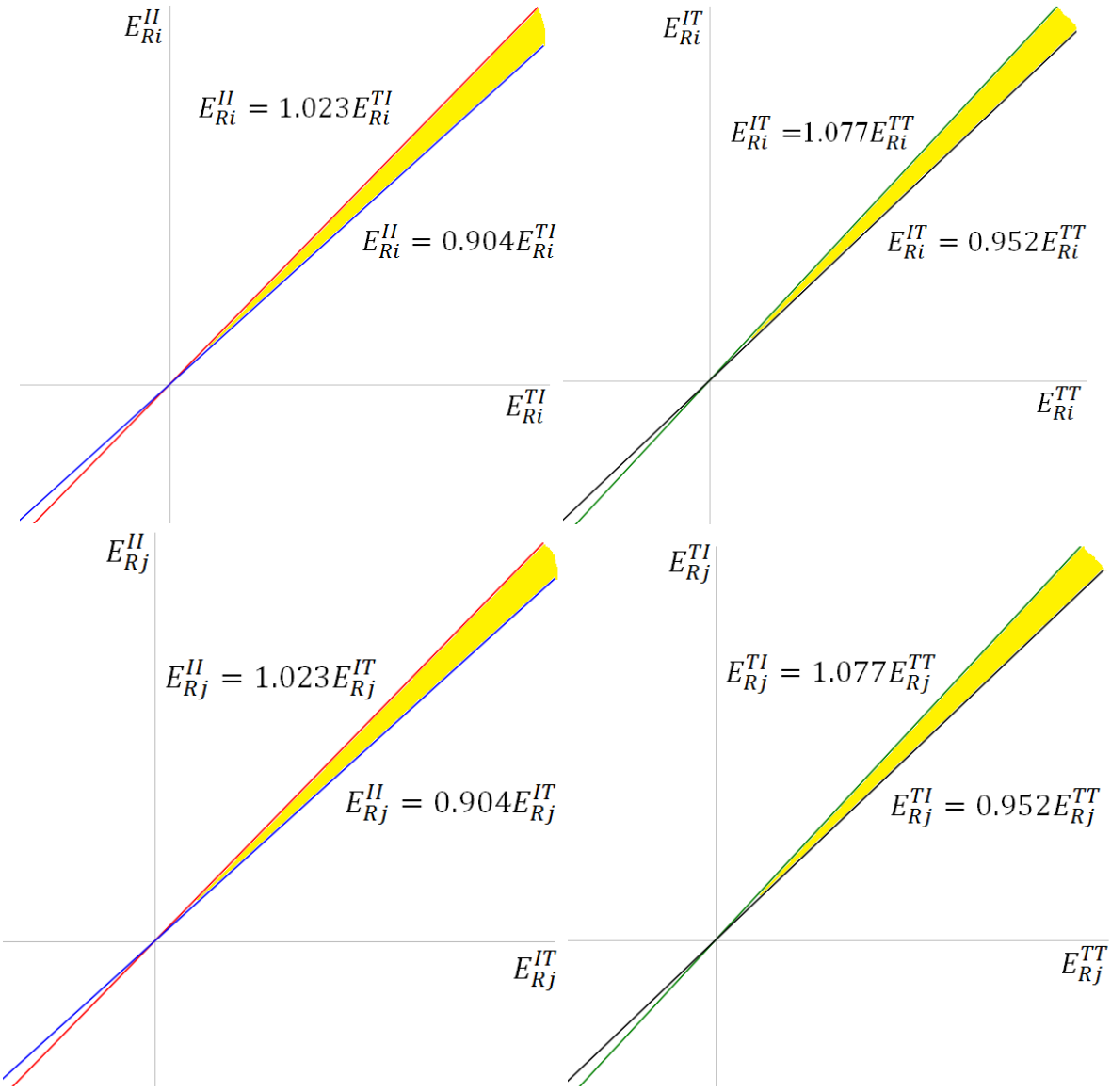


Figure 2: Conditions for Two Natural N.E. as the I.G.N.E. in Two Reaction Choices in the Example



