Prisoners of Persecutory Ideation: Differentiating Paranoia from Rational Distrust

Benjamin Francis Frayne

A thesis submitted for the degree of Doctor of Clinical Psychology

Word Count:19964

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Acknowledgements

Thesis Abstract

This thesis is a testament to the scarcity of research into interpersonal factors in the formation and maintenance of persecutory beliefs. Theories of paranoia have primarily viewed persecutory beliefs as resulting from illogical, biased or anomalous cognitive processes, maintained by individual processes. This thesis aims to broaden the conceptualisation of paranoia by examining the role of interpersonal factors. It highlights how paranoia shares much in common with interpersonal distrust, and therefore aims to bridge the gap between the clinical psychology literature and the social psychology literature, pulling together some disparate concepts such as paranoia, interpersonal distrust, persecutory ideation, and persecutory delusions. Paranoia is conceptualised as an irrational form of distrust based on the notions of foundedness (i.e. empirical rationality) and on the basis of negative personal and collective consequences of acting on the persecutory belief (i.e. instrumental irrationality). The thesis is therefore composed of a literature review, briefly examining theories of paranoia and how paranoia relates to distrust. It also reviews the literature on distrust and aims to draw out a number of key dimensions along which distrust may become irrational. The second part of the thesis is an empirical investigation which uses an iterated prisoner's dilemma game to investigate the dynamic formation and maintenance of persecutory beliefs. In particular, it focuses on the role of exploitative harm and betrayal on the formation of persecutory beliefs and the role of social motivation and problems in reciprocity in their maintenance. The thesis concludes that persecutory beliefs can be a rational response to exploitative harm but can also become irrational when associated with patterns of interpersonal behaviour which are detrimental to both the individual and their collective.

Literature Review:

The relationship between paranoia and distrust

Ben Frayne

Prepared as if for submission to: Clinical Psychology Review

Abstract

Recent theories of psychotic phenomena view them as continuous with normal experience (e.g. Straus 1969). Paranoia is one such phenomena. Numerous studies have found persecutory ideation, a key feature of paranoia, to be prevalent both in student samples and in the general population. Paranoia is fundamentally an interpersonal phenomenon. Despite this, clinical models of paranoia have little to say about the interpersonal aspects of the development and maintenance of persecutory beliefs. Given that paranoia is commonly associated with interpersonal distrust, clinical models to date have incorporated very little from the social psychology literature on distrust. This oversight may have arisen from a tendency to view clinical paranoia and distrust as phenomenologically disparate concepts. This review will aim to highlight the overlaps between distrust and paranoia, concluding that the assessment of others as malevolent (i.e. persecutory beliefs) are central to both paranoia and distrust. We recognise that distrust has the propensity to be well founded and adaptive (e.g. Kramer & Messick, 1998) and therefore conceptualise paranoia as an irrational form of distrust. Our notions of rationality are based on the 'foundedness' of the belief (i.e. empirical rationality) and in relation to patterns of behaviour which are detrimental to the individual and their collective (instrumental rationality) (e.g. Spohn 2002). We suggest that a higher propensity to distrust may relate to previous experiences of betrayal and outline a number of dimensions of distrust along which an individual's distrust may become distorted and therefore paranoid.

Introduction

The aims of this literature review will be to firstly briefly outline the clinical significance of paranoia. A brief overview will then be given of how a single symptom dimensional approach to researching paranoia has come about. This will lead to an attempt to define the meaning of the word paranoia with reference to its root meaning and historical development. We will conclude that the concepts of persecution, delusionality and irrationality are central concepts to paranoia. The overlap with concepts such as distrust and suspicion will also be highlighted, although with caution, in that distrust and suspicion may be well founded and adaptive and therefore not necessarily irrational or delusional. The review will then move on to describe current approaches to classifying beliefs as persecutory. In attempt to define delusions it will be shown that the concept is plagued by a host of semantic and epistemological difficulties. We will argue that dimensions of the belief such as distress preoccupation, and conviction may be helpful in differentiating a belief as delusional and review research evidence to support this. Given that paranoia can often be a social as well as an individual problem, we will argue that the degree to which persecutory beliefs are associated with behaviours that are self limiting, disabling or cause harm or distress to the individual and/or others, should also be taken into account when considering the rationality of persecutory beliefs.

We will then attempt to give a brief overview of contemporary psychological models of persecutory delusions. We are clear from the outset that this will not be a detailed or comprehensive review. Primarily, the aim of this review is to move away from a conceptualisation of paranoia purely based purely on delusionality and foundedness of a belief (i.e. an empiricist view of paranoia), to focussing more on how paranoia can be

defined in relation to its consequences i.e. the 'instrumental rationality' of a belief. We propose that a weakness of current models of persecutory delusions is their lack of attention to the social dimensions of paranoia. We believe this to be a significant oversight in that paranoia cannot exist without the paranoid person believing that a relationship exists between them and their persecutor. In addition, persecutory beliefs often become problematic when they are not only associated with adverse personal consequences but also adverse social consequences. Current models are vague regarding how interpersonal factors as well as past experiences are involved in the formation and maintenance of persecutory beliefs and we highlight the need for a more detailed social-cognitive model of paranoia.

We will then summarise recent research which has investigated persecutory ideation in the normal population and review recent attempts to look at 'unfounded' persecutory ideation using virtual reality methodologies. We highlight some conceptual problems of claims that such methodologies actually measure paranoia, and suggest that in using such methodologies researchers need to measure various dimensions of threat and the emotional, behavioural and interpersonal consequences associated with persecutory beliefs.

The remainder of the review will give a brief overview of the literature on trust and distrust, suggesting how such concepts may relate to paranoia. We look at how distrust can become self-perpetuating, leading to self-fulfilling prophecies which help to maintain it. Along the way we will suggest specific hypotheses about how various aspects of distrust may be related to paranoia and will propose an alternative view of paranoia as 'irrational distrust'. We will also further look at developing a meta-cognitive account of

paranoia. This will begin by giving a brief review of the literature on metacognition in paranoia. We will discuss how a focus on 'beliefs about paranoia' may be problematic, particularly when investigating persecutory beliefs in non-clinical populations. We propose an alternative approach, investigating 'beliefs about trust', and suggest why this may be a more suitable focus particularly when using analogue samples.

We will then consider the 'irrational distrust' hypothesis in greater detail with discussion of the concept of 'instrumental rationality', that is, the degree to which persecutory beliefs are associated with actions that are either self-limiting 'individualistic rationality' and/or limit the collective, or group 'collective rationality' in relation to needs, goals and values. This will culminate in suggesting that a computerised simulation of the iterated prisoner's dilemma may be useful in differentiating between rational and irrational distrust based on the dimension of 'reciprocity errors'. The notion of reciprocity is deconstructed to look at specific dimensions along which an individual's interactions may become self limiting (irrational) in non-finite social interactions.

The clinical significance of paranoia

According to DSM-IV (American Psychiatric Association, 1994), there are at least four disorders which contain 'paranoid' constructs, including paranoid personality disorder, schizotypal personality disorder, delusional (paranoid) disorder and the paranoid type of schizophrenia. Less dramatic instances of paranoia also occur in association with other clinical problems such as marital distress, depression, anxiety disorders and addictive disorders (Maher, 1974; Meisner, 1978; Rettersol, 1966; Shapiro, 1965; Winters & Neale, 1983) and can cause considerable personal and social distress (Haynes, 1986). Paranoia

therefore poses a significant clinical problem. Jorgensen (1994) reported that patients with main delusions of persecution or influence had the most pessimistic outcome in a study charting the course and outcome of a group of 88 delusional patients.

Single symptom approaches to paranoia

There has been a surge in psychological research on paranoia in the past decade. One of the main contributory factors to this has been the pioneering detailed deconstruction of the scientific validity of the concept of schizophrenia by authors such as Bentall (1990) & Boyle (1990). Such authors have concluded that the concept of schizophrenia lacks scientific validity. Bentall et al. (1988) conclude that the most effective way forward in developing a scientific understanding of psychotic phenomena is to adopt a single symptom approach. This suggestion has been taken on board by many, and consequently single symptom research on paranoia has flourished in the last decade or so.

Dimensional approaches to psychosis

Another factor contributing to the 'boom' in psychological research on paranoia has been a zeitgeist change in the conceptualisation of psychotic phenomena, from viewing them as discontinuous with normality, to instead lying on a continuum. This work is thought to have originated from early ideas regarding the concept of schizoid personality (Bleuler, 1911). These were later developed into concepts such as 'schizotypy', a term first used to describe a genetically determined disposition to schizophrenia by authors such as Meehl (1962), and later a psychological trait (e.g. Claridge 1990). Straus, as early as 1969, was amongst the first to challenge the view of psychosis being discontinuous with normality,

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and similar observations were made by Chapman and Chapman (1980). A lack of working definitions of psychotic phenomena at that time however, hampered further scientific research in this area. More recently, the foundations of evidence to support a dimensional view of psychotic phenomena are beginning to emerge, both in the fields of psychology (e.g. Claridge 1997) and psychiatry (e.g. van Os et al. 1999.)

Different versions of the dimensional view

Costello (1994) has distinguished two main versions of this dimensional view. The first, the phenomenological view 'that symptoms of psychopathology occur in less intense, persistent and debilitating, *but not qualitatively different forms*, in normal people' (emphasis in original). The second, the vulnerability view 'that though there may be qualitative differences between symptoms of psychopathology and their normal counterparts, the degree to which the person possesses the apparent normal counterparts of the symptoms of a particular disorder is an index of the person's vulnerability for the disorder' (p.391). This distinction between phenomenological versus vulnerability views has parallels with the distinction between fully dimensional and quasi dimensional views proposed by Claridge (1994). The fully dimensional viewpoint views traits as represented in personality as healthy diversity, whereas from the quasi dimensional perspective, they are seen as attenuated symptoms. There is no doubt that the dimensional view of paranoia has facilitated the development of a psychological understanding of paranoia and has prompted researchers to investigate how such phenomena present within the normal population.

So what is this thing we call paranoia? The historical and root meaning of the word.

The word paranoia derives from the Greek words 'para', meaning beyond, wrong abnormal or irregular, and, 'nous' meaning mind, intellect, or common sense. German psychiatrist Heinroth (1773-1843) used the term in the early 19th century to describe a type of delusional disorder (Lewis, 1970; cited in Bentall et al 2001). Kraeplin later adopted this usage, to describe disorders where 'delusionality' was the prominent characteristic. Kraeplin divided the non affective psychoses into dementia praecox, dementia catatonia and dementia paranoides. He later collapsed these into a single category dementia praecox (Kraeplin, 1899/1990). Following the fifth edition of his textbook, he argued that 'paranoia' could be used as a distinct diagnosis in cases where delusions were the only prominent symptom. It therefore appears that the word paranoia's original root meaning and usage was as a term used to describe 'delusionality'.

In the middle of the 20th century the word paranoia took on a different usage. The term began to be used within psychodynamic theory to describe beliefs which were 'persecutory' and not necessarily delusional. This may have been due to the relatively high prevalence of persecutory themes (35.2%; Garety, Everitt, and Hemsley, 1988) that is found in delusions (e.g. World Health Organisation, 1973; Denmark, Jorgensen and Jensen, 1994). Consequently, the term paranoia has been incorporated into everyday language where it now refers to 'A tendency to suspect or distrust others or to believe oneself unfairly used' (Brown 1993, p2097), without necessarily taking into account whether the beliefs are delusional or not. That is, the word 'paranoia' is also associated with terms such as persecutory ideation, distrust and suspicion, not always taking into account the psychopathological dimension. In this regard, Fenigstein and Vanable (1992)

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refer to a 'subclinical' form of paranoia defined by exaggerated self referential biases that occur in normal everyday behaviour and thinking characterised by relatively stable tendencies towards suspiciousness, feelings of ill will or resentment, mistrust, and belief in an external locus of control or influence (Fenigstein, 1997: Fenigstein & Vanables, 1992). They are careful to distinguish this form of paranoia from what they refer to as 'clinical paranoia' which can include 'delusions of persecution or personality traits of pervasive suspicion and extreme mistrust' (Combs, Penn & Fenigstein, 2002; p249).

Obviously, when paranoia is used to refer to 'persecutory delusions', both meanings of the word (i.e. 'persecutory ideation' and 'delusionality') are represented. However when only one meaning of the word is represented by its use, the word paranoia can come to represent a much broader array of psychological phenomena, from delusions more generally, through to persecutory ideation, distrust and suspicion; even when the latter are justified or rational. For instance, in relation to persecutory beliefs Gilbert et al (2005) has classified all 'human anxieties that are focussed externally, on what others may do (that is the hostile intent or power of others)' as 'paranoid anxieties'. He suggests that such anxieties 'can focus on a range of specific fears of others inflicting harm, even killing the self, but may also relate to fears of deception disloyalty defection and/or exploitation (suspiciousness and low trust)' In addition, he goes on to describe how:

> 'paranoid anxieties can be specific to roles, as in a subordinate's fear of a
>
> dominant authority figure (e.g. the boss is out to get me), or sexual partners
>
> (jealousy); can be focused on out-groups and gangs (e.g. the police, the Mafia or
>
> religious groups); can be generalised as a trait (as in paranoid personality

disorder), and can operate at the level of delusion and psychosis...Paranoid anxieties can be marked by low trust, a sense of vulnerability to the harm that can be inflicted by others, beliefs in the harmful intent of others and a preparedness to use aggression as a means of defence' (Gilbert et al 2005 p.124-125).'

What is not covered in Gilbert et al's definition is the concept of how such beliefs become irrational. Haynes (1986) argues that 'Most people manifest ...unwarranted jealousy, mistrust or suspicion ...but because they are usually transient, modifiable, and not significantly socially or personally disruptive a paranoid label is unwarranted.' (p.268)

Recent operational definitions of persecutory ideation

In a review by Bentall et al (2001) on psychological research on persecutory delusions the authors are explicit about using the term 'paranoid' as an alternative to 'persecutory', or shorthand to indicate individuals who 'suffer' from persecutory ideas. (p 1149). This statement is problematic in that it assumes persecutory beliefs and paranoia are interchangeable terms. This raises certain unanswered questions. For instance would it be fair to say that someone's belief was paranoid if there was no doubt that they were being persecuted? Secondly, it assumes that suffering and distress is the key dimension upon which persecutory beliefs should be viewed as paranoid. Whilst the literature does seem to suggest that distress is one of the dimensions by which delusions can be differentiated from beliefs held in the normal population (e.g. Peters et al 1999) it is not a sufficient criterion upon which to view a belief as pathological let alone delusional. There is a need

to acknowledge that in some circumstances, an interpretation of events can lead to distress, but that may not qualify such an interpretation as being irrational. Equally, a persecutory belief may not cause much distress for the individual but may cause them to engage in behaviour which is distressing and perhaps harmful for those around them. An emphasis on distress and suffering alone is therefore overly simplistic. In Freeman & Garety's recent (2004) book 'Paranoia: The Psychology of Persecutory Delusions' the authors define persecutory beliefs and delusion separately (although they are not explicit about their reasons for doing so). They offer the following criteria for defining a belief as persecutory:

a) The individual must believe that harm is occurring, or is going to occur, to him or her.

b) The individual believes that the persecutor has the intention to cause harm.

They qualify this definition by proposing that:

i) Harm concerns any action that leads to the individual experiencing distress.

ii) Harm only to friends or relatives does not count as a persecutory belief, unless the persecutor also intends this to have a negative effect upon the individual.

iii) The individual must believe that the persecutor at present or in the future will attempt to harm him or her.

iv) Delusions of reference do not count within the category of persecutory beliefs

As a definition of paranoia these criteria are too narrow. Not only does it neglect the psychopathological dimension but its emphasis is on the cognitive and emotional components of paranoia and fails to take into account the behavioural, and interpersonal characteristics which may form the psychopathological aspects of a disorder. It also limits analysis of emotional experience to distress. In addition this definition is silent on the issue of falsity. This is likely to be due to problems in measuring the foundedness of a persecutory belief on the basis of the evidence for the belief. This is because persecutory beliefs by their very nature are judgements or inferences about another's intentions. What constitutes sufficient evidence of another's true intention is difficult to define. Persecutory beliefs therefore, by their very nature, are particularly vulnerable to 'false positives'. Given the likelihood of such errors occurring, it is of question whether it is useful to base judgements on the psychopathology of such beliefs on foundedness alone. Ideas of what constitutes reliable evidence for a belief and what is not reliable evidence for a belief is in itself often a matter of judgement. In addition, many beliefs people hold are not based on a systematic and scientific analysis of the available evidence.

