Journal of Economic Psychology 42 (2014) 136–147

Contents lists available at ScienceDirect

Journal of Economic Psychology

journal homepage: www.elsevier.com/locate/joep

Personality traits and strategic behavior: Anxiousness and aggressiveness in entry games ☆

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ARTICLE INFO

Article history:
Received 5 January 2013
Received in revised form 21 November 2013
Accepted 10 February 2014
Available online 18 February 2014

JEL classification:
C72
C91
D81

Keywords:
Entry game
anxiousness
aggressiveness
Personality
strategic behavior

ABSTRACT

We demonstrate that personality has a systematic effect on strategic behavior. We focus on two personality traits: anxiousness and aggressiveness, and consider a 2-player entry game, where each player can guarantee a payoff by staying out, a higher payoff if she is the only player to enter, but a lower payoff if both players enter. We find that: anxious players enter less; aggressive players enter more; players are more likely to enter against anxious than non-anxious players; and players are less likely to enter against aggressive than non-aggressive players. We discuss the possible mechanism through which personality affects strategic behavior.

1. Introduction

Game theory typically ignores players' personalities.[1] The purpose of this paper is to demonstrate that personality predispositions have a systematic effect on the players' strategic behavior. Specifically, we investigate how players' personality, as well as their lay-theories regarding the relationship between personality and behavior, affects decisions in a simple entry game.

Allport (1937, 1961) defines personality as the dynamic organization of characteristics that creates a person's cognitions, motivation and *behavior*. Over the years the study of personality psychology and individual differences encompassed many theoretical approaches. In this paper, we focus on a trait (disposition) approach. Trait approaches assume that personality traits differ across individuals, but are stable within an individual (during adulthood) and over time (McCrae & Costa, 1990), and that these traits *shape the person's behavior*.[2]

☆ We are thankful for financial support from NSF Grant #SES-0819780 to Tamar Kugler and financial support from the Said Business School, Oxford University to Nir Vulkan. We thank Joe Broschak and Jerel Slaughter for their helpful comments.

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[1] At best, it can be said that personality is implicitly incorporated into the players' payoffs.

[2] Examples can be found in Barrick and Mount (1991), Hurtz and Donovan (2000), Hogan and Holland (2003), Mount, Barrick, and Strauss (1994), Barrick, Mount, and Judge (2001), Poropat (2009), Roberts, Kuncel, Shiner, Caspi, and Goldberg (2007); but see Morgeson et al. (2007), for a different perspective.

http://dx.doi.org/10.1016/j.joep.2014.02.006
0167-4870/

The Five-Factor personality (FFM) Model (Costa & McCrae, 1992; Goldberg, 1993; Russell & Karol, 1994; also known as the "Big 5" model) is a prominent theory of personality. According to this model, there are five major personality dimensions (or domains): Neuroticism, Extraversion, Conscientiousness, Agreeableness and Openness to Experience. Each of these dimensions is further composed of several different facets. The Big-5 model is empirically based, and the 5 factors as well as their facets have been derived using factor analysis.[3]

We focus on two of the facets of the Neuroticism domain. Neuroticism, also defines as low emotional stability (Goldberg, 1993), is characterized by a tendency to experience negative affectivity and psychological distress. Neurotic individuals are "ineffective in their attempts to cope with stress and are prone to engage in irrational thought" (Betterncourt, Talley, Benjamin, & Valentine, 2006, p. 754). They are more likely to experience anxiety, anger, guilt and depression, and interpret ordinary situations as threatening (Matthews & Deary, 1998). The facets of neuroticism include anxiety, angry hostility,[4] depression, self-consciousness, and impulsiveness. We limit the current investigation to the connection between anxiousness and aggressiveness[5] (angry hostility) and strategic behavior.