The evolution of Ego Identity can be viewed as a life cycle in an individual's life journey. When a child has internalized the primary caregiver as the first image of Inner Thou, her Ego Identity starts the process of adaptation in daily interactions with others in order to protect herself from various uncomfortable feelings. As she grows up and becomes an adult with formed Ego Identity, she has a set of perceptions and beliefs about herself and others to effectively deal with issues in the real world. However, by applying her Ego Identity formed from previous experiences to new encounters and relationships, she

inevitably meets some intrapersonal or interpersonal conflicts which may further lead to uncomfortable feelings or even sufferings. As a result, she may find herself in one of three situations: (1) be trapped in interpersonal conflicts or even fights with the outside world; (2) be trapped in intrapersonal conflicts or even inner sufferings; (3) try to avoid[9] any close relationship in order to run away from uncomfortable feelings in relationships. Actually, there is a way out, which is to honestly observe her own Inner Game(s) in every choice, try to break the attachment to the formed Ego Identity in attitudes and behaviors, and then initiate actions in the final/important choice(s) after reaching Natural N.E. in related Inner Games. On becoming a self-actualized person as described by Maslow (1943), the ability to see through the mist of Ego Identity is a helpful and expeditious toolkit in the face of choices and decisions.

IV. Example: a Two-Round Prisoners' Dilemma

In a two-round Prisoner's Dilemma without communication, two players (Player A & Player B) need to make choices in {Cooperate, Non-Cooperate} in two rounds, as below:

Step 1: Player A and Player B simultaneously choose in {C, N} in Round #1.

Step 2: Their choices in Round #1 are revealed to both players.

Step 3: Player A and Player B simultaneously choose in {C, N} in Round #2.

In the framework, each player's Ego Identity contains her beliefs about two players in this game. Table 13 lists all the sixteen perceptions for Player A and Player B in a two-round Prisoner's Dilemma. Though there are only sixteen possibilities of choices[10] in a two-round Prisoners' Dilemma game, there are 256 possibilities of perceptions for each player, and 256×256(=65,536) possibilities of perceptions for two players in this game. Some players may make the same choices in the game, but their perceptions and feelings under their choices could be quite different.

[9] In the framework with Ego Identity, this strategy is to reduce the values of α and β to almost zero.
[10] The sixteen possible results are: {CC,CC}, {NC, CC}, {CN, CC}, {CC, NC}, {CC,CN},{NN, CC}, {CN,NC}, {CC,NN}, {NC,NC}, {NC,CN}, {CN,CN}, {NN,NC}, {NN,CN}, {NC,NN},{CN, NN}, {NN,NN}.

If Player A is full rational in this game, this means that she can make choices with the Natural N.E. as the I.G.N.E. in each Inner Game. Therefore, her total utility from a two-round Prisoner's Dilemma is:

$$U(Player\ A) = [(P_i)^{E_{Di}^{II}} + (P_j)^{E_{Dj}^{II}}] + \alpha\beta[(R_j)^{E_{Di}^{TT}} + (R_i)^{E_{Dj}^{TT}}] + [(p_i)^{E_{Ri}^{II}} + (p_j)^{E_{Rj}^{II}}] + \alpha\beta[(r_j)^{E_{Ri}^{TT}} + (r_i)^{E_{Rj}^{TT}}]$$

$$\text{with } E_{Di}^{TT} \cdot \frac{\ln(R_j)}{\ln(S_j)} > E_{Di}^{IT} > E_{Di}^{TT} \cdot \frac{\ln(R_i)}{\ln(T_i)} > 0,\ E_{Di}^{TI} \cdot \frac{\ln(T_j)}{\ln(P_j)} > E_{Di}^{II} > E_{Di}^{TI} \cdot \frac{\ln(S_i)}{\ln(P_i)} > 0,$$
$$E_{Dj}^{TT} \cdot \frac{\ln(R_i)}{\ln(S_i)} > E_{Dj}^{TI} > E_{Dj}^{TT} \cdot \frac{\ln(R_j)}{\ln(T_j)} > 0,\ E_{Dj}^{IT} \cdot \frac{\ln(T_i)}{\ln(P_i)} > E_{Dj}^{II} > E_{Dj}^{IT} \cdot \frac{\ln(S_j)}{\ln(P_j)} > 0\ ,$$
$$E_{Ri}^{TI} \cdot \frac{\ln(t_j)}{\ln(p_j)} > E_{Ri}^{II} > E_{Ri}^{TI} \cdot \frac{\ln(s_i)}{\ln(p_i)} > 0,\ E_{Ri}^{TT} \cdot \frac{\ln(r_j)}{\ln(s_j)} > E_{Ri}^{IT} > E_{Ri}^{TT} \cdot \frac{\ln(r_i)}{\ln(t_i)} > 0,$$
$$E_{Rj}^{IT} \cdot \frac{\ln(t_i)}{\ln(p_i)} > E_{Rj}^{II} > E_{Rj}^{IT} \cdot \frac{\ln(s_j)}{\ln(p_j)} > 0,\ E_{Rj}^{TT} \cdot \frac{\ln(r_i)}{\ln(s_i)} > E_{Rj}^{TI} > E_{Rj}^{TT} \cdot \frac{\ln(r_j)}{\ln(t_j)} > 0$$