Defining Delusions

Problems also arise when considering the concept of delusionality in relation to paranoia. Jaspers (1913) was amongst the first to attempt to define delusions and ascribed three basic characteristics:

1) They are held with extraordinary conviction

2) There is an imperviousness to other experiences and to compelling counter-argument (incorrigibility)

3) Their content is impossible (falsity)

These three themes are also reflected in the DSM-IV classification of delusions.

'A false belief based on incorrect inference about external reality *(falsity)* that is firmly sustained *(certainty)* despite what almost everyone else believes and despite what constitutes incontrovertible proof or evidence to the contrary *(incorrigibility)*. The belief is not one ordinarily accepted by other member of the person's culture or subculture *(bizarreness)*. '

(italics added: DSM-IV; APA 1994)

This definition considers four criteria to be significant when establishing whether a belief is delusional: falsity, conviction, belief flexibility and bizarreness. Defining a delusion based on belief conviction is problematic in that many delusions do not show absolute conviction and often conviction in the same belief will vary over time (Brett-Jones et al 1987, Sharp et al 1996). Holding a belief with absolute conviction is not pathological in itself, since all beliefs which are personally significant or which support self-esteem tend to be held with absolute conviction, such as religious or scientific beliefs (Maher 1988).

Delusions are often differentiated on the basis of being bizarre or non bizarre. 'Bizarre delusions are generally impossible, whereas non bizarre delusions are generally improbable' (Sedler, 1995, p.256). However there is an absence of agreed operational

definitions as to how these criteria are arrived at clinically (Bell et al., 2003). Many studies of psychiatrists have shown poor reliability for ratings of bizarre beliefs (Flaum et al., 1991; Junginger et al., 1992). Moreover, most clinicians are not in a position to know or find out whether such beliefs comprise those normally accepted, except with direct comparison with those of his or her peer group (Bell et al., 2003). Most clinical judgements on the prevalence of beliefs are not based on empirical evidence such as surveys, and beliefs in the paranormal or unscientific phenomena are not statistically uncommon (Della Salla, 1999).

The falsity criterion too has been rightly questioned (Spitzer, 1990) as it is unclear what level of evidence would be required to consider a belief as 'incontrovertibly false' and whether judgements should be made on the 'balance of probabilities' or the more stringent test of 'beyond reasonable doubt' (Bell et al., 2003). Many 'normal' everyday beliefs lack supporting evidence. Beliefs in general tend to keep pace with advancing technologies and discoveries in the natural sciences, and tend to vary with social background, confirming that they are derived from acquired knowledge (Roberts, 1992). Maher (1992) noted that beliefs are defined as delusional and false because they are deemed implausible, with the assessment of plausibility 'typically made by a clinician on the basis of 'common sense,' and not on the basis of a systematic evaluation of empirical data (p.261). As French (1992) points out, most beliefs are based upon personal experiences, perhaps supported by reports of trusted others, and the general cultural acceptance that such phenomena are indeed genuine.'

Defining a delusion in terms of the flexibility of the belief is problematic in so much as delusions are not necessarily impervious to experience, and deluded individuals

vary on how much they accommodate new evidence into their existing delusions (Brett-Jones et al. 1987). There is also evidence that delusions are open to modification through cognitive behavioural techniques (Chadwick and Lowe, 1994, Drury et al. 1996. Kuipers et al 1997, Sensky et al 2000). Strong non-delusional beliefs are typically maintained with little evidential support. Such beliefs also influence the way in which we seek out, store and interpret relevant information (Alloy and Tabachnick 1984), a phenomena known as 'confirmation bias', which supports the view that normal beliefs, as well as delusional beliefs, are to a degree impervious to contradictory evidence

Oltmanns (1988) has suggested a multi-criteria approach to categorising beliefs as delusional. These criteria are:

i)   The balance of evidence for and against the belief is such that other people consider it completely incredible.

ii)   The belief is not shared by others.

iii) The belief is held with firm conviction. The person's statements or behaviours are unresponsive to the presentation of evidence contrary to the belief.

iv)   The person is preoccupied with (emotionally committed to) the belief and finds it difficult to avoid thinking or talking about it.

v)   The belief involves personal reference, rather than unconventional religious, scientific or political conviction.

vi)   The belief is a source of subjective distress and interferes with the person's occupational and social functioning.

vii)   The person does not report subjective efforts to resist the belief (in contrast to patients with obsessional ideas.)

The more a belief fits the above criteria then the more likely it is to be a delusion. However it is important to note that none of the dimensions alone constitutes a sufficient criterion.

It has been argued that the problem with most attempts to classify delusions is the focus on form rather than the content of the phenomena. Classification systems such as DSM-IV transform behaviour into symptoms which are either present or absent (Barrett, 1988). Boyle (1992) has proposed that this preoccupation with form over content derives in part from the assumption that the content of delusions is meaningless. Roberts (1992) notes how the content of 'delusional' beliefs often makes sense when viewed from a stance informed by the believer's biography.

Defining delusions by their consequences rather than content

Peters et al (1999a, b) have proposed that whether or not one becomes overtly deluded is determined not just by the content of mental events, but also by the extent to which it is believed, how much it interferes with one's life and its emotional impact. She proposes that these dimensions are often more revealing than the content of the belief alone for placing an individual on the continuum from health to psychopathology. She proposes that what makes people cross the psychotic 'threshold' is not necessarily the content but the consequences of the belief. Indeed, psychological interventions for delusional beliefs usually involve dissociating percepts from beliefs and emotional reactions, as well as

exploring alternative coping or behavioural strategies, rather than directly challenging the content of delusions.

Similarly, in relation to persecutory beliefs in particular, Freeman et al (2005) suggest that persecutory fears are not necessarily a clinical problem, only becoming so when they are excessive, unfounded, exaggerated, or cause distress. In addition to Freeman's criteria we would like to add some social and behavioural dimensions upon which a persecutory belief may be seen as irrational. That is, we propose a belief may become 'irrational' when it is related to patterns of behaviour that are both self and collectively limiting in relation to one's own, or one's collective, needs, values, goals and desires (a notion we later go on to describe as 'instrumental rationality'). In addition, a persecutory belief can be considered pathological when it is associated with patterns of behaviour which are disabling or harmful to oneself and/or ones collective, or limits a person's occupational or social functioning. We view this dimension also as a continuum upon which there is no distinct cut off between delusional and non-delusional.

Contemporary models of persecutory delusions

At this point we will give a brief outline some of the main psychological models of persecutory delusions. Our brevity in coverage of this area in part is due to the attempt to move away from a conceptualisation of paranoia based on delusionality to one which also incorporates the notion of 'instrumental rationality'. We argue that existing models of persecutory delusions are overly individualistic and neglect the degree to which paranoia is an interpersonal problem as well as an individual one, and how persecutory beliefs may actually serve adaptive *inter*personal as well as *intra*personal functions.

The intrapersonal function of persecutory delusions

Recent models and theories of persecutory delusions predominantly focus on how biases or deficits in information processing contribute to the formation and maintenance of persecutory delusions and beliefs. The models seem to differ primarily in terms of the '*intra*personal function' served by the persecutory delusion.

The 'meaning making function' of persecutory delusions.

Freeman et al's (2002) multifactorial model suggests that persecutory delusions are a result of a 'meaning making' function, an attempt to explain or make sense of 'ambiguous' or 'anomalous' experiences and physiological arousal (particularly anxiety). They highlight the role that pre-existing beliefs about the self, others and the world play in contributing towards the formation of persecutory beliefs (such pre existing beliefs are often precipitated by stressful life events, including difficult interpersonal relationships, bullying, and social isolation.)

The 'defence of self esteem' account of persecutory delusions

Bentall and Kaney (2001) propose a model that suggests that persecutory beliefs serve a 'defensive' function, to protect the individual from damages to their sense of self which may lead to depression. They suggest that external attributional biases which lead to the persecutory appraisals serve this defensive function. The attributions made are dependent

on currently available self representations. If self representations are available which match the event then an internal attribution will be made. Conversely, failure to find an event-consistent self representation will lead an individual to attribute an external cause. External attributions tend to be personalistic rather than situational, due to the relative amount of cognitive effort that is required to make an external-situational attribution (i.e. external personal attributions are therefore a default option as they are more cognitively efficient). In their so called 'attributional self representation cycle' model Bentall & Kaney (2001) propose a reciprocal relationship between self representations and attributions. They propose that a person's attributions are moderated by attentional bias to threat related information and beliefs about others' mental states. The person's mood as a result of their persecutory beliefs is said to be a result of discrepancies between the ideal-self and the self perceived at that moment in time.

Information processing biases in persecutory delusions

Bentall and Kaney's (2001) model focuses primarily on the role attributional biases in the formation and maintenance of persecutory beliefs. Freeman et al's (2002) multifactorial model, whilst acknowledging the role that attributional biases play in the formation of persecutory beliefs, also emphasises the role that other information processing biases, particularly reasoning biases (e.g. jumping to conclusions), and also theory of mind deficits, play in the formation of persecutory delusions. Frith (1992) was amongst the first to propose that schizophrenic symptoms in general develop from acquired deficits in a person's metarepresentational ability or 'theory of mind'. With regards to persecutory

delusions more specifically, Frith suggested that they arise from a person knowing that other people have mental states that cannot be directly viewed, but make invalid attempts at inferring them (i.e. there is a dysfunction in the representation of the mental states of others). According to Frith, persecutory delusions occur because the person notices that other people's actions have become opaque and surmises that a conspiracy exists.

Summary of contemporary models of paranoia

These three main theoretical (i.e. information processing bias, attribution-self representation cycle, and theory of mind) accounts of persecutory delusions have received the most research attention to date, many of the results showing conflicting evidence for such accounts. It is beyond the scope of this review to compare such findings. For a more detailed review the reader is directed to reviews such as Garety and Freeman (1999); Bentall et al (2001) and Freeman and Garety (2004). In summary contemporary models of persecutory delusions tend to focus on the 'intrapersonal' functions of persecutory delusions, in terms of meaning making and defence against low self esteem and depression. They also highlight the important role played by various information processing abnormalities.

The need for a social-cognitive model of paranoia

Cromby & Harper (2005) suggest that one of the main problems with traditional cognitive models of paranoia is that by explaining paranoia with reference to attributional errors or individual cognitive processing biases, they wrongly individualise experience,

unjustly translating the acquired effects of adverse socialisation into information processing flaws (Cromby & Harper, 2005). Cromby and Harper (2005) stress the importance of paying attention to the content of a person's persecutory belief and the need to be sensitive to its context in the light of the person's history. In short, Cromby & Harper seem to be advocating an interpersonal social-learning perspective to paranoia. Many recent proponents have begun to adopt the view that paranoia also serves an interpersonal function. For instance, Morrison and colleagues conceptualise paranoia as a response to the perception of interpersonal threat (Morrison et al 2005). Gilbert et al in their work on 'paranoid anxieties' highlight the broad array of threats that can be posed interpersonally and how the wariness of such threats can often be adaptive.

'Social threats can take a variety of forms, including threats to a child from parental abandonment, threats from more dominant or powerful others, threats of defection and deception, threats of exclusion and ostracism from other in-group members, and threats of persecution from out-group member. Hence, humans can pose a variety of threats for each other, which are related to different types of social role (e.g., attachment, friendship, sexual, dominant-subordinate and between groups). According to the nature of the social threat, animals will adopt different defensive behaviors, e.g., submitting to a dominant but threatening a subordinate, or distress calling and searching for a lost parent. Threats ignite tendencies for specific defenses and styles of thinking (Gilbert, 1989, 2001a; Marks, 1987; Marks & Nesse, 1994). Many species, including humans, can threaten, bully, injure and kill each other, and anxiety and wariness for those who could inflict such damage is highly adaptive.'   (Gilbert et al 2005 p124)

Gumley & Schwannauer (2006) also suggest that paranoia can be conceptualised as an evolutionary adaptive state of mind, designed to favour survival. They recognise however that this goal of survival may often be achieved at the cost of affiliation, proximity seeking and kinship. What these authors seem to be suggesting is that persecutory appraisals can serve an adaptive function for the individual but may lead to detrimental social outcomes.

Interpersonal factors involved in the maintenance of persecutory beliefs

Within their multifactorial account of persecutory delusions, Freeman et al (2002) acknowledge the role that interpersonal factors may play in mediating the formation and maintenance of a persecutory belief. They highlight how social isolation may lead to the person being unable to revise his or her thoughts on the basis of interactions with supportive others. They also acknowledge that the individual may be secretive or mistrustful (Cameron, 1959), or believe that personal matters should not be discussed with others (Joseph, Dalgleish, Williams, Yule Thrasher & Hodgkinson, 1997; Williams, Hodgkinson, Joseph & Yule, 1995). An unwillingness to discuss matters with others has been supported partly by their recent research (Freeman et al 2005). Other social factors, such as submissiveness and negative social comparisons, whilst not having been proposed in Freeman and Garety's original model, have also been researched and found to be related to paranoia (Freeman et al 2005: Gilbert et al 2005).

Paranoia in the normal population

As a consequence of the rise of single symptom approaches to researching psychotic phenomena and the growing evidence for a dimensional view of psychosis, a number of researchers have begun to investigate persecutory beliefs as they occur in the general population.

Authors distinguishing 'sub clinical' from 'clinical' paranoia

Whilst investigating paranoia in a student sample, Fenigstein and Vanable (1992) were clear to distinguish 'clinical paranoia' from 'subclinical paranoia'. They define 'sub clinical paranoia' as a mode of thought marked by exaggerated self referential biases that occur in normal everyday behaviour. Such thinking is characterised by relatively stable tendencies towards suspiciousness, feelings of ill will or resentment, mistrust and belief in external influence or control (Fenigstein, 1997; Fenigstein & Vanable 1992). In contrast, the authors propose that 'clinical paranoia' can include delusions of persecution, or personality traits of pervasive suspiciousness and mistrust. In addition, subclinical paranoia is differentiated by 'behaviours and beliefs that apply to normal people whereas clinical paranoia is more pathological and found mainly in people with psychiatric diagnosis.' (Combs, Penn & Fenigstein 2002). In summary, the authors differentiate sub clinical paranoia from clinical paranoia on the basis of delusionality, pervasiveness and abnormality.

In order to measure 'sub-clinical paranoia' Fenigstein and Vanables developed the Paranoia Scale (PS), one of the most widely used measures of paranoia in research today,

particularly with analogue samples. The items for this scale were derived from the

Minnesota Multiphasic Personality Inventory (Hathaway & McKinley, 1983: MMPI).

(Fenigstein & Vanables 1992). The so called 'Paranoia Scale' (PS) has demonstrated

good internal consistency (alpha=0.84) and reliability (r=0.70). The PS has been shown

to be positively related to measures of anger, self consciousness, beliefs in control by

others, independent clinical ratings of paranoia, and negatively related to scores on

interpersonal trust (Fenigstein & Vanable 1992: Smari et al 1994). Research using this

measure has suggested that 'sub-clinical' paranoia is prevalent among normal people.

The mean total on the Paranoia Scale (range, 20 to 100) was 42.7 (N=581).This scale has

been criticised more recently for its construct validity because it contains many items

which are not persecutory for instance 'e.g. My parents and family find more fault with

me than they should' 'No one really cares what happens to you' 'I am sure I get a raw

deal from life' (e.g. Freeman et al. 2005a & b). Combs et al suggest that PS can be

viewed as assessing the lower end of the paranoia continuum in contrast to other self

report measures such as the Minnesota Multiphasic Personality Inventory and the

Personality Assessment Inventory (PAI; Morey 1991) which measure more severe,

pathological levels (Combs et al. 2002).

