



Personality accounts for stable preferences and expectations across a range of simple games

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ABSTRACT

Behaviour on even simple experimental games shows considerable individual differences, but previous attempts to link these preferences to stable personality traits have had mixed results. Here we address three limitations of earlier studies, namely: (1) uncertainties concerning the reliability of preferences; (2) use of personality instruments with limited cross-study comparability; and (3) confounds where more than one psychological motive can lead to a particular choice. Sixty-seven participants completed 12 distinct real-money games twice over a two-week interval along with 6 measures concerning their expectations about other players' choices. Personality was measured using the full NEO-PI-R. Choices were highly stable across time ($r = .84$). Moreover, choices on the 12 games and 6 expectations reflected a single underlying dimension of "prosocial orientation", measuring concern for the payoffs received by other players. Scores on the prosocial orientation dimension were related to personality, with openness, (low) neuroticism, and (low) extraversion retained as significant predictors.

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1. Introduction

According to Binmore (2007), "A game is being played whenever people have anything to do with each other" (p. 3). As used in research, games are generally run in 2-player laboratory settings. In a typical dictator game, a dictator is endowed with a fund from which they must choose some amount (from 0% to 100%) to give to the recipient. The variable under study is the percent offered by the dictator. Multiple variations of such games have been developed: For instance, in the ultimatum game the recipient can choose to accept or reject the offer (in the case of rejection neither player receives anything).

Research has revealed considerable individual differences in social preferences on these simple games (defined here as preferences over the distribution of resources between individuals; Camerer, 2003). One candidate in explaining these important differences is personality, where prima-facie associations, such as links of agreeableness to empathy and cooperation (Jensen-Campbell & Graziano, 2001), suggest associations with benevolent social preferences. However, studies testing these associations have reported mixed results (e.g. Kurzban & Houser, 2001).

Here we present a study of the influences of personality on social preferences taking into account three possible limiting factors in previous research, namely: (1) the existence of inherent confounds within certain games used in prior research, such that identical behaviours can reflect distinct underlying motivations; (2) the limited comparability of personality instruments used in previous research; and (3) the possible low-stability of social preferences. Next we briefly introduce previous work examining relationships between personality and social preferences, before describing limitations in previous research in more detail, and, finally, presenting a study that addresses these limitations.

1.1. Individual differences in social preferences

It has long been argued that individual differences are likely to play at best a trivial role in determining social preferences (Pruitt & Kimmel, 1977), though personality has been linked to retaliation (Skarlicki, Folger, & Tesluk, 1999) and to preferences over allocations (Schmitt, Neumann, & Montada, 1995), both of which are intimately related to social preferences. Recent studies, however, have begun to explore trait dispositions underlying variation in economic behaviour generally (Borghans, Duckworth, Heckman, & ter Weel, 2008) and in game behaviour specifically. For example, Hirsh and Peterson (2009) found that the withdrawal aspect of neuroticism (tapping fear and insecurity) and the enthusiasm aspect of extraversion (tapping positive affect and sociability) from

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the Big Five aspect scale (DeYoung, Quilty, & Peterson, 2007) independently predicted a greater likelihood of cooperation in a prisoner's dilemma game ($\beta = -.14, -.12$, respectively). By contrast, Lönnqvist, Verkasalo, and Walkowitz (2011) found that low neuroticism and high Openness to Experience predicted more cooperative transfers. Using the dictator game paradigm, Ben-Ner, Kong, and Putterman (2004) reported significant associations between agreeableness and (low) extraversion and the sum offered by the dictator. Finally, Kurzban and Houser (2001) reported non-significant associations between Big Five personality traits and social preferences. Further studies have examined variation in social preferences using personality frameworks other than the five-factor model. For example, Boone, De Brabander, and van Witeloostuijn (1999) observed that the personality traits locus of control, self-monitoring, and sensation seeking had significant associations ($r = .28-.44$) with levels of cooperative behaviour in a prisoners' dilemma game. Scheres and Sanfey (2006) observed significant associations between BAS-Drive and BAS-Reward and (low) offers in a dictator games. And Swope, Cadigan, Schmitt, and Shupp (2008) reported no significant effects of the Myers-Briggs Type Indicator on social preferences.