Player A's total utility is the sum of four components in four square brackets: the first one is the utility from Player A's choice in Round #1, the second one is the utility from Player B's choice in Round #1 with the discount factor $\alpha\beta$, the third one is the utility from Player A's choice in Round #2, and the last one is the utility from Player B's choice in Round #2 with the discount factor $\alpha\beta$. Only when the eight conditions above are satisfied, the total utility above is Player A's utility from the game. When some of the eight conditions cannot hold, the corresponding utility component in the total utility should be updated with the new I.G.N.E. in the corresponding Inner Game. Moreover, the sixteen utility parameters in Inner Games ($P_i, R_i, P_j, R_j, T_i, S_i, T_j, S_j, p_i, r_i, p_j, r_j, t_i, s_i, t_j, s_j$) are related to the monetary payment in the game.

There is another situation which happens a lot in the real world. If Player A made two choices with the following cells as I.G.N.E.:

- (I am the Boss, You are the Boss) for Player A's inner (Self, Thou) pair in Player A's choice in Round #1;
- (You are the Boss, I am the Boss) for Player A's inner (Thou, Self) pair in Player B's choice in Round #1;
- (You are responsible, I am Responsible) for Player A's inner (Self, Thou) pair in Player A's choice in Round #2;
- (I am Responsible, You are responsible) for Player A's inner (Thou, Self) pair in Player B's choice in Round #2.

Then Player A's total utility will be:

$$U(Player\ A) = [(T_i)^{E_{Di}^{IT}} - (S_j)^{E_{Dj}^{IT}}] + \alpha\beta[(S_i)^{E_{Dj}^{TI}} - (T_j)^{E_{Di}^{TI}}] + [(s_i)^{E_{Ri}^{TI}} - (t_j)^{E_{Rj}^{TI}}] + \alpha\beta[(t_i)^{E_{Rj}^{IT}} - (s_j)^{E_{Ri}^{IT}}]$$

with $E_{Di}^{TT} \cdot \frac{\ln(R_j)}{\ln(S_j)} > E_{Di}^{IT} > E_{Di}^{TT} \cdot \frac{\ln(R_i)}{\ln(T_i)} > 0$, $E_{Di}^{TI} \cdot \frac{\ln(T_j)}{\ln(P_j)} > E_{Di}^{II} > E_{Di}^{TI} \cdot \frac{\ln(S_i)}{\ln(P_i)} > 0$,

$E_{Dj}^{TT} \cdot \frac{\ln(R_i)}{\ln(S_i)} < E_{Dj}^{TI} < E_{Dj}^{TT} \cdot \frac{\ln(R_j)}{\ln(T_j)} < 0$, $E_{Dj}^{IT} \cdot \frac{\ln(T_i)}{\ln(P_i)} < E_{Dj}^{II} < E_{Dj}^{IT} \cdot \frac{\ln(S_j)}{\ln(P_j)} < 0$,

$E_{Ri}^{TI} \cdot \frac{\ln(t_j)}{\ln(p_j)} < E_{Ri}^{II} < E_{Ri}^{TI} \cdot \frac{\ln(s_i)}{\ln(p_i)} < 0$, $E_{Ri}^{TT} \cdot \frac{\ln(r_j)}{\ln(s_j)} < E_{Ri}^{IT} < E_{Ri}^{TT} \cdot \frac{\ln(r_i)}{\ln(t_i)} < 0$,

$E_{Rj}^{IT} \cdot \frac{\ln(t_i)}{\ln(p_i)} > E_{Rj}^{II} > E_{Rj}^{IT} \cdot \frac{\ln(s_j)}{\ln(p_j)} > 0$, $E_{Rj}^{TT} \cdot \frac{\ln(r_i)}{\ln(s_i)} > E_{Rj}^{TI} > E_{Rj}^{TT} \cdot \frac{\ln(r_j)}{\ln(t_j)} > 0$

Similarly, Player A's total utility is the sum of four components in four square brackets. The difference is to calculate the differences of two utility parts when the beliefs of two inner images are dissonant. Player A may end up with negative utility from her choices in the game.