Surveys of psychotic symptoms in the general population

In a study using a different measure of paranoia, Johns et al (2004) examined the

distribution of self reported psychotic symptoms in the British population using the

'Psychosis Screening Questionnaire'. This contains three items relating to persecutory

ideation. These items are 'Over the past year, have there been times when you felt that people were against you?'; 'Have there been times when you felt that people were deliberately acting to harm you or your interests?' and 'Have there been times when you felt that a group of people were plotting to cause you serious injury or harm'. These items were endorsed by 21.2%, 9.1% and 1.5% of the population respectively. Paranoid thoughts were found to be associated with neurotic symptoms, victimisation experience(s), younger age, alcohol dependence, stressful life events in the past six months, average IQ and male gender. The authors suggest that experiences of victimisation may lead individuals to believe that they are vulnerable and to view the world as hostile and threatening; and stressful life events may trigger them. However, due to the nature of the data, it was not possible to determine the precise temporal relationship between victimisation, life events and paranoia. The authors recognise that subjects with a tendency toward paranoia may have a biased recall for those experiences, or alternatively that supposedly paranoid thoughts are actually well founded and that people are trying to harm them.

Peters et al (1999) designed the Peters et al Delusions Inventory (1999) to measure delusional ideation (together with associated distress, preoccupation and conviction), in the normal population. The scale was shown to have good internal consistency and concurrent validity comparing it to scales measuring schizotypy (Schizotypal Personality Scale; STA, Claridge and Broks 1984), magical ideation (Magical Ideation Scale; MgI; Eckbland and Chapman 1983) and delusions (Delusions Symptom-State Inventory; DSSI; Foulds and Bedford 1975). It also displayed good test-re-test reliability at 1 year follow up and showed good criterion validity, with psychotic

inpatients having significantly higher scores. The range of scores between normal

individuals and a deluded group overlapped considerably, but the two samples were

differentiated by their ratings on the distress, preoccupation, and conviction scales. The

most commonly reported belief of those who had not had a history of psychiatric disorder

was that people were not who they seemed to be (69.3%) that people had experienced

telepathic communication (46.9%) that seemingly innocuous events had double meanings

(42.2%); that the individual was being persecuted in some way (25.5%); and that occult

forces were at work (23.4%).

Verdoux, van Os, Maurice-Tison, Gay, Salamon, & Bourgeois (1998) surveyed a sample

of seven hundred and ninety GP 'consecutive attender' adult patients. They were asked to

complete the PDI-21. Of 462 that had no psychiatric history, 118 (25.5%) endorsed items

of being persecuted against compared to eight of the eleven (72.7%) patients who had a

history of 'psychotic disorder'.

'Paranoia' in student populations

Ellett et al (2003) found that in a sample of 324 college students who were asked 'Have

you ever had the feeling that people were deliberately trying to harm or upset you in

some way?', 47% reported a clear experience of persecution, whilst a further 23%

endorsed having had such an experience, but their descriptions lacked an explicit

statement of intent.

Martin and Penn (2001) found in a study of undergraduates that higher levels of

paranoid ideation (as measured using the PS; Fenigstein & Vanables, 1992) were

associated with greater depression (Beck Depression Inventory; BDI; Beck, Steer and

Garbin, 1988) and lower self esteem (Rosenberg Self Esteem Scale, RSES, Rosenberg,

1965) greater awareness of the socially observable aspects of oneself (self monitoring

scale; SM; Snyder & Gangestad, 1986) and greater social anxiety (Brief Fear of Negative

Evaluation Scale; bFNE; Leary 1983; Social Avoidance and Distress Scale; SAD;

Watson & Friend, 1969). Paranoid ideation was not associated with attributional style

(Internal Personal and Situational Attributions Questionairre, IPSAQ; Kinderman &

Bentall, 1996). These findings were replicated when paranoia was measured using the

SCID-II Personality Questionnaire Screen for Paranoid Personality Disorder (DSM-III-

version). Of these variables, higher depressed mood, greater self monitoring and higher

social avoidance and fear of negative evaluation were the best predictors of paranoid

ideation (as measured using the PS). When the SCID-II paranoia scores were used, the

same variables, except for fear of negative evaluation, remained the best predictors of

paranoid ideation.

In a similar study of undergraduates, Combs and Penn (2004) found that those

high on subclinical paranoia (measured by the Paranoia Scale; Fenigstein & Vanables

1992) had greater depression (measured by the Beck Depression Inventory II- BDI-II;

Beck et al 1996), social anxiety (measured by the Fear of Negative Evaluation Scale,

FNE, Leary 1983), self consciousness (Self Consciousness Scale; SCS: Fenigstein et al

1975), and lower self esteem (Rosenberg Self Esteem Scale, RSES, Rosenberg 1965).

They also performed worse on laboratory measures of emotional perception (The Bell-

Lysaker Emotional Recognition Task, BLERT, Bell et al 1997; Bryson et al., 1997;

Facial Emotion Identification Test; FEIT; Kerr and Neale 1993) and on an in vivo

measure of social perception. There were also behavioural differences, in that persons high in sub clinical paranoia sat further away from the examiner, took longer to read the consent form, and were more likely to rate the examiner as more likely to be influencing their performance on the study, to be analysing their actions, and to be less trustworthy than did the group low in subclinical paranoia.

More recently, Freeman et al (2005) conducted an internet survey on a 'self-selected' university student population. The study investigated the relationship between frequency, conviction and associated levels of distress with persecutory beliefs; in relation to coping strategies, attitudes to emotional expression, social comparison and submissive behaviours. For the purpose of the study they devised a new measure, the 'Paranoia Checklist'. This measure was designed to assess paranoid thoughts of 'a more clinical nature' than that of the Paranoia Scale (Fenigstein & Vanables 1992) and also measure frequency, preoccupation and distress associated with paranoid thoughts. The scale was found to have excellent internal reliability (alpha=0.9). There was also convergent validity with Fenigstein and Vanable's Paranoia Scale. More frequent and distressing paranoia was found to be associated with becoming isolated, giving up activities, and feelings of powerlessness and depression. Less frequent paranoia was associated with not catastrophising and gaining sufficient meta-cognitive distance to consider the situation dispassionately. Not expressing feelings to others related to increased paranoia. Paranoia was also positively related to submissive behaviour. Individuals who felt left out, inferior, or less competent in relation to others reported higher levels of paranoia.

Freeman et al (2005b) conducted a similar internet survey using a different

selection of measures (Paranoia Scale, PS, Fenigstein and Vanables, 1992; Peters et al.

Delusions Inventory PDI ; Peters et al., 1999; Launay Slade Hallucination Scale, LSHS;

Launay and Slade, 1981; Structured interview for assessing perceptual anomalies;

SIAPA; Bunney et al., 1999; Need for Closure Scale, NFC, Kruglanski et al 1993;

Depression Anxiety Stress Scales DASS Lovibond & Lovibond, 1995; Interpersonal

Sensitivity Measure, IPSM, Boyce and Parker, 1989 and the Private Self Consciousness

Scale, PSCS, Fenigstein et al 1975). All the factors assessed were associated with

paranoia. Non clinical paranoia was best explained by (in decreasing order of

contribution) separation anxiety (IPSM) depression (DASS), fragile inner self (IPSM),

hallucinatory experiences (LSHS), discomfort with ambiguity (NFC), stress (DASS), self

focus (PSCS), perceptual anomalies (SIAPA), and anxiety (DASS). These variables

explained 44% of the variance in paranoia scores.

Can questionnaire studies measure paranoia?

Freeman et al (2005a) raise some valid criticisms of questionnaire studies that claim to be

measuring paranoia as opposed to persecutory ideation, in that it is not possible to know

whether the experiences assessed are actually 'unfounded'. Questionnaire studies may

include an unknown proportion of paranoia that is realistic and well judged and

appropriate. In another article, Freeman et al (2005b) recognise that in their most severe

form, there may be a relationship between such thoughts and persecutory delusions.

Cross sectional questionnaire studies are also limited in the conclusions which can be drawn concerning the causal relationship between variables.

Virtual reality studies of 'unfounded' persecutory beliefs

Freeman et al (2005c) derived a solution to this limitation of questionnaire based studies. They suggest that using a virtual reality environment with programmed virtual characters (avatars), which provides an environment to measure 'unfounded' persecutory ideation. That is, a number of individuals can enter an identical situation and their persecutory appraisals be assessed. Differences in persecutory ideation can therefore be attributed to individual differences in persecutory appraisals rather than due to individual difference in environmental experiences. The psychological factors associated with such 'unfounded' persecutory appraisals can then be identified. The avatars can also be programmed to exhibit expressions that the majority of people would assess as neutral. In their pilot of the methodology, Freeman et al (2003) found that 'non-clinical' individuals had persecutory thoughts (measured using the VR-Paranoia scale; Freeman et al 2003) about neutral avatars in a library scene. They found that whilst participants typically ascribed benevolent intentions to the avatars some had 'unfounded' persecutory thoughts about them. They also found that higher levels of anxiety (as measured by the Brief Symptom Inventory; BSI) although not state anxiety (as measure by the Spielberger State Anxiety Questionnaire; Spielberger et al 1983) and interpersonal sensitivity (Brief Symptom Inventory; BSI; Derogatis 1993) predicted the presence of VR-persecutory ideation. In a second study, Freeman et al (2005) investigated the relationship between virtual reality persecutory ideation (VR Questionnaire; Freeman et al 2003) with trait paranoia (using

the Paranoia Scale; Fenigstein & Vanable, 1992) hallucinatory experiences (LSHS; Launay & Slade 1981) perceptual anomalies (SIAPA; Bunney et al 1999) need for closure scale (NFC; Kruglanski et al., 1993), depression, anxiety, and stress (DASS; Lovibond & Lovibond, 1995), interpersonal sensitivity (IPSM; Boyce & Parker, 1989) and private self consciousness (PSCS Fenigstein et al 1975) probabilistic reasoning (beads task, Garety et al . 1991) social avoidance and distress (Social Avoidance and Distress Scale, SAD; Watson & Friend, 1969), virtual reality social anxiety (VR-SAD; a modified version of the SAD for use within a virtual reality environment; Freeman et al 2005c). A sense of presence questionnaire was also administered to assess the extent to which the participant experienced a sense of being in the virtual world (Slater et al., 1992). Again they found that the virtual computer characters did elicit 'unfounded' persecutory thoughts particularly if the participants had a greater sense of presence in the virtual environment. Persecutory ideation in the virtual environment was also associated with Paranoia Scale scores, higher levels of anxiety, timidity and hallucinations. No association was found between persecutory ideation in the virtual environment and probabilistic reasoning. It was suggested that this may have been due in part to the ratio of beads in jars, making the task too easy, and therefore unable to discriminate jumping to conclusions biases. It was also suggested that reasoning biases may be more closely related to belief conviction rather than the occurrence of persecutory beliefs per se. Whilst 'need for closure' was not found to be directly associated with persecutory ideation in the virtual environment, it did predict anxious reactions in the virtual environment, indicating a potential confound of anxiety in previous studies linking need for closure with delusions (e.g. Colbert & Peters, 2002; Bentall & Swarbrick, 2003).

Does virtual reality really measure paranoia?

Whilst this 'virtual reality' methodology claims to investigate 'unfounded' persecutory ideation, the authors have neglected to investigate whether their participants truly believed that harm was likely to occur to them as a result of being in the virtual environment. It is possible that ascribing characteristics and intentions to virtual characters is different to believing that the harm is actually possible and likely to occur and that one is vulnerable to such harm. That is to say, within a virtual environment one can gain a great deal of security in knowing that there is no real threat. Whilst in their second study (Freeman et al 2005c) they used a measure a 'sense of presence', this is different from measuring participants' perceptions of the likelihood that harm was actually going to occur to them, or indeed their ability to cope with that threat, the presence of rescue factors, and the perceived severity of harm, all of which have been proposed to influence a person's threat appraisal (Beck, Emery and Greenberg, 1985). The nature of the persecutory ideation measured in such environments is therefore likely to be detached somewhat from the emotional, behavioural and social consequences found in 'real world' paranoia.

Distrust and Paranoia

In the remainder of this review, we will examine the concept of distrust and how this relates to paranoia. We will discover that central to both distrust and paranoia is the assessment of another's intentions. When another's intentions are assessed as malevolent (i.e. a persecutory appraisal), it is likely to lead to a person distrusting another. Distrust will therefore be viewed as a superordinate concept to persecutory appraisals which incorporates both the cognitive and interpersonal dimensions. We will discuss how distrust can become distorted along a number of psychological and interpersonal dimensions, therefore becoming irrational. We will propose that paranoia can be conceptualised as 'irrational distrust' and will suggest a number of research questions that warrant further investigation.

A definition of trust

Trust seems to be a universal concern, and research into the concept has spanned many disciplines including psychology, sociology, economics, business, and evolutionary biology to name but a few. Despite the abundant trust literature, there is an evident lack of coherence among researchers with the definition and meaning of trust. One definition of trust is 'the giving discretion to another who is free to betray the faith placed in him or her' (Gambetta, 1988a, 218-219; Hardin 1993, 507). In essence, trust involves pursuing a course of action in a particular situation with the belief that the trustee will not disappoint the truster while they have the opportunity to do so. The choice to engage in a reciprocal relationship is what distinguishes trust from confidence or reliance (dependability, predictability). One may rely, as opposed to trust someone, because one has to, or

because sometimes it is the best or only choice available. Trusting always involves taking a risk (Solomon and Flores (2001). That is, the consequences of misplaced trust should be worse than not having relied on the other in the first place. Otherwise, it is simply a matter of rational choice for which no trust is required (Luhmann 1979, 24-25).

Hardin (2004) describes how both trust and distrust are three part relationships. That is, A trusts/distrusts B with regard to X. That is, trust is both situation and trustee dependent. Hardin (2004) also describes distrust (like trust) as a matter of degree. For instance, A might distrust B more than he distrusts C with respect to X.

'Encapsulated interest' account of trust

Why in a trusting relationship, would an individual forgo an opportunity to gain at another's expense? The most obvious explanation is the value placed on the continuation of the relationship. This phenomenon has been referred to as 'encapsulated interest'. That is, the trustee encapsulates the truster's interests in their own interests. Trust can therefore be maintained even when each party's interests are conflicting, providing the continuation of the relationship is more important (Hardin, 2004, p6). Both parties may faithfully observe their obligations because the other party might otherwise retaliate or exit, thereby cutting off possible future benefits (Luhmann 1979, 36-37; Hardin 1991).

Trust compared to Trustworthiness assessments

Solomon and Flores (2001) differentiate 'trust' from 'trustworthiness assessments' in that a 'trustworthiness assessment' is an evaluation of certain facts about the person to be trusted. A trustworthiness assessment is a necessary but not sufficient aspect of trust.

Trusting is a choice or decision to engage in a relationship based on the assessment of someone's trustworthiness. In addition, trust does not only involve a weighing of the evidence of the person's trustworthiness, it also takes into account the way the relationship will change as a result of that choice. Trustworthiness is a characteristic of the trustee, a judgement that one can rely on another party's word or promise at the risk of a bad outcome, should the other cheat or renege (Deutsch, 1958; Luhmann 1979, 25; Coleman, 1990, 91: Hardin 1993, 516; Dasgupta 1988, 51-52; Luhmann 1988, 97; Gambetta 1988a, 217). A truster's beliefs in the level of the trustee's trustworthiness vary along a number of dimensions. The four most prevalent trust related beliefs in the literature, as surveyed by McKnight & Chervany (1996), are beliefs about the trustee's a) benevolence b) honesty c) competence and d) predictability.

