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The neural basis of the Machiavellians' decision making in fair and unfair situations

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ABSTRACT

Although previous research has revealed a number of social, cognitive and neural components of Machiavellians' decision making processes, less attention has been given to the neural correlates of the high Mach (HM) and low Mach (LM) people's responses to situations involving risks and costs imposed by others in interpersonal relationships. In the present study, we used an fMRI technique to examine individuals as they played the Trust game in fair and unfair situations. Our results revealed that the social environment involving opportunities for exploiting others may be more demanding for Machiavellians who showed elevated brain activities in the fair condition (where the partner made a cooperative initiation) but not in the unfair condition. Regarding the specific activated brain areas in the fair condition, the HM's anterior dorsolateral prefrontal cortex (DLPFC) was responding, which is likely to be involved in the inhibition of the prepotent social-emotional response to the partner's cooperative initiative. Furthermore, we found increased activity in the HM subjects' inferior frontal gyrus (IFG), compared to LMs, that plays a crucial role in the evaluation of the signals associated with the others' social behavior, especially when the player faces a cooperative partner. Alternatively, although Machiavellians are regarded as poor mind readers, inferior frontal gyrus may be effective in anticipating their partner's subsequent decisions in the social dilemma situation.

1. Introduction

Machiavellianism is frequently defined as a behavioral attitude and strategy in using others as devices for achieving the manipulators' own goals (Christie & Geis, 1970; Sutton & Keogh, 2001). It includes three core components: endorsement of deception and manipulation in interpersonal interactions, a cynical view of human nature (seeing others as weak and untrustworthy) and a disregard for conventional morality (Fehr, Samsom, & Paulhus, 1992; Hawley, 2006). Individuals with relatively high scores on Mach scales are referred as high Machs (HM), and are habitually considered as "Machiavellian persons" or "Machiavellians" (Christie & Geis, 1970; Jones & Paulhus, 2009). They have a tendency to be callous, selfish and malevolent in their interpersonal dealings (Paulhus & Williamas, 2002). They easily separate themselves from moral precepts, especially in situations that offer material rewards for breaking norms (Geis & Moon, 1981). In accordance with their egocentrism, they have lower ethical standards and stronger intentions to behave unethically in the future (Jones & Kavanagh, 1996). In contrary, low Mach (LM) persons are characterized by more emotional and ethical orientation.

HM persons are considered to be goal oriented rather than person oriented (Christie & Geis, 1970; Hawley, 2006). They are egoistic and cynical persons who are not likely to be concerned about other people beyond their own self-interest (Hawley, 2006; Jakobwitz & Egan, 2006). They are found to be emotionally detached in their interactions with others, with an interpersonal orientation described as cognitive as opposed to emotional (Austin, Farrelly, Black, & Moore, 2007; Christie & Geis, 1970). Their cold-mindedness has been shown by a recent study that found an association between Machiavellianism and the Interpersonal Schizotypy of a schizotypal personality scale (SPQ-B) that refers to distanced and cold behavior (Montag et al., 2015). Other studies have revealed that high Machs may have certain cognitive deficits, compared to LMs, especially for mentalization capacity, emotional intelligence and empathy. They perform poorly in various mindreading tests, show difficulties in expressing and understanding emotions, and sharing emotions with others

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(Ali & Chamorro-Premuzic, 2010; Lyons, Caldwell, & Shultz, 2010; Paal & Bereczkei, 2007; Wastell & Booth, 2003).

In spite of these cognitive deficits, Machiavellian persons were found to be very effective and successful in exploiting others in various interpersonal interactions, including a social dilemma situation, alliance formation, mate choice (Czibor & Bereczkei, 2012; Gunnthorsdottir, McCabe, & Smith, 2002). Several authors argue that one of the crucial Machiavellian characteristics underlying successful adaptation to the social environment is flexibility (Bereczkei, Deak, Papp, Perlaki, & Orsi, 2013; Jones & Paulhus, 2009). They easily leave an alliance when it is advantageous for them and are likely to steal from someone who trusts them (Christie & Geis, 1970; Harrell & Hartnagel, 1976; Wilson, Near, & Miller, 1998). They also frequently conceal their intentions in order to achieve their goals (Wilson, Near, & Miller, 1996). A recent "real life" study found that HM subjects were not likely to give assistance when they were not observed by others but increased their help to others when their group members could observe their behavior (Bereczkei, Birkas, & Kerekes, 2010). Compared to LM's, HM people were found to have a superior ability to evaluate the clues related to the behavior of group mates in a social dilemma situation and adjust their actual behavior accordingly (Czibor & Bereczkei, 2012).