In four Inner Games (My Direct Choice, Your Direct Choice, My Reaction to Your Choice, Your Reaction to My Choice), the Natural N.E. is "ITIT-ITIT" for the inner (Self, Thou) pair. Here, "I" represents "I am the Boss" or "I am Responsible" in the corresponding Inner Game, and "T" represents "You are the Boss" or "You are Responsible" in the corresponding Inner Game. If the Natural N.E. is used as the starting point in Inner Games, we can count the number of deviations from the starting point in Table 14.

Though a two-round Prisoner's Dilemma without communication is a simple interaction between two players, Table 14 shows one player's inner state could be much more complicated than her choices in this game. We can predict that even when communication is allowed in a two-round Prisoner's Dilemma, if players' I.G.N.E. deviates from the Natural N.E. too much, it is not easy for them to reach mutual cooperation in such a simple game.

Table 13: Two Players' Perceptions in a Two-Round Prisoner's Dilemma

Whose Perception	Whose Business	Type of Choice	Perception Question in the Corresponding Inner Game	# of Possibilities
Player A's Perception (Player A as the I-subject)	Player A's Business	Player A's direct choice in Round #1	Player A's perception about who is the Boss in Player A's choice in Round #1	2*2=4
			Player A's perception about how Player B thinks about who is the Boss in Player A's choice in Round #1	
		Player A's reaction in Round #2 to Player B's choice in Round #1	Player A's perception about Who is responsible for Player A's reaction in Round #2 to Player B's choice in Round #1	2*2=4
			Player A's perception about how Player B thinks about who is responsible for Player A's reaction in Round #2 to Player B's choice in Round #1	
	Player B's Business	Player B's direct choice in Round #1	Player A's perception about who is the Boss in Player B's choice in Round #1	2*2=4
			Player A's perception about how Player B thinks about who is the Boss in Player B's choice in Round #1	
		Player B's reaction in Round #2 to Player A's choice in Round #1	Player A's perception about who is responsible for Player B's reaction in Round #2 to Player A's choice in Round #1	2*2=4
			Player A's perception about how Player B thinks about who is responsible for Player B's reaction in Round #2 to Player A's choice in Round #1	
Player B's Perception (Player B as the I-subject)	Player B's Business	Player B's direct choice in Round #1	Player B's perception about who is the Boss in Player B's choice in Round #1	2*2=4
			Player B's perception about how Player A thinks about who is the Boss in Player B's choice in Round #1	
		Player B's reaction in Round #2 to Player A's choice in Round #1	Player B's perception about who is responsible for Player B's reaction in Round #2 to Player A's choice in Round #1	2*2=4
			Player B's perception about how Player A thinks about who is responsible for Player B's reaction in Round #2 to Player A's choice in Round #1	
	Player A's Business	Player A's direct choice in Round #1	Player B's perception about who is the Boss in Player A's choice in Round #1	2*2=4
			Player B's perception about how Player A thinks about who is the Boss in Player A's choice in Round #1	
		Player A's reaction in Round #2 to Player B's choice in Round #1	Player B's perception about Who is responsible for Player A's reaction in Round #2 to Player B's choice in Round #1	2*2=4
			Player B's perception about how Player A thinks about who is responsible for Player A's reaction in Round #2 to Player B's choice in Round #1	

Table 14: Heat Map of the Deviations from the Natural N.E. for one Player in the Two-round Prisoner's Dilemma

		Inner Thou (My Direct Choice, Your Direct Choice, My Reaction to Your Choice, Your Reaction to My Choice)															
		ITIT	IIIT	ITII	ITTT	TTIT	IIII	IITT	ITTI	TTII	TTTT	TIIT	IITI	TIII	TITT	TTTI	TITI
Inner Self (My Direct Choice, Your Direct Choice, My Reaction to Your Choice, Your Reaction to My Choice)	ITIT	0	1	1	1	1	2	2	2	2	2	2	3	3	3	3	4
	IIIT	1	2	2	2	2	3	3	3	3	3	3	4	4	4	4	5
	ITII	1	2	2	2	2	3	3	3	3	3	3	4	4	4	4	5
	ITTT	1	2	2	2	2	3	3	3	3	3	3	4	4	4	4	5
	TTIT	1	2	2	2	2	3	3	3	3	3	3	4	4	4	4	5
	IIII	2	3	3	3	3	4	4	4	4	4	4	5	5	5	5	6
	IITT	2	3	3	3	3	4	4	4	4	4	4	5	5	5	5	6
	ITTI	2	3	3	3	3	4	4	4	4	4	4	5	5	5	5	6
	TTII	2	3	3	3	3	4	4	4	4	4	4	5	5	5	5	6
	TTTT	2	3	3	3	3	4	4	4	4	4	4	5	5	5	5	6
	TIIT	2	3	3	3	3	4	4	4	4	4	4	5	5	5	5	6
	IITI	3	4	4	4	4	5	5	5	5	5	5	6	6	6	6	7
	TIII	3	4	4	4	4	5	5	5	5	5	5	6	6	6	6	7
	TITT	3	4	4	4	4	5	5	5	5	5	5	6	6	6	6	7
	TTTI	3	4	4	4	4	5	5	5	5	5	5	6	6	6	6	7
	TITI	4	5	5	5	5	6	6	6	6	6	6	7	7	7	7	8