The link between trust and paranoia (assessment of intentions)

If assessments of trustworthiness are based on an assessment of the trustee's benevolence, honesty, competence and predictability, it should therefore follow that evaluations of a potential trustee's untrustworthiness are based on the opposite dimensions i.e. a) malevolence b) dishonesty c) incompetence and d) unpredictability. It is here where the link between persecutory ideation and distrust becomes apparent. Persecutory appraisals (i.e. an assessment of another's malevolent intentions) are central to a trustworthiness assessment. As Ullmann-Margalit (2004) describes '...the intention *(i.e. benevolence/malevolence)* component goes to the core of the notion of trust and therefore it cannot be dropped. In one version or another it is indispensable. This is, in principle, what distinguishes the notion of trust from the notions of reliance or

confidence.' (p.64: italics added). Therefore, beliefs about another's malevolence i.e.

persecutory beliefs, are as key to distrust as they are to paranoia. The relationship

between paranoia and beliefs about others' honesty, competence and predictability as yet

has not been investigated. A strong relationship between paranoia and these other

dimensions of beliefs about others would strengthen the argument for paranoia to be

viewed as a form of distrust.

The nature of Distrust

Distrust is often conceptualised as the opposite of trust. However, Solomon and

Fernandes suggest that distrust is not so much the opposite of trust as the other side of

trust (you cannot have one without the other, apart from in the case of naïve trust)

(Solomon and Fernandes 2001; p30). That is because to trust is to take a risk that

someone may betray. To be ignorant of that risk and the possibility that someone may

betray is therefore considered to be naïve. Distrust is to take action as if the other agent is

not trusted, with respect to a certain situation or context. To distrust is different from not

having any opinion at all on whether to trust or not, (referred to by Ullmann Margalit

(2004) as 'trust agnosticism'). These relationships between trust and distrust are

illustrated in the diagram below.

Figure 1. Relationships between Trust and Distrust

Distrust	Trust "agnosticism"	Trust
	Not to trust	
	Not to distrust	
	Reproduced from Ullmann-Margalit (2004)	
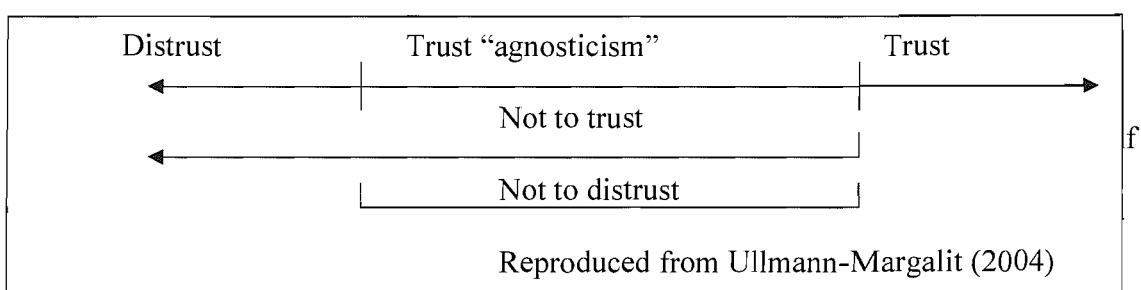
The threshold points depend on the person's disposition to trust and the potential losses/risks involved in trusting.

Interpersonal behaviours associated with distrust

Welch Larson (2004) suggests that some behavioural indicators of distrust may be information gathering, monitoring, protective measures, use of deterrence, or refusal to enter into long-term cooperative exchanges. Such behaviours overlap considerably with those often found in paranoia. For instance, Haynes (1986) has highlighted behaviours such as aggression and verbal and litigious harassment. Freeman, Garety and Kuipers (2001) also highlight the presence of 'safety behaviours' in people with persecutory delusions. They propose a person's persecutory belief may partly be maintained by the use of avoidance and safety behaviours. Safety behaviours are those which are used to obtain safety from, or prevent anticipated threat, from occurring. However, the use of such behaviours also prevents processing of disconfirmatory evidence for the threat. The non occurrence of the threat, or the lack of resultant harm, is often attributed to having used the safety behaviour. Freeman et al (2001) highlight seven main categories of safety behaviours found in a population of people with persecutory delusions 1) Avoidance (92%; Mainly people and public places or unsafe scenarios); 2) In situation safety behaviours (68% Protection, invisibility, vigilance, and resistance); Escape (36%); 3) Compliance (with persecutors wishes; 24%); 4) Help seeking (36%; family, friends, neighbours hospital staff, and police); 5 Aggression (20%); 6) Delusional (8% not logically related to reducing threat). The concept of safety behaviours has been borrowed from the literature on anxiety disorders, in a recognition that persecutory beliefs are essentially threat beliefs. What is not highlighted in Freeman et al's account is the

'defensive' function of some of these safety behaviours in paranoia. In addition the author's fail to account for how refusal to trust or cooperate with others may also serve the function of a safety behaviour, and describe how distrust may actually 'contaminate' the possibility for a cooperative relationship. We would therefore like to propose that paranoia in part is likely to be maintained by distrust itself. That is, by taking action towards another as if they are untrusted (e.g. a refusal to engage in cooperative ventures and a tendency towards oppositional relationships) may not only prevent disconfirmation of beliefs about another's untrustworthiness, but may actually provoke from the other, the feared outcome i.e. untrustworthiness. This may happen in a number of ways. Firstly, what seems defensive to the distruster may seem offensive to the distrusted and as such distrust can often be misinterpreted as hostile. If the 'distrusted' perceives the 'distruster' to be defensive this may lead the distrusted to fear defensive aggression and they may respond to this threat accordingly. Both parties will then become locked into a defensive stale mate. Distrust may also create distance and alienation of affection, which in turn provokes resentment. This then precipitates an oppositional relationship on the part of the other person, often leading to anti-collaborative and perhaps malevolent intentions towards the distrustful person. In addition, distrust may reduce disconfirmatory feedback. Erroneous distrust is difficult to falsify, and indeed, distrust is reinforced by not trusting. By distrusting a person, one is less likely to establish the kind of dependent or cooperative relations with them that might enable them to demonstrate their trustworthiness. In summary, whilst misplaced trust is a self disconfirming prophecy, misplaced distrust leads to a lack of cooperative relations and therefore no opportunity to

test whether the distrust was mistaken. Distrust also reduces the likelihood of exploitation and harm – so is negatively reinforced.

Beliefs about someone's untrustworthiness may also influence the interpretation of the distrusted's behaviour (confirmation bias). Holding beliefs about the untrustworthiness of others will lead a person to interpret the other's behaviour in such ways that evidence is sought to confirm that their caution and refusal to trust is a prudent choice.

Trust disposition

Trust disposition describes the general trusting attitude of the truster, 'a sense of basic trust, which is a pervasive attitude toward oneself and the world' (McKnight & Chervany 1996). Therefore it is independent of any other party or situation. A person's trust disposition decides how much initial trust to give and also affects how the truster reacts to feedback from interactions that affect trust (Brann & Foddy 1987; Rotter 1967). According to Boon & Holmes (1991), trust disposition is rooted deeply in childhood experiences. Ullmann-Margalit (2004) suggests that as small children, we have to start out with something like an instinctive conclusive presumption in favour of sweeping trust in the adults who care for us. Distrust is therefore later learned (Ullmann-Margalit 2004; p74).

McKnight et al (1995) breaks down dispositional trust into 2 further subtypes. Type A concerns the truster's belief of whether other people are generally good, trustworthy, and therefore should be trusted, and Type B concerns the truster's belief that irrespective of whether others are good or not, a positive outcome can be obtained by

acting 'as if' one trusts the other person. The relationship between paranoia and trust

disposition is unknown. It is possible that key to paranoia is a problem in the amount of

initial trust a person is willing to give, which sets the president for a reciprocal

oppositional stance from the distrusted party. The relationship between paranoia and trust

disposition therefore warrants further investigation.

Distrust and Betrayal. Is Paranoia a consequence of experiences of violations of trust?

Trust is created and is reinforced by trusting (Solomon and Fernandes 2001; p32.) Trust

cannot be willed nor imposed (Baier 1985) but must be learned (Hardin 1993) through

repeated encounters and experience (Dasgupta, 1988; Gambetta, 1988; Luhmann 1988).

A reputation for trustworthiness can only be established through consistent good

behaviour over time, but it can be lost in an instant (Dasgupta 1988, 62; Luhman 1979,

28-29). People ordinarily do not take notice when someone behaves honestly, whereas

they may infer from a single highly dishonest action that an individual is untrustworthy

(Reeder and Brewer 1979; Skowronski and Carlston 1987, 137-38). Jones and Burdette

(1994) define betrayals as the violations of the expectations, commitment and trust on

which a relationship is based. The role of expectation in betrayal is therefore central.

However not all disappointments and unfulfilled commitments are violations of trust.

(Solomon and Fernandes p135-p136). Transgressions may be attributed as unintentional,

accidental, or made under duress (i.e. a third party's responsibility). Therefore, betrayals

require a belief that the transgression was intentional and was not unduly influenced by

others. Alternatively it is possible to attribute transgressions of trust to fate,

circumstances (rather than anybody's fault), unintentional mistakes or failures or

misjudgements. An individual may be willing to overlook repeated transgressions until a threshold is crossed, where the impact on one's beliefs is out of proportion to the provocation 'the last straw'. If one values the relationship, it is rational to hold onto one's long standing beliefs unless the contradictory evidence is overwhelming. (Solomon and Fernandes, 2001). Similarly, in relation to paranoia, Gumley & Schwannauer (2006) propose that a person's beliefs about others as characterised by mistrust, danger and exploitation, are embedded in important and emotionally salient life experiences and that these may have become shaped over time in the context of confirmatory experiences and in contradiction to other aspects of the self-understanding, such as the longing to be accepted. The relationship between paranoia and experiences of betrayal is therefore an important one worthy of further investigation.

Distrust and vigilance. Is paranoia 'blind' or 'hypervigilant' distrust?

Vigilance is an awareness that not everybody is trustworthy and a tendency to show caution when dealing with unknown others (Markoczy, 2003). It encompasses a general sensitivity to information related to trust concerns. In other words, vigilant individuals tend to use information about others to update initial expectations. Gurtman and Lion (1982) have shown that vigilant individuals tend to have a lower threshold in recognizing stimuli that indicate potential opportunism. Paying attention to information that one's interaction partner may not be trustworthy is not the same as distrust as is often assumed (e.g. Kramer, 1999). Being vigilant is a propensity to notice trust-related information and a general willingness to update expectations in the light of new information. Markoczy (2003) has argued that trusting individuals vary on their level of vigilance. Those

showing a high level of vigilance are labelled 'prudent' trusters whereas those showing

low levels of vigilance are labelled 'naïve' or 'blind' trusters.

Two possibilities arise when thinking about how verification may relate to

paranoia. One is to view paranoia as a form of blind distrust (e.g. Solomon & Flores

2001) where people with paranoia reach conclusions about another's trustworthiness

quickly and fail to look for further evidence of their trustworthiness. An alternative

explanation is that paranoid people are highly vigilant to information regarding trust

concerns, so much so that they are likely to find evidence confirming their suspicions

about a person's untrustworthiness. If the other person picks up on this excessive

vigilance it is likely that it will be interpreted by the trustee as distrust and therefore

evoke resentment and perhaps an oppositional relationship. As Baier says 'Trust is a

fragile plant, which may not endure inspection of its roots, even when they were before

the inspection quite healthy' (Baier, 1985). Increased vigilance may also prevent

disconfirmation of the belief 'if I had not observed them then they would have acted

untrustworthily'. Given that 'blind distrust' and 'hypervigilance' hypotheses of paranoia

derive opposing predictions about the nature of relationship between paranoia and

vigilance/verification the relationship between these variables warrants further

investigation.

Beliefs in an unjust world: Is Paranoia related to a lack of trust in the system?
System trust refers to a trust relation that is not based directly on any property or state of

the trustee, but rather on the property of the system or institution within which the trust

relation exists. Luhmann (1979) suggests that system trust has gained predominance in

modern social relationships over the more spontaneous interpersonal trust. There is a

reliance on the system to perform satisfactorily, rather than wholly trusting the other

person. (Luhmann, 1979). That is, we may trust someone because we believe he will be

punished if he defects (Dasgupta 1988). One particular aspect of system trust are so

called 'Beliefs in a Just World' (BJW). The theory behind BJW (Lerner, 1980; Lerner &

Miller, 1978) asserts that the belief that on the whole, the world is a just place, helps the

individual to 'commit himself to the pursuit of long-range goals or even to the socially

regulated behaviour of day to day life' (Lerner & Miller, 1978, p.1030). Studies have

found a link between BJW and scores on Rotter's (1967) Interpersonal Trust Scale (Fink

& Guttenplan, 1975) a number of experimental measures of trust (Zuckerman and

Gerbasi, 1977) and trust in specific individuals such as one's spouse (Lipkus, 1991).

Given its role in trusting relationships, the link between 'Beliefs in a Just World' and

paranoia warrants further investigation.

Meta trust beliefs. Is paranoia related to positive and negative beliefs about trust?

Metacognition has been defined as any knowledge or cognitive process that is involved in

the appraisal, monitoring or control of cognition (e.g. Flavell, 1979; Moses & Baird

2001). It is a multifaceted concept. It comprises knowledge (beliefs), processes and

strategies that appraise, monitor or control cognition (e.g. Moses & Baird, 2001).

Freeman and Garety (1999) found that, as with distress about worry seen in GAD,

delusional distress was not simply related to the content of thoughts but associated with

whether the individual experiences meta worry concerning the control of delusional

ideation. Morrison and Wells (2003) found that people with persecutory delusions scored

significantly higher than non-patients on several types of negative metacognitive beliefs.

Whilst metacognitive 'beliefs about *worry*' seem to be important in paranoia,

Morrison (2001) has also suggested that, 'Positive beliefs about unusual experiences or

beliefs may be implicated specifically in the development of psychotic symptoms; for

example a patient may take substances to induce such phenomena, deliberately allocate

attention to such phenomena, or such phenomena may occur as a coping response as

suggested by Romme and Escher (1989). It would only be when such psychotic

experiences are appraised as uncontrollable or dangerous, or lead to negative

environmental consequences (such as problems with occupational and social functioning)

that they become problematic.' (p.265)

Morrison et al. (2005) conceptualises paranoia 'as a strategy more frequently used

by persons with positive beliefs about their paranoia; such positive beliefs may include

beliefs about paranoia as a survival strategy or paranoia as a way of making life more

interesting' (Morrison, Renton, Dunn, Williams and Bentall, 2003). Distress may thus

develop when a state of cognitive dissonance is caused by the activation of negative

beliefs about the individual's paranoia.' (Morrison et al 2005; p155-156). Gumley &

Schwannauer (2006) too suggest that whilst paranoia too can be conceptualised as an

evolutionary adaptive state of mind designed to favour survival, this goal of survival may

be achieved at the cost of affiliation, proximity seeking and kinship. Other costs of

paranoia include loss of emotional well being, loss of feelings of closeness, warmth and

affiliation with others, loss of the ability to trust and understand others' experiences,

lowered self esteem, relationship difficulties, loneliness, anxious reactions to others and

emotional distress and problems weighing evidence in decision making (Gumley &

Schwannauer, 2006.)

Morrison et al (2005) developed a self report measure to assess metacognitive

beliefs about paranoia in a non-clinical population. The scale was found to be composed

of four factors; negative beliefs about paranoia; beliefs about paranoia as a survival

strategy; general positive beliefs; and normalising beliefs. They found that beliefs about

paranoia as a survival strategy were associated with frequency of paranoia and negative

beliefs were associated with distress in the paranoid ideation. There are a number of

limitations with Morrison et al's methodology. Firstly, the authors themselves recognise

the problems with the usage of the term 'paranoia' in that colloquially it can be used in a

similar way to worry e.g. 'I'm paranoid I am going to fail my exam'. In addition in their

study, there was no specified definition of the word paranoid. The authors highlight how

the word 'paranoia' can be seen by some as stigmatizing or pathological, and may cause

offence. There are several negative connotations that the word paranoia may carry (e.g

madness). The authors may have been better focussing on a definition of persecutory

ideation i.e. 'beliefs that others intended to harm them' rather than the word paranoia. We

would also suggest that one way of overcoming some of the problems involved in using

the term 'paranoia' would be to focus on beliefs about trust (or alternatively distrust).