These results on the Machiavellian persons' flexibility and context-dependent behavior require further analysis about the HM persons' cognitive capacity and the underlying neural mechanisms. The use of brain imaging techniques is advantageous because they can reveal the basic level of decision making processes, and, therefore, can confirm or falsify the particular findings of behavioral studies. Unfortunately, only a few brain imaging studies have been done in this field. A structural MRI analysis revealed significant positive differences for high versus low Machiavellianism in the basal ganglia, left prefrontal cortex, bilateral insula, and the right hippocampus (Verbeke et al., 2011). Spitzer and his colleagues (2007) found a strong correlation between Mach scores and the activity of lateral orbitofrontal cortex that is involved in detecting and evaluating the punishment threat. These abilities are likely to play an important role in the Machiavellians' response to threats of punishment that enabled them to earn higher profit by the end of the Ultimate game. Bereczkei and colleagues (2013) recently demonstrated increased neural activations in areas that are involved in inference making and reward-related decision making (inferior and middle frontal gyri, anterior insula, thalamus, anterior cingulate cortex). The authors suggested that Machiavellian persons – in spite of their poor performance in mentalization and emotional intelligence – may have cognitive heuristics that enable them to make predictions about future rewards in a basically risky and unpredictable situation.

The above mentioned studies have revealed certain social, cognitive and neural components that are involved in Machiavellians' decision making in various social dilemma situations. They showed how successfully Machiavellians respond to others' behavior (e.g. previous contributions) and situational demands (e.g. punishment). However, to date, they have not attempted to analyze a very important aspect of their social environment that may profoundly influence the decision to exploit others, such as the risks and costs imposed by others in an interpersonal relationship. What happens if subjects face partners who do not reciprocate at all or reciprocate less than what was previously received? Do HM and LM people behave differently in a situation where they receive an unfair offer from the partner? What neural correlates are involved in their decisions when facing correct and incorrect responses? Which of the responses represents a higher demand on their cognitive capacities and neural processes?

Scientific evidence suggests that people are very sensitive to being cheated and manipulated. A number of studies confirmed that individuals recognize and discriminate against non-reciprocators and punish them when they can (Cosmides, Barrett, & Tooby, 2010; Kovács-Bálint, Bereczkei, & Hernádi, 2013; Yamagishi, Tanifda, Mashima, Shimoma, & Kanazawa, 2003). Other studies found that a sense of fairness plays an important role in economic decision making. They have shown that unfair offers in various experimental games were associated with negative emotional responses and evoked punishment that may force the violators to obey social norms (Fehr & Fischbacher, 2004; Fehr & Gachter, 2002).

Studies focusing on the neural correlates of interpersonal relationships found elevated activities in certain brain areas that are responsible for detecting and answering unfair acts (Tabibnia, Satpute, & Lieberman, 2008). Some studies concerning norm violations stated that less fair offers in a social dilemma situation activated the bilateral insula which has been implicated in negative emotional states such as pain, fear, disgust (Dulebohn, Conlon, Sarinopulus, Davison, & McNamara, 2009; Rilling et al., 2002; Sanfey, Rilling, Aronson, Nystrom, & Cohen, 2003). Unfair offers also activated the dorsolateral prefrontal cortex that is often associated with goal maintenance and executive control, and the anterior cingulate cortex that is related to the detection of cognitive conflicts. Another study found that unreciprocated cooperation was associated with greater activity in the bilateral insula, left hippocampus and left lingual gyrus, compared with reciprocated cooperation (Rilling et al., 2008).

These studies suggest that people on both the behavioral and neural level are very sensitive to being cheated and are ready to evaluate and punish unfair responses. However, inferring from the previous studies, we assume that the Machiavellians' thinking is different: they would be sensitive primarily to cues from cooperators as potential victims. A lot of studies have confirmed that one of the main characteristics of Machiavellianism is cynicism toward others (Christie & Geis, 1970; Wilson et al., 1996). They typically attribute negative intentions to others and do not expect cooperation from them; they start out with the assumption that others will exploit them if they themselves fail to do so (Repacholi et al., 2003). They assume that other people are cheaters (Harrell, 1980) and believe that others will engage in unethical behavior such as feigning dissatisfaction with a service received in order to obtain a refund (Wirtz & Kum, 2004). They do not only have a broadly negative view of other people but, at the same time, they are more tolerant of unethical behavior in others (Murdrack, 1993). Jones and Paulhus (2009) argue that a "projective" logic underlies this attitude: e.g. workers who say they believe that others steal are the very ones who go on to steal from the company (Cunningham, Wong, & Barbee, 1994).

It is possible, then, that HM people are more likely to accept others' uncooperative behavior than LM's and even regard antisocial acts as "normal" in the interpersonal relationship. They do not expect a fair social contract in an exchange and would not be concerned too much about the partner's selfish decision. Conversely, a cooperative social environment may be highly demanding for them because it needs additional cognitive effort to evaluate the possible costs and benefits associated with their selfish response. If this is so, we expect that HM people show higher neural activities in fair social conditions (as "unusual" from their perspective), compared to unfair social conditions. More specifically, in the case of their partners' cooperative initiatives, they are supposed to recruit specific neural mechanisms that would enable them to make appropriate decisions against the prevailing reciprocity and equality norms. LM persons are expected to behave in the opposite manner: they should show an increase in brain activity when they face the partner's unfair reaction that they usually consider as an act that threatens their social relationship. Since they are more likely than HMs to obey social norms and