V. Emotions in Inner Games

The literature of standard economic theory typically neglects emotions or discusses some specific emotions but not to pursue an approach of integrating emotions into the economic models (Elster 1998). The literature of behavioral economics pays more attention to the role of emotions in economic behavior. Besides anticipated emotions modeled in anticipatory utility models (Caplin and Leahy 2001; Kőszegi 2006), Loewenstein (1996; 2000) pointed out the necessity to integrate immediate emotions – which are experienced at the moment of decision-making – into economic model of human behaviors. In recent years, the literature of psychological game theory proposed a framework of belief-based motivations to incorporate emotions into economic analysis (Battigalli and Dufwenberg 2020).

In the psychology literature, Lazarus (2006) recommended a person-centered way to study emotions in a continuous flow of actions and reactions with a social context of interpersonal or person-environment relationship. He suggested two fundamental principles for a cognitive, motivational, and relational theory of emotions: "First, if we begin our analysis of an adaptational encounter with an emotion that is displayed or being experienced by a particular person under a given set of life conditions, we should be able to make a good deductive guess about what that person must be desiring and thinking. Second, if we instead begin our analysis with what a particular person desires and thinks, we should be able to make a good deductive guess about which emotion this person is likely to display or experience under given conditions."

This paper views the I-subject's feelings as the by-product of the intrinsically private introspection of her Inner Game(s) in decision making. Due to a lack of self-observation, some people may not have a good understanding of their own subtle feelings in daily choices, and cannot identity and name some feeling(s) in the process of decision making (Rogers 1951). However, some feelings are too strong to be ignored by most of people, and this kind of feelings can be referred as Emotions.

It is the possible to distinguish five types of anger in the framework of Inner Games with Ego Identity in Table 15. The first type is healthy anger, which can be used as a guide in life to protect the I-subject's personal boundary. Moreover, Table 16 lists several types of emotions that may emerge in "My Direct Choice" when the I.G.N.E. deviates from the Natural N.E. in the Inner Game. Other types of emotions in other Inner Games are left to readers.

Table 15: Five Types of Anger in the Relationships

#	Type of Anger	Inner Game and I.G.N.E.	Possible Situation	Purpose of the Anger Feeling
1	Anger to protect my personal boundary	My Direct Choice with (I am the Boss, You are the Boss) for the inner (Self, Thou) pair as the I.G.N.E.	I think that I am the boss in My Direct Choice, but also perceive that you try/want to manipulate my choice. Therefore, I feel angry to protect my personal boundary and prevent your potential invasion.	This is healthy anger, which can be used as a guide to protect my personal boundary in My Direct Choices.
2	Anger for invasion	Your Direct Choice with (You are the Boss, I am the Boss) for the inner (Thou, Self) pair as the I.G.N.E.	I think that I am the boss in your business, but also perceive that you try to take charge and refuse my involvement. Therefore, I feel angry to your refusal.	Known as Aggressive Anger in Psychology. An I-subject can use this kind of anger to frighten the Thou-subject in order to cross the Thou-subject's personal boundary.
3	Anger to your irresponsibility behavior (with Blame)	My Reaction to Your Choice with (You are Responsible, I am Responsible) for the inner (Self, Thou) pair as the I.G.N.E.	I think that you are responsible for My Reaction to Your Choice, but also perceive that you think that I am Responsible for my reaction. Therefore, I feel angry to your irresponsibility for your behavior (or I blame you).	This kind of anger is a strong version of blame. The purpose is to force the Thou-subject to be responsible for my reaction to your behavior. This kind of anger often comes with the second type of anger.
4	Your Anger after failing to avoid your responsibility	Your Direct Choice with (I am the Boss, You are the Boss) for the inner (Thou, Self) pair as the I.G.N.E.	In Your Direct Choice, I perceive that you think that I am Responsible, but I know that you are responsible for your business. I expect that you will feel angry after failing to get rid of the responsibility in your business. The expected anger toward me may influence my behavior.	Some Thou-subjects often use this kind of anger to threaten the I-subject to take the responsibility for the Thou-subject's direct choices. When the I-subject takes threaten as real, she may alter behaviors in order to calm down the Thou-subject.
5	Your Anger to force me to be responsible for your reaction	Your Reaction to My Choice with (I am Responsible, You are Responsible) for the inner (Thou, Self) pair as the I.G.N.E.	I think that you are responsible for Your Reaction to My Choice, but also perceive that you think that I am responsible for your reaction. Therefore, I expect that you will feel angry toward me if I refuse to be responsible for your reaction.	Some Thou-subjects often use this kind of anger to threaten the I-subject to take the responsibility for Thou-subject's bad feeling due to the I-subject's direct choices, and the final purpose is to influence the I-subject's direct choices. This kind of anger often comes with the fourth type of anger.