Both trust and distrust as psychosocial strategies have their advantages and

disadvantages. Whilst trust always involves risk, it also opens up possibilities that would

be impossible without it (Solomon and Flores 2001). It allows us to engage in projects

that one could not or would not undertake on one's own. Distrust is not necessarily an

emotional or irrational reaction, as it is often a sensible and rational response to potential

dangers. Distrust may either be well founded or unwarranted, just as trust may be justified or misplaced. Distrust protects us from losses incurred by foolishly relying on those who would harm us. Distrust can motivate us to acquire more information about the situation and the other party contributing to better quality decisions. Distrust can motivate us to be defensive against potential dangers and exercise appropriate caution. Conversely, trust is not always a good thing. Trust can be foolish, naïve, gullible, and blind. The costs of misplaced trust can be devastating, whereas distrust merely impedes valuable cooperation or exchange (Solomon and Flores (2001). People completing questionnaires on beliefs about trust and distrust are likely to have fewer apprehensions about endorsing items which have less psychopathological connotations and associations. The question of how positive and negative beliefs about trust relate to paranoia therefore warrants further investigation.

Paranoia as irrational distrust.

Until this point, we have noted the close relationship between paranoia and the concept of distrust. Whilst the predominant conceptualisation of paranoia is one of 'unfounded' persecutory beliefs (e.g. Freeman et al 2005a), the issue of 'falsity' is problematic. A central problem with both trust and distrust is that they are essentially based on cognitive assessments of the trustworthiness of the other party and may therefore be mistaken. Since we can never be certain that a person will continue to behave in the same way, trust and distrust always go beyond available information in making inferences (Luhmann 1979, 26). Trust is not always about evidence and outcomes. It does not develop from a scientific 'wait and see' attitude, but through engagement with another person/people.

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Erroneous distrust is difficult to falsify. By distrusting someone we become less likely to establish the kind of dependent or cooperative relationship with them that might enable them to demonstrate their trustworthiness. Trust is therefore often ultimately concerned about relationships and what it takes to create, maintain and restore them. (Solomon and Flores 2001).

An alternative conceptualisation of paranoia therefore may be as 'irrational distrust', in which it is the behaviour associated with persecutory ideation that is assessed as rational, with respect to the individual's needs, goals, interests, desires, values etc. That is, persecutory beliefs can be conceptualised as paranoid if they are associated with patterns of behaviour which are relatively detrimental in accessing one's needs, and pursuing one's valued goals in relation to alternative patterns of behaviour. Spohn (2002) proposed that general assessments of rationality are based upon a subject's actions in relation to both 'her empirical beliefs or judgements about the happenings of the world, and relative to her interests, desires, values etc and thus according to her subjective standards' (p2). This latter form of rationality he refers to as 'instrumental rationality'. Spohn (2002) further breaks down rationality into two separate dimensions, 'theoretical rationality' and 'practical rationality'. 'Theoretical rationality' examines individual's beliefs both in terms of other beliefs of consistency and coherence, and also in line with past beliefs and experiences. Practical rationality is the evaluation of individual actions and the likelihood of achieving the desired outcome through our actions. Spohn (2002) emphasises the relativity of rationality assessments 'we call a ...belief, evaluation rational in the absolute sense if it is rational in relation to other things which are rational

in turn.' This presupposes an absolute concept of rationality. In contrast practical

rationality is relative to ultimate aims or values and ends.

The iterated Prisoner's dilemma. A useful way of researching irrational distrust

(paranoia)?

The prisoner's dilemma has been referred to as the 'crucible of paranoia' (Barash, 2003).

It is therefore surprising that as yet it has not been used as a methodology by which to

study paranoia, whilst it has been frequently used in social sciences as a measure of

trusting/cooperative behaviour. The prisoner's dilemma is considered to be a social

dilemma, i.e. a situation where a pursuit of self interest (competition) is in conflict with

the collective interest (cooperation).

Essentially, the prisoner's dilemma game (PDG) involves an interaction between

two opponents. Each side can choose between either a cooperative (X) and a no

compete/defect (Z) choice. The outcomes are summarised in figure 2 below.

Figure 2: Outcomes on a traditional prisoner's dilemma.
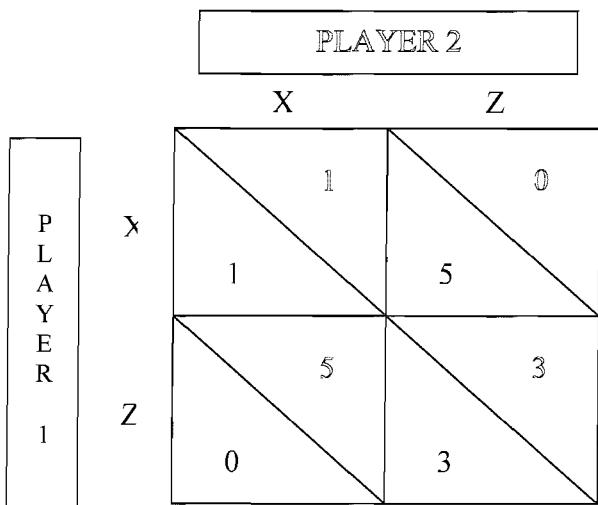
N.B. For this to be a valid prisoner's dilemma game matrix the outcomes of the column player (i.e. Computer) increase in rank order across the cells from the upper right (ZX) to upper left (XX) to lower right (ZZ)to lower left (XZ). Also the average outcome in the lower left (XZ) and upper right cells (ZX) is higher than the average outcome in the upper left cell. This requirement guarantees that the players cannot receive higher outcomes by taking turns selecting X and Z compared with mutually cooperating by both consistently selecting X.

The dilemma faced by both players is that on any given trial, each player can minimize their sentence, by selecting Z (i.e. compete), providing the other player selects an X strategy (i.e. cooperate). However if both sides select a Z (compete) strategy, both opponents achieve outcomes that are worse than the outcomes they could have achieved by mutual selection of an X (cooperate) strategy.

Two types of rationality

With regard to the prisoner's dilemma, Anatol Rapoport (1978) highlighted two kinds of rationality. Individual rationality refers to the choice of strategy that has the best outcome for oneself as an individual. Collective rationality refers to the choice of strategy that has the best outcome for all parties involved (i.e. the collective). On a 'one shot' version of the prisoners' dilemma, an individualistic rational move (also known as the Nash equilibrium) would be to compete/defect whilst the collectivist rational move is to cooperate.

The iterated prisoner's dilemma

An interesting situation occurs when the prisoner's dilemma game is played out a number of times (known as an 'iterated' prisoner's dilemma). This allows both players opportunity to respond to the previous outcome. In the iterated prisoner's dilemma, each player is better off cooperating both in terms of individual rationality and collective

rationality. However, this is not the case when each player knows what the total number

of games will be. When the total number of games is known by each player, the logical

strategy on the last game is to defect (a so called 'end game strategy'). Given that

individual rational choice in the last game is to defect, the same logic works backwards

throughout the games. The penultimate game becomes, in effect, the last game and by the

same logic that caused the person to defect in the last game, defect becomes the

individualistic rational choice, and so on back to the first game. Therefore, when the total

number of games is known, the rational choice is to always defect. The logic of this

strategy breaks down if the last game in the sequence remains uncertain. In this case,

cooperation becomes the logical strategy. Therefore, where the end is sufficiently

uncertain, both the collective and individual rational move becomes to cooperate.

Nice guys can finish first- The evolution of cooperation

Whilst logic dictates that in an 'uncertain ended' iterated prisoner's dilemma each player

should cooperate, a strategy that always cooperates is susceptible to exploitation by one

that always competes. So what is the 'optimal' strategy in the open ended iterated

prisoner's dilemma where a person has the opportunity to react to the outcomes of

previous games? This question was asked by Robert Axelrod, who challenged a number

of specialists in the field of game theory to submit a programme for a 'round-robin'

tournament of the iterated prisoner's dilemma (Axelrod, 1984). The winner of the overall

tournament submitted by Anatol Rapoport was called TIT-FOR-TAT. This programme

cooperated on the first move; from then on doing whatever its opponent did on the

previous round. So what was it about this strategy that made it so successful? TIT-FOR-TAT epitomised all the characteristics of all the successful strategies entered into the tournament. Axelrod identified that out of all the characteristics which distinguish the relatively high-scoring entries from the relatively low scoring entries, starting off being 'open to cooperation' was the most important (a characteristic he referred to as being 'nice'). In addition, Axelrod proposed that it pays to be provocable, that is to react to an opponent's defection so that one cannot be taken advantage of, or at least not for long. Axelrod also highlighted the importance of an equally prompt willingness to forgive, that is, to resume cooperation as soon as the other player does the same (i.e. it does not pay to hold grudges). Axelrod summarized the successful characteristics of TIT-FOR-TAT as being its combination of being nice, retaliatory, forgiving and clear (understandable). Interestingly though, TIT-FOR-TAT never defeated its opponent. In the worst case, TIT-FOR-TAT is defeated by one defection: after being suckered a single time. TIT-FOR-TAT achieves its overall high score by evoking cooperation from the other side, after which both sides get the moderately high payoff. At the same time, TIT-FOR-TAT avoids being consistently suckered because it effectively punishes any defection, while repeatedly giving the other side the opportunity to repent from any previous defections.

Tit-for-Tat as an Ethical Strategy

Because of its tendency to retaliate to provocation, TIT-FOR-TAT may not concur with the values and ideals of those who believe that retaliation is wrong. Ethical characteristics of the strategy however do include its niceness, its restraint (it doesn't take advantage

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when the other side behaves cooperatively) and its forgiveness (if the other side switches

from defecting to cooperation, TIT-FOR-TAT follows suit, never holding a grudge). One

problem however with TIT-FOR-TAT is that it is susceptible to being harsh towards

mistakes made by its opponent and will punish them as if they were intentional. It has

been proposed that 'TIT-FOR-TAT needs to be tinctured with both generosity and

contrition.'(Barash, 2003). Despite these problems, Axelrod's work highlights how in

non finite interactions, players see themselves as having an investment in maintaining an

ongoing mutually beneficial relationship. Relationships are therefore more likely to be

trusting when they are keyed to long term interactions. Axelrod's work highlights how

'reciprocity' is often key to successful long relationships (Barash, 2003)

Using the prisoner's dilemma to research 'irrational distrust' i.e. paranoia

Given that it would appear that TIT-FOR-TAT is the optimal strategy on an iterated

prisoner's dilemma, where one has no previous knowledge of one's opponent's

strategies, and where the end is sufficiently uncertain, it can therefore be used as a

benchmark upon which to measure the rationality of a person's distrust. Departures from

the TIT-FOR-TAT strategy (we will refer to these as TIT-FOR-TAT errors) represent a

tendency towards non-optimal reciprocity and as such can be viewed as irrational (both

individually and collectively). The more TIT-FOR-TAT errors a person makes the more

irrational their patterns of interactions are. Therefore, irrational distrust is proportional to

the number of TIT-FOR-TAT errors made, given that cooperation is always the rational

strategy unless one is retaliating to being exploited in the previous game.

Categories of reciprocity errors

TIT-FOR-TAT errors can be further subcategorised into closed to cooperation (nasty) errors, non retaliation (submissiveness) errors, non-forgiveness (grudge) errors, and exploitative errors. In addition, if a person makes a nasty or exploitative error the optimal choice on the next game becomes firstly to resume cooperation (repentance) and not to retaliate to the justified retaliation of one's opponent (penance).

Manipulating exploitative threat in a simulated iterated prisoner's dilemma

In addition, if a person plays the iterated prisoner's dilemma over a computer, and is led to believe they are playing another player, it is possible to pre-programme the opponent's strategy in such a way as to control the amount of exploitative threat the opponent poses. For example, one can manipulate whether the opponent competes (exploits) or cooperates on the first game.

Differentiating rational from irrational distrust on a simulated iterated prisoner's dilemma

By measuring persecutory ideation about the 'simulated' opponent, one can differentiate the proportion of the variance in persecutory ideation accounted for by the actual exploitative threat in the environment (i.e. whether or not the simulated opponent

competed on the first game) and that which is associated with tit for tat errors (i.e.

irrational distrust).

Simulating betrayal experiences on a simulated iterated prisoner's dilemma

In addition, by comparing a condition where there is a simulated agreement between

opponents to cooperate over the course of the games, with another condition where there

is no simulated pre-game agreement, this allows investigation of the effect of expectation

of cooperation on experiences of exploitation. That is, it allows us to look at the effect of

experimentally simulated betrayals (where expectation of cooperation is key) on

persecutory ideation.

In summary a simulated iterated prisoner's dilemma allows for a dynamic

assessment of persecutory ideation in relation to actual exploitative threat, betrayals and

irrational patterns of reciprocity (i.e. irrational distrust).

Conclusions and further research questions

We have reviewed how a definition of paranoia based on delusional persecutory beliefs

may be problematic. We have seen how attempts to define paranoia have been

predominantly derived from a focus on the cognitive aspects of the phenomena and have

been influenced mainly by empiricist philosophy of rationality. Theories of paranoia have

tended to be individualistic and there is a strong need for a more interpersonal focus

based on 'instrumental' as well as 'empiricist rationality'. We have noted the problems

involved in measuring paranoia in the normal population by using questionnaire

methodology. Whilst recent virtual reality studies go some way towards addressing such conceptual problems, to date these methodologies have not measured the dimensions of threat proposed to mediate emotional and behavioural consequences of paranoia, such as perceived probability of threat, the severity of the threat, ability to cope with threat and perceived rescue factors (Beck, Emery & Greenberg 1985). We proposed that these dimensions and consequences of persecutory threat beliefs are as important as the content in defining persecutory beliefs as paranoid. The relationship between paranoia and distrust was examined and it was proposed that paranoia may be conceptualised as 'irrational distrust', recognising that distrust has the propensity to be rational and prudent. Whilst distrust appears to be a super-ordinate concept to persecutory beliefs, a shared assessment of the intentions of the other is common to both, in particular an assessment of another's intentions as malevolent seems to be shared between both distrust and persecutory beliefs. We proposed that the relationship between some dimensions of distrust and paranoia warrants further investigation to test the 'irrational distrust hypothesis'. Some of the questions that warrant further investigation in both clinical and non clinical populations include the following.

- What is the relationship between persecutory beliefs (frequency, conviction and preoccupation) and beliefs about others' honesty, predictability and competence?

- Is paranoia related to high vigilance (hypervigilance hypothesis) or low vigilance (blind distrust hypothesis)?

- Is paranoia related to lower Beliefs in a Just World?

- Is paranoia related to metacognitive beliefs about trust (i.e. positive and negative beliefs about trust)?

- To what degree is persecutory conviction related to a low trust disposition?

- To what degree is persecutory conviction related to reciprocity errors (grudge, submissiveness, exploitation, non-repentance and non-penance)?

- To what degree is persecutory conviction related to experiences of betrayal (both self reported and experimentally manipulated)?

- To what degree is paranoia related to individualistic or collective motives on a prisoner's dilemma game?

Some of these questions will form the focus of the empirical paper to follow.

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Empirical Paper:

Paranoia as irrational distrust: An investigation using the iterated prisoner's dilemma

Ben Frayne

Prepared as if for submission to: Cognition and Emotion

Abstract

Contemporary theories of paranoia are limited in accounting for interpersonal factors in the formation and maintenance of persecutory beliefs. The current study set out to explore how experiences of betrayal, social motivation and patterns of distrust relate to persecutory conviction. Students (N = 164) played a computerised simulation of the iterated prisoner's dilemma. The degree of exploitative harm, and whether or not participants received an invitation to cooperate before commencing was manipulated between groups. Motives for choice of strategy (collective, egocentric and self sacrifice/altruistic) and beliefs about the simulated opponent's malevolence were taken repeatedly. Departures from the optimal TIT-FOR-TAT strategy were used as a measure of non-optimal reciprocity. Persecutory conviction increased with experience of exploitative harm, increased with an invitation to cooperate, decreased with familiarity to the simulated opponent, and was associated with and maintained by non-optimal reciprocity. Persecutory conviction also decreased with higher collective motives. An analysis of subcategories of reciprocity errors revealed that an oppositional disposition was the only reciprocity error to be negatively associated with persecutory conviction. The findings suggest that persecutory conviction is related to experiences of exploitative harm, and that this effect is enhanced by a preagreement to cooperate (i.e. experience of betrayal). Persecutory conviction decreases with familiarity to others and when one is more concerned about collective rather than individual outcomes. Problems in reciprocity seem to play both an integral and maintaining role in paranoia. The findings contradict the idea that greater persecutory conviction is associated with a low disposition to trust. A conceptualisation of paranoia as an instrumentally irrational form of distrust is proposed.