1.2. Limitations in previous research

There are a number of possible explanations for the mixed results described above. Firstly, much research has focused on just one or two experimental games, such as the dictator and ultimatum games; however, important confounds have been identified in these games which render choices ambiguous as to underlying motivations or preferences (Charness & Rabin, 2002). For example, rejection of a low offer in the ultimatum game can reflect difference aversion or retaliation. These distinct motives, in turn, confound potential underlying personality traits, such as neuroticism and agreeableness, respectively. Likewise, in the prisoners' dilemma, a choice to defect can reflect aversion to differential outcomes, aversion to risk, or a self-regarding preference. These confounds can be mitigated by exploring a range of payoff pairings, varying absolute and relative payoff differences, as well as allowing multi-stage games (Charness & Rabin, 2002). Finally, and importantly, choices reflect expectations about the other player in addition to personal preferences. An example would be the expectation (or fear) that the other player will defect. Because of these confounds in single games, personality is likely to have apparently divergent or null associations to preferences on different games because of the distinct ways in which each game might trigger personality-related preferences.

Secondly, the various personality instruments used in studies associating social preferences and personality have made it difficult to compare results and uncover personality-preference links. For example, Swope et al. (2008) used the Myers-Briggs Type Indicator (which does not tap neuroticism; McCrae & Costa, 1989), and Boone et al. (1999) used an assortment of scales: locus of control, self-monitoring, type-A behaviour, and sensation-seeking. While each of these measures may tap specific traits of relevance to social preferences, the core five-factor model has demonstrated broader coverage of stable human behaviour than any other measurement instrument (e.g. Costa & McCrae, 1992; Goldberg, 1993), and so provides a more comprehensive tool by which to understand putative trait influences on social preferences.

Finally, and most straightforwardly, research has seldom addressed the reliability of social preferences. As recently noted by Ferguson, Heckman, and Corr (2011), the stability of economic preferences still needs to be established. Although we do not think that this is the likely explanation for the mixed results, if reliability in choice behaviour is low (e.g. because participants choose randomly), this would explain both the high variability typically seen

in games and the inconsistency of measured relationships with stable personality traits in previous research, as noted above.

1.3. The current study

To address these limitations, in the present study we measured social preference with Charness and Rabin's (2002) set of dictator games (described in more detail below) twice over a two-week interval, and utilised the full-spectrum NEO-PI-R (Costa & McCrae, 1992) in order to gain a comprehensive assessment of personality.

The current study used a large set of games which are well-established in the experimental economics literature (Charness & Rabin, 2002). This mixture of games allows us to aggregate over many more choices than are commonly elicited from subjects and thus to eliminate common confounds between Pareto-damaging behaviour (behaviour that makes at least one person worse off without making anyone better off, in monetary terms), retaliation, and inequality reduction. These games also tap into the two primary factors which economic theorists have identified as critical for explaining social preferences: How much the other participants receive (comparison-based preferences; people will be less kind towards those who have more than themselves), and the perceived intentions of the other participants (intention-based preferences; people will be less kind towards those who have shown bad intentions). These factors have been separately identified by Fehr and Schmidt (1999), Bolton and Ockenfels (2000), and Charness and Rabin (2002; see also Daruvala, 2010, for a review), but have so far only been discussed in terms of their influence on average behaviour: The factor structure of these games has not yet (to our knowledge) been examined.

1.4. Predictions

With regard to social preferences, we were agnostic about the underlying factor structure on account of the scarcity of individual differences work in this field to guide predictions. In addition to assessing the reliability of social preferences and examining the consistency of these preferences across a range of 18 games, we made several predictions relating personality to social preferences. Concerning comparison-based preferences, we hypothesised that agreeableness would be positively associated with choices reflecting concern for the welfare of others, as well as positive expectations of others' choices, on account of demonstrated links with empathy and trust (Jensen-Campbell & Graziano, 2001). Similarly, we predicted that neuroticism would associate negatively with concern for welfare of others, and expectations of others' choosing selfishly, due to the contribution of facets such as hostility (Costa & McCrae, 1992). Finally, we hypothesised that openness would predict benevolent social preferences, and positive expectations of others' choices, on account of relationships of openness to values of fairness and harm reduction (Lewis & Bates, 2011a). Regarding predictions concerning personality associations with intention-based preferences, we hypothesised that neuroticism and extraversion, with links to revengeful thoughts following a transgression (Maltby et al., 2008) and dominance behaviours (Nettle, 2005), respectively, would predict less concern for the welfare of others following a selfish choice.

2. Method

2.1. Participants

Seventy-five participants were recruited from an undergraduate participation pool: participants received partial course credit for attending as well as a financial remuneration based on choices

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