Table 16: Some Related Emotions in the Inner Game of My Direct Choice

Emotion Type	I.G.N.E. in My Direct Choice	Possible Situation	Example in the Parent-Child Relationship
Anger or Fear	(I am the Boss, You are the Boss) for the inner (Self, Thou) pair	I think that I am the boss in My Direct Choice, but also perceive that you try/want to influence/manipulate my choice. Therefore, I am angry to protect my personal boundary and to prevent your potential invasion. However, if I depressed my angry feeling under the pressure of a powerful Thou-subject, I will feel fearful instead.	Child feels angry/fearful to a parent for her controlling behaviors/words/attitudes in the kid's choice of food, hobbies, and friends, etc.
Guilt	(I am the Boss, You are the Judge) for the inner (Self, Thou) pair	I know that I am Responsible for what I did in My Direct Choice, and also think that you are the judge in it. Therefore, I expect to feel guilty if I failed to meet your standard.	Child feels guilty after failing to get the first-place in a competition as his mother wishes for.
Disappointment	(You are Responsible, I am Responsible) for the inner (Self, Thou) pair	I hope that you will take care of me (I rely on you in my business), but also perceive that you try to push it back to me. Therefore, I feel disappointed about your irresponsibility.	If a child is used to depend on the parents in most of her direct choices before, the child will feel disappointed with her parents when they suddenly start to ask her to make choices independently.
Feeling of Inferiority	(You are the Judge, You are the Judge) for the inner (Self, Thou) pair	In my own business, I use your criticism to criticize myself, and also perceive that you will criticize me. There is no inner conflict in the issue, but I feel inferiority about myself.	If a child internalized the parent's criticisms about her ability in one field, she will feel inferior to others in the field.

VI. Conclusion

By formalizing economical and psychological insights with a game-theory approach, this paper offers new thinking about an individual's utility function in daily choices. There are three major differences in the framework of Inner Games with Ego Identity from the previous literature of decision making process. The first difference is that this framework focuses on Inner Games that happen in the mind of the I-subject. The Thou-subject's influence can only work through touching or even shaking one or both inner images in the I-subject's mind. The second feature is to decompose the human psyche into four Inner Games: My Direct Choice, My Reaction to Your Choice, Your Direct Choice, and Your Reaction to My Choice. A two-round Prisoner's Dilemma is an example which includes all four Inner Games for each player's choices in the game. The third feature is to introduce Ego Identity into the framework through sixteen exponential factors on utility parameters, and to utilize two discount factors α and β to present the importance of other's business to the I-subject and the significance of the relationship in the eyes of the I-subject, respectively. The framework of Inner Games with Ego Identity is expected to serve as a platform on which to formalize some psychological concepts and to study phenomena of human decisions and behaviors in a structural way. One limitation of the framework is its silence on the relationship between monetary payoff (consumption) and utility parameters.

This paper closes by listing some open topics for future work. First, it is interesting and important to discuss how a child's Ego Identity evolves in the first three years of life in the parent-child relationship. Some important questions for future research are: What kind of events in a relationship has the power to distort one or more exponential factors of the child's Ego Identity? How are the sixteen exponential factors related to each other in the evolvement of the child's Ego Identity? Does the change in the child's Ego Identity happen gradually in a relationship or instantly in some events? The psychology research and practice has done tremendous work in this field, and it is possible to revisit their findings in the framework of Inner Games with Ego Identity.