Introduction

Persecutory beliefs have been defined by Freeman and Garety as beliefs in the intention of another to cause (current or future) harm (Freeman & Garety, 2004). In keeping with the idea that paranoia is dimensional with ordinary behaviour (Strauss, 1969), persecutory beliefs have been found in a number of survey studies of the general population (e.g. Johns et al 2004; Peters et al 1999; Verdoux et al 1998) and in student samples (e.g. Fenigstein & Vanables, 1992; Ellett et al 2003; Freeman et al 2005a & b). However, questionnaire studies of paranoia have been criticised as being unable to differentiate unfounded from accurate persecutory beliefs (Freeman et al, 2005). – unfoundedness being another defining attribute of paranoia according to these authors and in traditional psychiatric classifications (e.g. DSM IV; APA 1994).

The relationship between paranoia and distrust.

How are paranoia and distrust related? Reviewing the literature on trust, McKnight et al (1998) identified the four most prevalent dimensions upon which a person is assessed as trustworthy. These include beliefs about the other's a) benevolence, b) honesty, c) reliability and d) competence. With regards to distrust it would seem reasonable to assume that beliefs about another's malevolence (i.e. the opposite end of the benevolence dimension) play a central role in an assessment of someone as untrustworthy. Therefore distrust and paranoia both involve an assessment of another's intentions (Ullmann-Margalit, 2004) as malevolent. Given that Freeman et al's definition of persecutory ideation relates entirely to beliefs about another's

malevolence, distrust and paranoia cannot therefore be differentiated upon the presence of persecutory beliefs alone. This highlights some shortcomings of a purely cognitive definition of paranoia in that such a definition is independent of an individual's context and does not take into account the consequences (emotional behavioural and interpersonal) of holding such a belief. Distrust has the propensity to be well founded and adaptive. In the competition for scarce resources and in attempts to gain social power, individuals are almost certain to encounter other individuals who wish to hold them back, rival individuals who seek to displace them, and /or less powerful individuals seeking to conspire against or mislead them (Kramer and Messick, 1998). As Gilbert et al (2005) suggest, humans can pose a variety of threats to one another and a wariness of those who can inflict such harm is highly adaptive (Gilbert et al 2005 p124). Therefore there is a need to differentiate rational distrust from paranoia.

Using the iterated prisoner's dilemma to differentiate rational from irrational distrust.

The prisoner's dilemma has previously been referred to as the 'chalice of paranoia' (Barash 2003, p113) although surprisingly no studies have used this methodology to investigate persecutory ideation. The methodology has however been widely used within the social sciences, as an experimental measure of cooperation and trust. The prisoner's dilemma is a game for two players. Each player has a choice of two strategies, a cooperate (X) and a compete/defect (Z) strategy. The negative outcomes (i.e. the prison sentence) is determined by the combination of both players'

strategies. An example of possible outcomes is shown in Figure 1 below. The numbers

represent the proportionate prison sentences for each player.

Figure 1 Possible Outcomes of the Prisoner's Dilemma Game

PLAYER 2

		X	Z
P L A Y E R 1	X	1 / 1	0 / 5
	Z	5 / 0	3 / 3
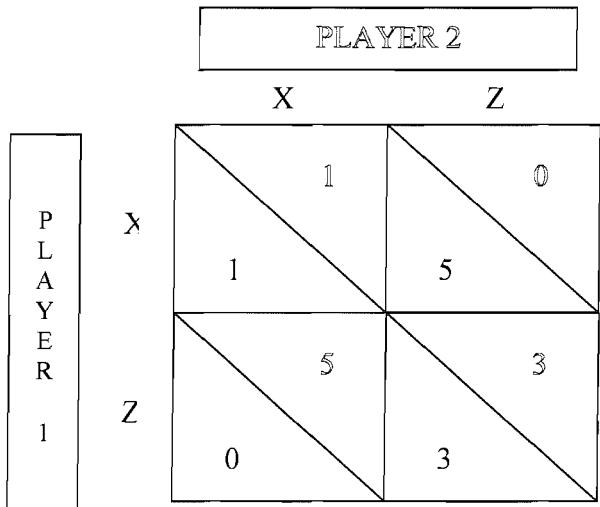
N.B. For this to be a valid prisoner's dilemma game matrix the outcomes of the column player increase in rank order across the cells from the upper right (ZX) to upper left (XX) to lower right (ZZ)to lower left (XZ). Also the average outcome in the lower left (XZ) and upper right cells (ZX) is higher than the average outcome in the upper left cell. This requirement guarantees that the players cannot receive higher outcomes by taking turns selecting X and Z compared with mutually cooperating by both consistently selecting X.

The dilemma faced by both players is that on any given trial a pursuit of self-

interest (individualistic rationality) is in conflict with the collective interest (collective

rationality; Rapoport, 1974). On each trial a player decides simply whether to co-

operate (X) or compete/defect (Z). Each player can minimize his or her sentence, by

selecting Z (i.e. compete/defect), providing the other player selects an X strategy (i.e.

cooperate). However if both sides select a Z (compete) strategy, both opponents

achieve outcomes that are worse than the outcomes they could have achieved by mutual

selection of an X (cooperate) strategy. When the game is played repeatedly (known as

the iterated prisoners dilemma), and when the end is sufficiently unclear, because each

player has the opportunity to respond to the other players previous move, cooperation

becomes both the individual and collective rational strategy. However a strategy that always cooperates is susceptible to exploitation from one that competes. Axelrod (1984) found that the optimal strategy in a 'round robin' computer tournament of the iterated prisoners dilemma, where entrants had no knowledge of their opponents strategies, was to cooperate on the first move; from then on doing whatever their opponent did on the previous round, the so called TIT-FOR-TAT strategy. TIT-FOR-TAT epitomises all the characteristics of all the successful strategies entered into Axelrod's (1984) tournament. Initially being 'open to cooperation' from the outset was the most important of these characteristics (Axelrod refers to this as being 'nice'). This quality relates to an individual's disposition to trust when they have no previous experience on which to base their judgement on. It also pays to be provocable, that is to react to an opponent's defection so that one cannot be taken advantage of. Axelrod (1984) also highlighted the importance of an equally prompt willingness to forgive, that is, to resume cooperation as soon as the other player does the same (i.e. it does not pay to hold grudges). Axelrod (1984) summarized the successful characteristics of TIT-FOR-TAT as being its combination of being nice, retaliatory, forgiving and clear (understandable).

Given that the iterated prisoner's dilemma has an established optimal strategy (i.e. TIT-FOR-TAT) it is possible to use departures from such a strategy as a measure of how 'non-optimal' an individual's patterns of cooperation are. We will term such departures 'reciprocity errors'. Reciprocity errors allow the possibility of distinguishing distrustful behaviour which is well founded i.e. retaliation to a previous attempted exploitation, from that which represents patterns of behaviour which are overcautious,

submissive, excessively punitive or provocative and are therefore relatively detrimental to both the individual and the collective.

The current study uses an iterated prisoner's dilemma to investigate the role of simulated experiences of betrayal on the formation and maintenance of persecutory conviction. The hypotheses were as follows:

- Persecutory conviction would increase with an experience of competition/exploitation (i.e. a 'Z' strategy) by the simulated opponent (i.e. would be related to the amount of exploitative/competitive threat present and therefore rational.)

- The effect of an experience of competition/exploitation on persecutory conviction would be moderated (enhanced) in those who made a pre-agreement to cooperate with their simulated opponent (i.e. those participants who experienced a betrayal).

- A proportion of persecutory conviction would covary with the number of reciprocity errors (i.e. would be associated with irrational patterns of reciprocity, and therefore could be regarded as paranoid)

- Reciprocity errors would be positively associated with a validated measure of paranoia.

In addition the following exploratory research questions were also posed:

- What is the relationship between subcategories of reciprocity errors (oppositional disposition, non-retaliation, exploit, grudge, failure to repent, and penance) and interpersonal motivation factors

(individualistic, collectivistic and altruistic) with persecutory

conviction?

- Do subcategories of reciprocity errors reduce into component factors?

Method

Design

Participants were randomly allocated to one of four groups in a mixed two by two

(between) x six (within) subjects design. The two between subjects factors were firstly

the 'exploitative harm' posed by the simulated opponent, determined by the computer's

initial strategy i.e. whether the simulated opponent played an overall 'Nice' strategy

(where the computer cooperated on the first game, from then on doing whatever the

participant did on the previous round); or a 'Nasty' strategy whereby the computer

competed on the first game and then cooperated on all subsequent games. The second

between subjects factor was whether or not there was a 'preagreement' to cooperate.

The pre-agreement factor was manipulated by whether or not participants were sent an

e-mail by their simulated opponent prior to starting the games inviting them to

cooperate. The programme pretended to randomly select a player to make the first call.

In actuality, the programme always selected the simulated opponent to make the first

call, whereby they would always invite cooperation. The single within subjects factor

was the number of games played, a predetermined total of six, although participants

were informed that there could be any number between one and ten, in order to keep the

number of games sufficiently uncertain, to prevent end game strategies (e.g. Barash,

2003).

Participants

Participants were 164 students (133 Female, 31 Male) aged 18-56 (mean age 20.7; standard deviation 4.5) recruited from the University of Southampton via an online booking system. Of these, 130 received credits which counted towards a requirement of their course, whilst the remainder (34) received financial reward appropriate to the amount of time they spent in the experiment.

Materials

Paranoia Checklist, PC (Freeman et al 2005)

This is an 18 item checklist designed to investigate paranoid thoughts of a 'more clinical nature' than previous measures of 'sub clinical paranoia' such as the Paranoia Scale, PS (Fenigstein & Vanables, 1992). Each of the 18 items is rated on a five point scale for frequency, degree of conviction, and distress. The scale has previously been found to have excellent internal reliability (Cronbach's alpha=0.9; Freeman et al 2005). All three dimensions have been found to have high convergent validity with Fenigstein & Vanables's (1992) Paranoia Scale (Freeman et al 2005).

Iterated Prisoners Dilemma Motive Scale (IPDMS)

The IPDMS is composed of ten items designed to assess different motives for choosing either a cooperate or compete strategy on the prisoners dilemma. This scale was a modified version of the 'Closed ended reasons assessment' originally designed by Wildshut et al (2002). The IPDMS was modified for the purpose of this study to refer to

the amount of time participants aimed to stay behind in relation to their opponent to

complete a fictitious cognitive task (described in more detail in the procedure). A

chain-P factor analysis (e.g. Cattell, 1978) with varimax rotation revealed that the scale

was composed of three main factors, egocentric/individualistic motives (three items;

$\alpha=.80$; see Table 1) collective motives (seven items; $\alpha=.87$; see Table 1), and self-

sacrificing/altruistic motives (two items; $\alpha=.77$; see Table 1).

Table 1 Chain-P Factor Analysis: Component loadings of items on IPDMS

IPDMS Item	Component 1 Collective Motives	Component 2 Egocentric Motives	Component 3 Self Sacrifice/ Altruistic Motives
1. I wanted to encourage the other person to cooperate	.764		
2. I wanted the other person to stay longer than me	-.409	.802	
3. I wanted the other person to stay behind for as short a time possible	.748		
4. I wanted to minimise the amount of time we both stayed behind	.810		
5. I wanted the other person to stay behind as long as possible	-.427	.727	
6. I wanted to defend myself against the actions of the other person		.849	
7. I did not want the other person to stay behind longer than me	.672		
8. I wanted to stay behind for as long as possible			.899
9. I wanted to minimise the amount of difference between the amount of time we both stay behind	.789		
10. I wanted to stay behind longer than the other person			.887

Experimental Trustworthiness of Others Scale (E-TOS).

This scale was designed for the current study to measure variations in conviction in

beliefs about the trustworthiness of one's opponent over each of the games of the

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iterated prisoner's dilemma. Participants are asked to rate their experience of the other

participant over nine bipolar dimensions; 'honest-dishonest'; 'predictable-

unpredictable'; 'reliable-unreliable'; 'trustworthy-untrustworthy'; 'is friendly towards

me-is hostile towards me'; 'wants to please me-wants to upset me'; 'wants to help me-

wants to harm me'; 'wants to play fair-wants to exploit me'; 'respects me-has it in for

me'. Each item is rated on a seven point scale from 'definitely'-'probably'-'maybe'-

'unsure'-'maybe'-'probably'-'definitely'. A post-hoc chain-P factor (e.g. Cattell, 1978)

analysis with varimax rotation conducted on participants responses within the current

study revealed the scale was comprised of a single factor i.e. trustworthiness,

demonstrating excellent internal reliability (α=0.94). The overall factor structure offers

support to the proposal that persecutory ideation is indeed a sub component of overall

distrust. The last five items can be summed to give an overall benevolence-malevolence

score (i.e. persecutory beliefs). The five item benevolence-malevolence (persecutory

ideation) sub-dimension also demonstrated excellent internal reliability (α=0.93). For

the purpose of this study, scores pertaining to persecutory ideation sub-dimension of

this scale were used only.

Procedure

Approval for the study was obtained from the psychology department's ethics

committee. Participants signed up for an experiment called social strategies which they

were informed would consist of three parts. The first part would involve completing an

online questionnaire (Paranoia Checklist) in their own time. The second part would

involve playing another participant in an online computerised strategy task. Participants

were informed that their performance on the second part of the experiment would determine how long they would be asked to stay to perform part three, a cognitive concentration task. Participants consented and signed up for the experiment online.

Upon arriving for the second part of the experiment all participant's received training in the iterated prisoner's dilemma game to ensure they understood the contingencies of the prisoner's dilemma matrix.

A computerised simulation of the iterated prisoner's dilemma was developed, designed to deceive participants into believing they were playing an online game against another participant in another lab. The programme informed participants that their total score over the series of prisoners dilemma games would determine how many minutes they would stay behind in the third part of the experiment to complete a fictitious cognitive concentration task, warning them that this cognitive task may cause them a degree of discomfort (i.e. to enhance the perceived threat of being beaten in the game). It also informed participants that they would be playing between one and ten games, the amount to be randomly determined by the computer. Participants were firstly presented with the instructions for the game. They were then shown a screen conveying the possible outcomes of the prisoner's dilemma (similar to figure 1) and given a minute to read these. Depending on the condition they had been allocated to (i.e. pre-agreement or no pre-agreement) determined whether participants were then either sent a message from their simulated opponent inviting them to cooperate, or progressed directly into the first game. In each game, participants selected their strategy using the mouse (i.e. cooperate or compete; labelled X or Z in order to control for

social desirability of the named choices). Participants were initially blind to their opponent's choice of strategy. Participants then completed the IPDMS measure on the computer to measure their motives for their choice of strategy. The results of the game were then revealed. The programme then presented participants with the E-TOS to rate their opponent's trustworthiness. After completing the E-TOS, participants returned to the possible outcome screen of the prisoner's dilemma. This overall process was repeated a total of six times. In each round, participants were shown all the outcomes of previous rounds. After six games the game was brought to an end and participants were shown how they had performed in relation to their simulated opponent.

A number of additional steps were taken in an attempt to deceive participants into believing they were playing a real opponent. Participants booked in for the experiment online alongside a fictitious other, whose name was not displayed. A notice was placed on the door of the lab of the experiment reading 'Social Strategies Experiment- Player Two'. Please wait outside. The experimenter will be along shortly.' The experimenter would always arrive a few minutes late apologising, saying that they were attending to the other participant. The experimenter would then pretend to coordinate both players on the computer task, and would leave and return to the lab pretending to check up on the progress of each player. Throughout the computer programme participants were presented with randomly allocated prompts asking them to wait whilst their opponent caught up. After finishing all six games, the experimenter would leave the lab pretending that they were going to set the other participant up on the cognitive task. The experimenter would then return telling the participant that the software for the

cognitive task was faulty, meaning that they would be unable to proceed to the final part of the experiment. Before sending participants away, the experimenter asked if they had had any previous experience of the prisoner's dilemma game and if they knew of any optimal strategies for the game. Participants were also asked if they had any observations, questions or comments to make about the study, or their opponent (as a means of eliciting suspicions of not having played an actual opponent). Participants were fully debriefed via e-mail following collection of all the data.