The choice of anxiousness and aggressiveness provides a particularly interesting contrast. While according to the Big-5 model both traits have a mutual origin (high neuroticism), their psychological experience and behavioral implications are very different. Anxiousness creates feelings of fear, worry, uneasiness, and dread (Bouras & Holt, 2007), and promotes behavioral patterns of withdrawal. Anxious individuals tend to be hyper vigilant and succumb to feelings of threat (Staw, Sandelands, & Dutton, 1981). Behaviorally, anxiousness is negatively correlated with risk-taking (Johnson and Tversky, 1983; Kowert & Hermann, 1997; Nicolson, Soane, Fenton-O'Creevy, & Willman, 2006). In contrast, aggressiveness is intended to increase social dominance, and cause pain or harm to others (Ferguson & Beaver, 2009) and is associated with approach-behaviors such as risk taking (Koole, Jager, van de Berg, Vlek, & Hofstee, 2001; Lerner & Keltner, 2001).[6]

There is very little research connecting personality and economic or strategic behavior (notable exceptions are Anderson, Burks, DeYoung, & Rustichini, 2011; Battigalli & Dufwenberg, 2007, 2009; Johnson, Rustichini, & MacDonald, 2009). In contrast, psychological research accumulated a lot of evidence regarding traits and specific behaviors. In the context of the traits that are relevant to this study, Betterncourt et al. (2006) present a meta-analytic review of personality and aggressive behavior. They conclude that personality should be included as a central variable in models of aggressive behavior. Marshall and Brown (2006) demonstrate that people who are higher on the aggressiveness *trait* are more reactive to provocation, resulting in more aggressive *behavior*. In a more related study, Lauriola and Levin (2001) study Neuroticism in the context of Prospect Theory (Kahneman & Tversky, 1979), and demonstrate that individuals high in Neuroticism engage in less risky decisions in the gains domain, but more risk taking in the domain of losses. It is noteworthy that the psychological literature focuses on individual behavior and decisions, and as such, is not directly applicable to strategic situations (games).

In contrast, we investigate anxiousness and aggressiveness in a 2-player symmetric entry game, where each player can guarantee a certain payoff by staying out, or obtain a higher payoff if she is the only player to enter but a lower payoff if both players enter. We selected this game for several reasons. First, a player in this game has to choose between an avoidance option (stay out), and a risky conflict, or approach option (enter). These two options correspond directly to the behavioral implications of the personality traits we wish to investigate, and create exactly opposite predictions regarding players' behavior. Second, the game is simple and easy to explain and analyze. Finally, the choice of an optimal strategy in an entry game is mainly affected by the player's beliefs regarding the behavior of the other players, so it highlights strategic considerations. As such, the game is a perfect vessel to look not only at the effect of personality on behavior, but also at the effect of the players' lay theories of personality or "theory of mind" of the personality of the other players.[7]

There is a consensus regarding the importance of expectations and beliefs to decision theory in general and game theory in particular. For example, Bicchieri (1988) stated that "in interactive situations, such as those treated in game theory, what is rational to do depends on what one expects that other agents will do" (p. 135). We choose to extend these claims, by incorporating expectations and beliefs regarding opponents who possess anxious and aggressive personality traits.

Research on *lay dispositionism* (Gilbert & Malone, 1995; Ross, 1977, 2001; Ross & Nisbett, 1991), shows that personality-based explanations of others' behavior are formed quickly, and others' personality are inferred from many sources, such as comments by mutual acquaintances, stereotypes, and even personality tests used within organizations. Personality characteristics are also believed to shape future behavior, and are used to form strong expectations of others' actions (Chiu, Hong, & Dweck, 1997; Idson & Mischel, 2001; Kunda & Nisbett, 1986; McCarthy & Skowronski, 2011; Newman, 1996; O'Sullivan, 2003).

In this paper, we develop a theoretical model, and use a controlled laboratory study, to manipulate players' expectations regarding the personality dispositions of others. While laboratory experiments are often limited in their external validity, the use of a theory driven lab study allows in this case for maximum control, and for the disentangling of the effects of a player's own personality from the player's beliefs regarding the personality of others.

[3] Most of the criticism of the Big 5 model revolves around the fact that the model is data driven rather than theory driven. See, for example, the comprehensive review by Block (2010).

[4] As opposed to antagonistic hostility that is associated with the (low) Agreeableness domain. We define and measure aggressiveness as angry hostility rather than antagonistic hostility.

[5] We use the term anxiousness and aggressiveness to refer to the *traits*, while anxiety and aggression refer to states or behaviors.

[6] See method section for a description of how anxiousness and aggressiveness are measured.

[7] A theory of mind ascribes mental states to the self or others (Premack & Woodruff, 1978) and enables attribution of motivation and intentions to others (Frith & Frith, 2003). It allows generating hypotheses and developing lay theories about mental states (Wegner & Vallacher, 1991) and making predictions about others' behavior, on the basis of assumed mental states (Fodor, 1992).