Second, for an adult with formed Ego Identity, it could be beneficial to examine and understand her own Ego Identity by using the framework as a map, in order to retire some outdated facets in Ego Identity. Rogers (1957) summarized six conditions which are necessary and sufficient for constructive personality change to occur in psychotherapy. The framework of Inner Games with Ego Identity may help understand what happens in a client-therapist relationship in a measurable way. Moreover, it is possible to revisit the family topics discussed in Becker (1991) and further our understanding of various types of addictions (Becker and Murphy 1988) in the framework.

Third, it is possible to test some ideas in this paper in carefully-designed experiments. The structure of Inner Games and Ego Identity can help explain and predict the occurrence or absence of emotions in experiments, if the features of the individual's Ego Identity can be captured in an experiment with survey questions. Besides, it is interesting to explore how the sixteen utility parameters $\{P_i, R_i, P_j, R_j, T_i, S_i, T_j, S_j, p_i, r_i, p_j, r_j, t_i, s_i, t_j, s_j\}$ in Inner Games are related to the monetary payments in the game.

Fourth, if the survey questions with imagined experiments can capture the features of Ego Identity, it is possible to utilize them in empirical survey, in order to study more research topics in the future. For example, survey questions about Ego Identity can be utilized in one year by the Panel Study of Income Dynamics (PSID) which is the longest running longitudinal household survey. It is possible to study the impact of Ego Identity on health or financial results by using the panel data.

Fifth, it is possible to apply the framework to study the collective unconsciousness theory proposed by Carl Jung in Jung (1916). For example, by gender and wealth status, future research could estimate and compare the utility parameters, exponential factors, and two discount factors in the collective Ego Identity shared by people in the same society/culture/religion over time. This kind of analysis may help understand the collective psychological forces under big social events and predict the results of social movements.

References

Akerlof, George A, and William T Dickens. "The Economic Consequences of Cognitive Dissonance." *The American Economic Review* 72, no. 3 (1982): 307–19.

Akerlof, George A, and Rachel E Kranton. "Economics and Identity." *The Quarterly Journal of Economics* 115, no. 3 (2000): 715–53.

Ashraf, Nava, Colin F Camerer, and George Loewenstein. "Adam Smith, Behavioral Economist." *Journal of Economic Perspectives* 19, no. 3 (2005): 131–45.

Battigalli, Pierpaolo, Roberto Corrao, and Martin Dufwenberg. "Incorporating Belief-Dependent Motivation in Games." *Journal of Economic Behavior & Organization* 167 (2019): 185–218.

Battigalli, Pierpaolo, and Martin Dufwenberg. "Belief-Dependent Motivations and Psychological Game Theory." *Journal of Economic Literature* forthcoming (2020).

———. "Dynamic Psychological Games." *Journal of Economic Theory* 144, no. 1 (2009): 1–35. https://doi.org/10.1016/j.jet.2008.01.004.

Becker, Gary S. "A Theory of Social Interactions." *Journal of Political Economy* 82, no. 6 (1974): 1063–93.

Becker, Gary S, and Kevin M Murphy. "A Theory of Rational Addiction." *Journal of Political Economy* 96, no. 4 (1988): 675–700.

Becker, Gary Stanley. *A Treatise on the Family: Enlarged Edition*. Cambridge, Massachusetts: Harvard University Press, 1991.

Bénabou, Roland, and Jean Tirole. "Identity, Morals, and Taboos: Beliefs as Assets." *The Quarterly Journal of Economics* 126, no. 2 (2011): 805–55.

———. "Mindful Economics: The Production, Consumption, and Value of Beliefs." *Journal of Economic Perspectives* 30, no. 3 (2016): 141–64.

———. "Self-Confidence and Personal Motivation." *The Quarterly Journal of Economics* 117, no. 3 (2002): 871–915.

Bordalo, Pedro, Nicola Gennaioli, and Andrei Shleifer. "Memory, Attention, and Choice." *The Quarterly Journal of Economics* 135, no. 3 (August 1, 2020): 1399–1442. https://doi.org/10.1093/qje/qjaa007.

Caplin, Andrew, and John Leahy. "Psychological Expected Utility Theory and Anticipatory Feelings." *The Quarterly Journal of Economics* 116, no. 1 (2001): 55–79.

Elster, Jon. "Emotions and Economic Theory." *Journal of Economic Literature* 36, no. 1 (1998): 47–74.