Results

Participants' previous experience of the prisoner's dilemma game

Of the 164 participants, 148 had no previous experience of the prisoner's dilemma game, nine had participated in a psychology experiment the previous year where the prisoner's dilemma had been used, although knew nothing more about the game. Six participants knew it was called the prisoner's dilemma game but were unable to describe a strategy. Only one participant correctly described the TIT-FOR-TAT strategy.

Reciprocity errors.

Given that TIT-FOR-TAT represents the optimal strategy on an iterated prisoner's dilemma (where one has no previous knowledge of one's opponent's strategy), reciprocity errors (defined as the number of games a participant failed to adhere to the TIT-FOR-TAT) strategy were used as a measure of irrational distrust.

These were broken down into six subcategories. Firstly, failure to commence with a

cooperative strategy was classified as a 'Oppositional Disposition (OD) error. Failure to

retaliate to a previous compete strategy after having cooperated was classified as a

'Non-retaliation' error. Failure to return to cooperation after one's opponent had done

so was classified as a 'Grudge' error. A competitive strategy following mutual

cooperation was classified as an 'Exploit' error. In addition, if a player had previously

made an exploitative or OD error, failure to resume cooperation on the following game

was classified as a 'Failure to Repent' (FR) error. If the player instigated retaliation

from the other player but then responded to this retaliation by retaliating themselves,

this was classified as a 'Penance' error. Descriptive data on reciprocity errors can be

found in Table 2.

Table 2. Descriptive data on reciprocity errors (RE) (N=164)

Measure	Mean (S.D.)	Possible Range
Oppositional Disposition RE	0.3 (0.5)	0-1
Non-retaliation RE	0.2 (0.4)	0-1
Exploit RE	0.3 (0.6)	0-5
Grudge RE	0.3 (1.0)	0-5
Failure to Repent RE	0.8 (1.5)	0-5
Penance RE	0.04 (0.2)	0-5
TOTAL Reciprocity Errors	1.9 (2.1)	0-6

Descriptive data from all participants on all the measures used is shown in Table 3 and

Table 4

Table 3. Mean scores on Paranoia Checklist (N=164)

Measure	Mean (S.D.)	Possible Range
Paranoia Checklist (Frequency)	27.9 (9.0)	18-54
Paranoia Checklist (Conviction)	27.3 (8.7)	18-54
Paranoia Checklist (Distress)	38.8 (18.6)	18-54

Table 4. Mean Scores (with standard deviations) on experimental measures of persecutory ideation (E-TOS) and Social Motivation Factors (IPDMS)

	Condition	Game 1	Game 2	Game 3	Game 4	Game 5	Game 6
E-TOS Persecutory Ideation Possible Range (5-35)	Nasty/ Preagree	23.50 (5.02)	19.05 (4.36)	17.73 (4.72)	16.43 (4.97)	15.45 (4.60)	14.68 (4.68)
	Nasty/No Preagree	22.32 (5.25)	17.83 (3.84)	16.17 (4.49)	14.73 (5.93)	14.00 (6.31)	13.78 (6.40)
	Nice/ Preagree	14.07 (3.69)	13.87 (4.64)	13.88 (5.35)	13.39 (5.29)	13.39 (5.71)	13.05 (5.79)
	Nice/No Preagree	14.86 (4.22)	14.74 (4.63)	14.43 (5.42)	14.05 (5.75)	13.40 (5.90)	14.12 (6.82)
IPDMS Collective Motives Possible Range (7-49)	Nasty/ Preagree	38.05 (8.09)	31.78 (11.05)	34.73 (10.15)	35.48 (10.53)	36.93 (9.49)	37.00 (9.39)
	Nasty/No Preagree	35.93 (7.30)	32.17 (10.64)	33.00 (9.31)	35.54 (10.42)	35.17 (10.63)	35.15 (11.36)
	Nice/ Preagree	38.51 (7.66)	38.63 (8.24)	39.46 (7.77)	38.39 (8.80)	38.78 (8.66)	38.00 (9.30)
	Nice/No Preagree	35.21 (8.65)	35.76 (9.12)	36.33 (9.42)	36.24 (10.25)	35.52 (10.08)	34.52 (11.62)
IPDMS Egocentric Motives Possible Range (3-21)	Nasty/ Preagree	6.18 (3.80)	10.48 (5.42)	8.38 (4.64)	7.58 (4.19)	7.45 (4.25)	7.45 (4.25)
	Nasty/No Preagree	8.02 (3.81)	10.59 (4.70)	9.76 (4.46)	9.46 (4.84)	9.46 (4.84)	9.27 (5.01)
	Nice/ Preagree	5.93 (3.84)	6.15 (4.03)	6.63 (4.65)	6.49 (4.31)	6.49 (4.31)	6.56 (4.35)
	Nice/No Preagree	7.98 (3.98)	8.36 (3.58)	8.19 (3.86)	8.23 (4.12)	8.24 (4.12)	8.45 (4.63)
IPDMS Self Sacrifice/ Altruistic Motives Possible Range (2-14)	Nasty/ Preagree	2.58 (1.68)	2.70 (1.71)	2.73 (1.92)	2.58 (1.68)	2.78 (1.90)	2.80 (2.03)
	Nasty/No Preagree	2.56 (1.42)	2.51 (1.27)	2.66 (1.62)	2.61 (1.74)	2.73 (1.80)	2.83 (1.77)
	Nice/ Preagree	2.61 (1.20)	2.54 (1.27)	2.54 (1.67)	2.73 (1.63)	2.85 (1.92)	2.85 (2.03)
	Nice/No Preagree	2.74 (1.34)	2.62 (1.13)	2.60 (1.08)	2.57 (1.11)	2.52 (0.92)	2.55 (1.09)

The effects of exploitative harm, preagreement to cooperate, familiarity with other and irrational distrust (total number of reciprocity errors) on persecutory conviction.

A mixed ANCOVA was carried out with conviction in persecutory beliefs (i.e. beliefs about the other's benevolence-malevolence; E-TOS) as the dependent variable; 'exploitative harm' and preagreement as two separate between subjects factors; game number as a within subjects factor and total number of reciprocity errors as a covariate.

There was a significant within subjects effect of game number on conviction in persecutory beliefs F $(5, 795) = 78.47$, $p < 0.001$, suggesting that conviction in persecutory beliefs dropped over the 'number of games played'. There was also a significant interaction between game number and reciprocity errors F $(5, 195) = 19.83$, $p < 0.001$ suggesting that reciprocity errors (irrational distrust) moderated the amount of decrease in conviction in persecutory beliefs, suggesting a maintenance role of reciprocity errors on persecutory conviction. There was also a significant interaction between game number and exploitative harm $F(5, 795) = 47.625$, $p < 0.001$ suggesting that the size of the difference in persecutory conviction between those who played against a 'Nice' strategy and those who played against a 'Nasty' strategy decreased over the number of games played. This may be explained by the difference in reactivity of the two conditions. The Nasty strategy was a non reactive strategy which made it eventually exploitable. There were no other significant interactions of any other factors with the 'number of games played' within subjects factor.

There were significant main effects for the 'exploitative harm' factor F $(1, 159)$ $= 17.88$, $p = 0.02$ with people in the 'Nasty' condition reporting higher persecutory

conviction than those in the 'Nice' condition. This suggests that persecutory conviction is partly a reaction to a previous experience of exploitative harm. There was also a significant main effect for preagreement factor F (1, 159) =5.194, p=0.02 with people who had been invited to cooperate showing higher conviction in persecutory ideation than those who had not. This suggests that raising expectations of cooperation increases persecutory conviction, independent of actual exploitative harm, .

There was also a significant effect of the covariate, 'reciprocity errors' $F(1,159)= 55.79$; p<0.001, suggesting that persecutory conviction was not only related to experience of an exploitative harm (i.e. rational distrust) but was also related to patterns of behaviour which were non-optimal (i.e. paranoid) in relation to both the individual and collective outcomes.

A graph of the estimated marginal means (covarying reciprocity error) for each of the fixed factors is shown in Graph 1.

Graph 1 Estimated Marginal Means of Persecutory Conviction (Covarying Reciprocity Errors.)
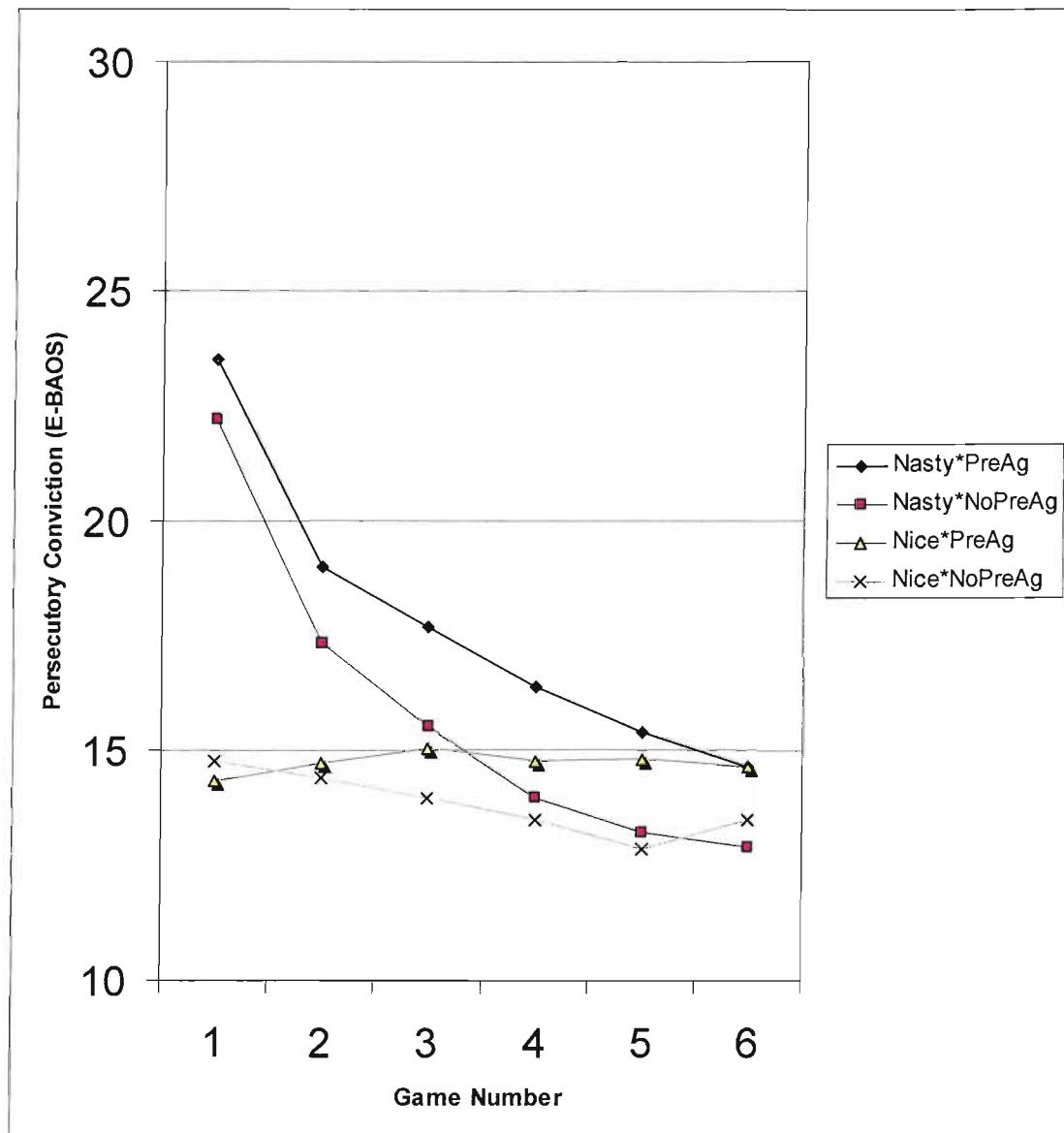
Effects of Suspicion and Gender on Persecutory Conviction

Of the 164 participants, 27 (16.5%) questioned whether they were playing against a real opponent. These participants could not simply be removed from the analysis as they distributed unevenly over the four conditions (15 being in the nice/preagreement, five being in the nice/no preagreement, five being in the nasty preagreement and one being in the nasty/no preagreement.) Instead a dichotomous variable was created relating to whether or not participants asked if they were playing a real opponent. When this item was added to the previous ANCOVA analysis as an additional covariate it was not found to be significantly related to persecutory conviction $F(1,150)=0.195$ $p=0.659$ (n.s.). This suggests that persecutory conviction scores were not significantly affected by whether participants suspected they were playing a real opponent. Because there was a high proportion of females in our sample the same analysis was done with gender to see if there were significant sex differences in persecutory conviction. Again this covariate was not significant $F (1,158) =.667$, $p=0.415$ (n.s.) suggesting no significant sex differences in persecutory conviction.

The relationship between persecutory conviction, sub categories of reciprocity errors and motivational factors

To investigate the relationship between persecutory conviction (E-TOS), motivational factors (IPDMS) and reciprocity errors, firstly a Pearson's product moment correlation matrix was calculated. This is shown in Table 4. This analysis showed that all reciprocity errors were significantly positively correlated with persecutory conviction. Egocentric motives were positively correlated with persecutory

conviction whilst collective motives were negatively correlated with persecutory

conviction.

Table 5: Correlations between E-TOS persecutory conviction scores, reciprocity errors
and motivational factors

	Reciprocity Errors						Motivational Factors		
	Opposit'l Disposition (OD)	Non-retaliation (NR)	Exploit (EXP)	Grudge (GRU)	Failure to Repent (FR)	Penance (PEN)	Collective Motives (COL)	Egocentric Motives (EGO)	Self Sacrifice/ Altruistic Motives (SSA)
Persecutory Conviction	.15***	.13***	.15***	.17***	.31***	.04***	-.45***	.36***	.06 n.s.
OD		-.20***	.27***	-.08* p=0.018	.58***	.13***	-.26***	.32***	.09** p=0.005
NR			-.10 p=0.001	-.15***	-.15***	-.09** p=0.006	.07* P=.029	-.15***	-.06n.s. p=0.068
EXP				-.09** p=.004	.14***	.052 n.s. p=.105	-.21***	.29***	-.21***
GRU					-.18***	-.07* p=0.021	-.32***	.30***	-.06n.s. p=0.051
FR						0.25***	-.43***	.45***	-.01 p=0.656
PEN							-.17***	.09** p=0.005	-.05n.s p=.101
COL								-.72***	-.07* p=0.023
EGO									.07* p=0.021

*** p<0.001

In order to explore direct relationships of the sub categories of reciprocity errors

and the separate motivational factors with persecutory conviction, a stepwise regression

analysis was carried out. Predictor variables included the fixed factors (exploitative harm, preagreement, and game number), the six subcategories of reciprocity errors and the three motivational factors. The analyses produced a model that explained 37.1 % of the variance in persecutory conviction. Predictor variables included in decreasing order of contribution, collective motivation (β=-.295, S.E.=0.019; p<0.001), game number (β=-.260, S.E.=0.086; p<0.001), exploitative harm (β=.208, S.E.=.365; p<0.001), Failure to Repent RE (β=.292, S.E. =.140; p<0.001), pre-agreement (β=.097, S.E.=.305; p<0.001), Non-retaliation RE (β=.114, S.E.=.459, p<0.001), Low Trust Disposition RE (β=-.083, S.E.=.427, p=0.013), Exploit RE (β=.080, S.E.=.250, p=0.004), and Grudge RE (β=.070, S.E.=.193, p=0.033). Penance RE was the only reciprocity error not to significantly predict persecutory conviction in the presence of all the other reciprocity errors. Penance reciprocity errors were therefore not included in further analyses. Oppositional Disposition RE was the only reciprocity error to be negatively related to persecutory conviction. People with lower trust disposition therefore had less persecutory conviction, a relationship which seems counterintuitive.