Erikson, Erik H. *Identity: Youth and Crisis*. WW Norton & company, 1968.

———. "The Problem of Ego Identity." *Journal of the American Psychoanalytic Association* 4, no. 1 (1956): 56–121.

Fudenberg, Drew, and David K Levine. "A Dual-Self Model of Impulse Control." *American Economic Review* 96, no. 5 (2006): 1449–76.

Geanakoplos, John, David Pearce, and Ennio Stacchetti. "Psychological Games and Sequential Rationality." *Games and Economic Behavior* 1, no. 1 (1989): 60–79.

Gilboa, Itzhak, and David Schmeidler. "Case-Based Decision Theory." *The Quarterly Journal of Economics* 110, no. 3 (1995): 605–39.

Golman, Russell, George Loewenstein, Karl Ove Moene, and Luca Zarri. "The Preference for Belief Consonance." *Journal of Economic Perspectives* 30, no. 3 (2016): 165–88.

Jung, Carl Gustav. "The Structure of the Unconscious." In *Collected Works*, 7:263–92, 1916.

Kahneman, Daniel, and Richard Thaler. "Economic Analysis and the Psychology of Utility: Applications to Compensation Policy." *The American Economic Review* 81, no. 2 (1991): 341–46.

Köszegi, Botond. "Ego Utility, Overconfidence, and Task Choice." *Journal of the European Economic Association* 4, no. 4 (June 1, 2006): 673–707. https://doi.org/10.1162/JEEA.2006.4.4.673.

Kőszegi, Botond. "Emotional Agency." *The Quarterly Journal of Economics* 121, no. 1 (2006): 121–55.

Laibson, David. "Golden Eggs and Hyperbolic Discounting." *The Quarterly Journal of Economics* 112, no. 2 (1997): 443–78.

Lazarus, Richard S. “Emotions and Interpersonal Relationships: Toward a Person-centered Conceptualization of Emotions and Coping.” *Journal of Personality* 74, no. 1 (2006): 9–46.
Loewenstein, George. “Emotions in Economic Theory and Economic Behavior.” *American Economic Review* 90, no. 2 (2000): 426–32.
———. “Out of Control: Visceral Influences on Behavior.” *Organizational Behavior and Human Decision Processes* 65, no. 3 (1996): 272–92.
Loewenstein, George, and Drazen Prelec. “Anomalies in Intertemporal Choice: Evidence and an Interpretation.” *The Quarterly Journal of Economics* 107, no. 2 (1992): 573–97.
Maslow, Abraham Harold. “A Theory of Human Motivation.” *Psychological Review* 50, no. 4 (1943): 370–96.
Mullainathan, Sendhil. “A Memory-Based Model of Bounded Rationality.” *The Quarterly Journal of Economics* 117, no. 3 (2002): 735–74.
Nash, John. “Non-Cooperative Games.” *Annals of Mathematics*, 1951, 286–95.
O’Donoghue, Ted, and Matthew Rabin. “Doing It Now or Later.” *American Economic Review* 89, no. 1 (1999): 103–24.
Rabin, Matthew. “Incorporating Fairness into Game Theory and Economics.” *The American Economic Review*, 1993, 1281–1302.
Rogers, Carl R. *Client-Centered Therapy: Its Current Practice, Implications, and Theory, with Chapters*. Houghton Mifflin Oxford, United Kingdom, 1951.
———. *On Becoming a Person: A Therapist’s View of Psychotherapy*. Constable London, 1967.
———. “The Necessary and Sufficient Conditions of Therapeutic Personality Change.” *Journal of Consulting Psychology* 21, no. 2 (1957): 95.
Schelling, Thomas C. “Self-Command in Practice, in Policy, and in a Theory of Rational Choice.” *The American Economic Review* 74, no. 2 (1984): 1–11.
Smith, Adam. *The Theory of Moral Sentiments*. Penguin, 1759.
Thaler, Richard H, and Hersh M Shefrin. “An Economic Theory of Self-Control.” *Journal of Political Economy* 89, no. 2 (1981): 392–406.
Thaler, Richard H, and Cass R Sunstein. *Nudge: Improving Decisions about Health, Wealth, and Happiness*. Penguin, 2009.
Tversky, Amos, and Daniel Kahneman. *Choices, Values, and Frames*. Cambridge University Press, 2000.
———. “Judgment under Uncertainty: Heuristics and Biases.” *Science* 185, no. 4157 (1974): 1124–31.