To determine whether oppositional disposition errors related to a low trust disposition rather than an attempt to exploit one's opponent a binary logistic regression was carried out using game one selection (i.e. cooperate/compete) as a dichotomous dependent variable and items two and three of the IPDMS (I wanted the other person to stay longer than me; I wanted the other person to stay behind as long as possible) as predictor variables relating to exploitative egocentric motives and item six (I wanted to defend myself against the actions of the other person) as a predictor variable relating to distrustful egocentric motives. Items 3 β=.607, S.E. =.249, p=0.015 and item 6, β=.519,

S.E. =.120, p<0.001 were significantly related to non cooperation on game one

suggesting a mixture of distrust and exploitative motives for oppositional disposition

errors.

Path analysis of relationship between motivational factors and reciprocity errors

Having established the direct predictors of persecutory conviction, the inter-

relationship between the motivational factors and the reciprocity errors warranted

further investigation. This was done using a series of regressional analyses to inform an

overall path analysis.

Given the previous correlational analysis (see Table 5) all reciprocity errors

were predicted to be significantly related to one another. In addition in terms of the

relationship between social motivational factors and subcategories of reciprocity errors

the correlational analysis (Table 5) suggested significant negative relationships between

collective motivation and four of the five remaining subcategories of reciprocity error

(predicting persecutory conviction). Non-retaliation was the only subcategory to be

significantly positively associated with collective motivation. Oppositional motives

were predicted to be significantly positively associated with all subcategories of

reciprocity errors except non-retaliation. The predicted relationship between the five

subcategories of reciprocity errors with self-sacrifice/altruistic motives was less clear

with a number of negative trends in the correlational analysis (non-retaliation, grudge

and failure to recompense) and a significant positive relationship with oppositional

disposition reciprocity error and a significant negative relationship with exploit

reciprocity error. The correlation matrix (Table 5) also predicted the social motivational

factors to be inter-related with collective motivation significantly negatively related to

egocentric motivation and negatively related to self-sacrifice/altruistic motivation and

self sacrifice motivation positively associated with egocentric motivation.

The five reciprocity errors which directly predicted persecutory conviction

(from the previous analysis) were each used as dependent variables, in five separate

multiple regressions, each analysis including the remaining four reciprocity errors, and

the three motivational factors as predictor variables. This type of analyses controlled for

the degree to which reciprocity errors were inter-related, as was demonstrated by the

initial correlation matrix (Table 5). Although a number of regressions were conducted

this was a planned strategy so no correction to avoid Type II error was considered

necessary. Given that all the regressions used no more than eight predictor variables,

and the number of participants was 164 this amounted to at least 20.5 cases per variable

which exceeds the recommended minimum of 15 cases suggested by (Dancey and

Reidy, 2004).

In addition to these five regressions, two separate regressions were carried out

to investigate the inter-relationship between the motivational factors. The first of these

analyses used egocentric motivation as the dependent variable and collective and self

sacrifice/altruistic motivation as predictor variables. The second used self

sacrifice/altruistic motives as the dependent variable and egocentric and collective

motives as predictor variables. The results of these analyses are displayed in Table 6.

Table 6: Path Analysis Steps

Regression analysis 1a:
DV: Non-retaliation RE $F_{(7,989)}=13.437$,$p<0.001$, $R^2=.081$

IV	Standardized Estimate	T	p
Egocentric Motivation	-.164	-3.539	<0.001***
Collective Motivation	-.065	-1.350	0.177 n.s.
Self Sacrifice/Altruistic Motivation	-.057	-1.818	0.069 n.s.
Grudge RE	-.223	-6.123	<0.001***
Exploit RE	-.074	-2.182	0.029*
Failure to Repent RE	-.151	-3.386	0.001***
Oppositional Disposition RE	-.121	-3.110	0.002**

Regression analysis 1b:
DV: Grudge RE $F_{(7,989)}=68.238$, $p<0.001$, $R^2=.322$

Collective Motivation	-.324	-8.391	<0.001***
Egocentric Motivation	.311	7.799	<0.001***
Self Sacrifice/Altruistic Motivation	-.093	-3.485	0.001***
Non-retaliation RE	-.165	-6.123	<0.001***
Exploit RE	-.195	-6.880	<0.001***
Failure to Repent RE	-.493	-13.988	0.001***
Oppositional Disposition RE	.058	1.729	0.084n.s.

Regression analysis 1c:
DV: Exploit Error $F_{(7,989)}=32.594$, $p<0.001$, $R^2=0.183$

Collective Motivation	-.077	-1.769	0.077n.s.
Egocentric Motivation	.313	7.113	<0.001
Self Sacrifice/Altruistic Motivation	.108	3.683	<0.001
Non-retaliation RE	-.065	-2.182	0.029
Grudge RE	-.236	-6.880	<0.001
Failure to Repent RE	-.224	-5.358	<0.001
Oppositional Disposition RE	.242	6.713	<0.000

Regression analysis 1d:
DV: Oppositional Disposition RE $F_{(3,989)}=89.673$, $p<0.001$, $R^2=.390$

Collective Motivation	.070	1.840	0.066
Egocentric Motivation	.022	0.573	0.567
Self Sacrifice/Altruistic Motivation	.066	2.569	0.010
Non-retaliation RE	-.081	-3.110	0.002
Grudge RE	.052	1.729	0.084
Failure to Repent RE	.574	18.044	0.001
Exploit	.182	6.713	<0.001

Table 6 (Continued) Path Analysis Steps

Regression analysis 1e: DV: Failure to repent RE $F(3,989)=164.264$, $p<0.001$, $R^2=.536$			
Collective Motivation	-.269	-8.443	<0.001
Egocentric Motivation	.255	7.714	<0.001
Self Sacrifice/Altruistic Motivation	-.093	-4.192	<0.001
Non-retaliation RE	-.076	-3.386	<0.001
Grudge RE	-.337	-13.988	<0.001
Oppositional Disposition RE	.434	18.044	<0.001
Exploit	-.127	-5.358	<0.001
Regression analysis 3a DV: Collective Motives $F(2,989)=539.538$, $p<.001$, $R^2=.521$			
Egocentric Motives	-.721	-32.685	<0.001
Self Sacrifice Motives	-.019	-.871	.384 n.s.
Regression analysis 3b DV: Self Sacrifice Motives $F(2,989)=3.057$, $p<0.047$, $R^2=.004$			
Collective Motives	.045	.971	.332 n.s.
Egocentric Motives	-.040	-.871	.384 n.s.

From these results, a path diagram was drawn up representing the statistically significant relationships (i.e. $p<0.05$) between the individual reciprocity error subcategories and the motivational factors, taken from the regression analyses described above. This is shown in Figure 2.

Figure 2: Path Diagram of Significant Relationships between reciprocity error subcategories and motivational factors
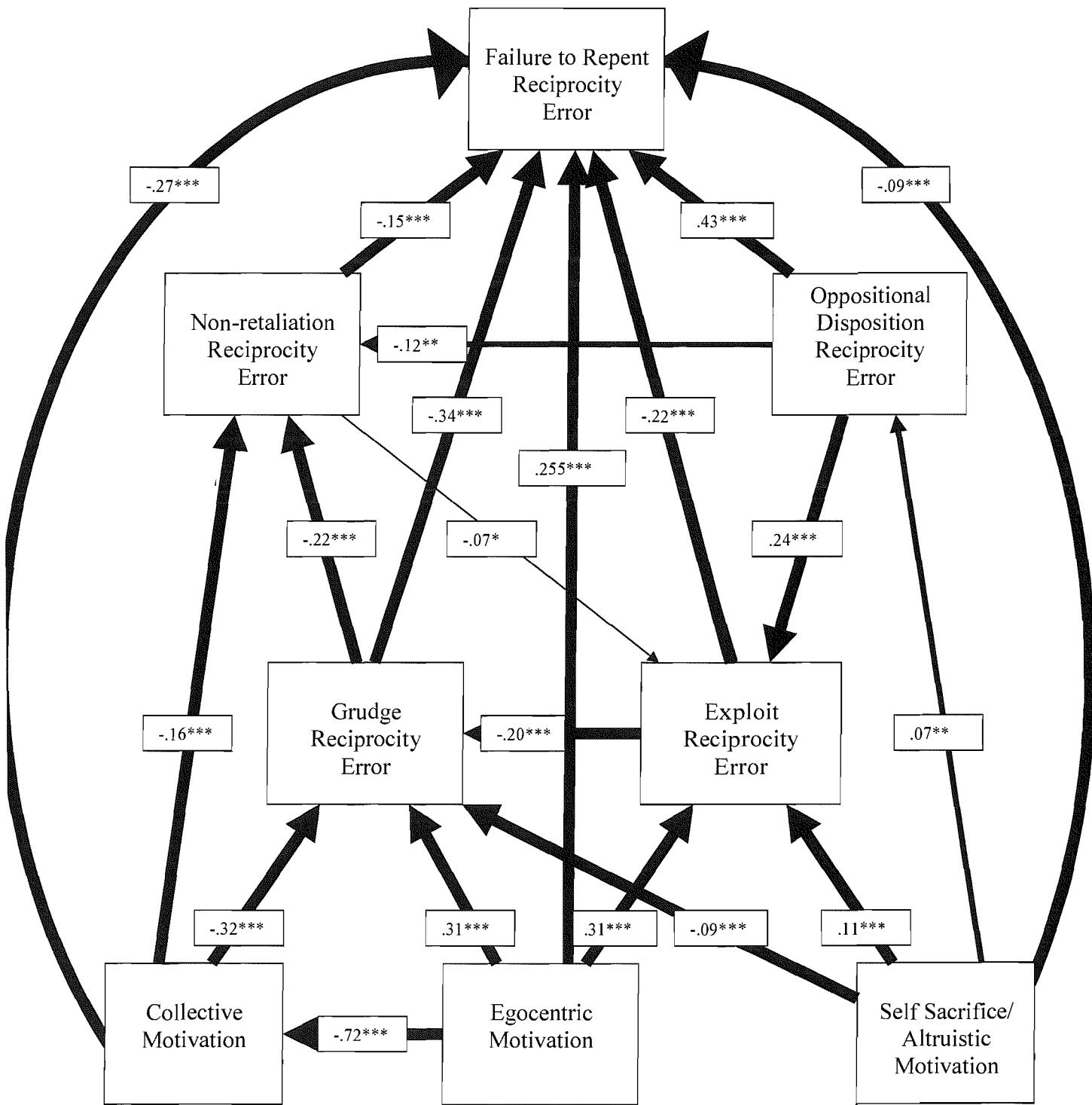
From this a number of interesting patterns emerged. Firstly, all of the subcategories of reciprocity errors were interrelated with every other subcategory, with the exception of there being no significant relationship between Oppositional Disposition and Grudge. However, there was a trend of a relationship between these two subcategories which approached significance (β =.052, t= 1.729; p=0.084). Despite the generally high significance in the relationships between the subcategories of reciprocity errors, the direction of the relationships varied. Eight out of the ten relationships were negative. The two positive relationships found were between Oppositional Disposition and Exploit, and between Oppositional Disposition and Failure to Recompense.

Examining the relationships between the motivational factors and the sub categories of reciprocity errors, some distinct patterns emerged. For instance, collective motivation shared negative relationships with three of the subcategories of reciprocity errors (Grudge, Non-retaliation and Failure to Repent) whereas egocentric motivation shared positive relationships with three subcategories of reciprocity error (Grudge, Failure to Repent, and Exploit). Self sacrifice/altruistic motives shared a mixture of positive (Exploit and Oppositional disposition) and negative relationships with reciprocity errors (Grudge and Failure to Repent).

In addition, the analysis of the inter relationships of the motivational factors revealed a strong negative relationship between egocentric and collective motivations. This suggests that increases or decreases in one or other of these motivational factors may lead to the opposite effect in the other motivational factor. This inter-relationship

enhances the overall effect of each motivational factor on reciprocity errors i.e. mediated by its opposite effect in the other motivational factor.

It is also worthy of note that Oppositional disposition errors were the only reciprocity error to be negatively associated with persecutory conviction. Oppositional disposition was also the only reciprocity error not to be directly associated with either egocentric or collective motives, being solely related to self sacrifice/altruistic motives.

Factor analysis of reciprocity errors

The relationships between the subcategories of reciprocity errors were explored further using factor analysis, to determine whether the subcategories divided into component factors. A principle components factor analysis with varimax rotation was carried out, with a cut off point of 0.4 for the inclusion of the variable in the interpretation of a component. Examination of the scree plot indicated a two factor component solution which accounted for 59.4% of the variance. The Eigen values were 1.82 and 1.15 (with a third component being 0.89, a fourth 0.75 and a fifth 0.39) (See Table 7).

Table 7. Component loadings of reciprocity error subcategories

Reciprocity Error (RE)	Component 1 Provocative Reciprocity Errors	Component 2 Reactive Reciprocity Errors
Oppositional Disposition RE	.85	
Non-retaliation RE		-.72
Exploit RE	.50	
Grudge RE		.79
Failure to Repent RE	.82	

The first of the two specified components for the rotated solution included the subcategories of reciprocity errors, Oppositional Disposition, Exploit and Failure to Repent. This component was labelled 'Provocative errors' because such errors are likely to provoke retaliation from an optimal TIT-FOR-TAT strategy. The second component included Non-retaliation error (negatively weighted) and Grudge. This component was labelled 'Reactive errors' as these are primarily errors in reacting to an opponents competitive strategy, either not responding (Non-retaliation) or responding excessively (Grudge).

The relationship between reciprocity errors and Paranoia Checklist Scores

To investigate whether reciprocity errors were related to pre rated scores on the Paranoia Checklist, three separate multiple regressions were conducted using the three dimensions of the Paranoia Checklist (Frequency, Conviction and Distress) as three separate dependent variables, and the six subcategories of reciprocity errors as predictor variables. None of the three models significantly predicted paranoid frequency $R^2 = -.02$, $F(6,151)=.513$, $p=0.798$, paranoid conviction, $R^2=-.032$, $F(6,154)=.208$ $p=0.974$ or paranoid distress, $R2=0.029$, $F(6,151)=1.763$, $p=0.111$ suggesting that reciprocity errors measured over the iterated prisoner's dilemma game were not related to global pre-ratings of paranoia. However, there was a trend for penance errors to be positively related to paranoid distress, $\beta=.160$, $t=1.937$, $p=0.06$ suggesting that individuals who had difficulty not responding to retaliation they had provoked had higher paranoid distress. None of the other individual predictor variables were close to significantly predicting Paranoia Checklist Scores. Overall this analysis suggests that

persecutory ideation as measured by the Paranoia Checklist does not relate significantly

to reciprocity errors. It is possible that persecutory ideation as measured by the

Paranoia Checklist relates more strongly to actual exploitative harm rather than

persecutory ideation associated with non optimal patterns of reciprocity (i.e. paranoia).

Alternatively reciprocity errors measured on the iterated prisoner's dilemma relate to a

specific persecutor and therefore may not generalise more globally to global ratings of

persecutory ideation. Therefore, Paranoia Checklist scores may need to be compared to

more general ratings of reciprocity such as global measures of submissiveness,

forgiveness, trust disposition and repentance.

Discussion

This study investigated the role of exploitative harm, preagreed cooperation,

familiarity and reciprocity errors on persecutory conviction, using a simulated iterated

prisoner's dilemma game. The findings suggest that persecutory conviction was

positively related to experiences of exploitative harm and to raised expectations of

cooperation through a preagreement to cooperate. The findings therefore suggest that

experimentally manipulated experiences of betrayal (a combination of both an

expectation of cooperation and an exploitative harm) lead to higher levels of

persecutory conviction compared to conditions in which there were no pre-agreement to

cooperate.

The findings partly contradict a proposal by Soloman and Flores's that the key

to trust is commitment made and commitment honoured (Soloman and Flores, 2001; p.

ix). Whilst persecutory conviction did decrease with experience of trusting interactions,

making an explicit commitment to cooperate increased rather than decreased

persecutory conviction. In addition, persecutory conviction was associated with

departures from the TIT-FOR-TAT strategy known as 'reciprocity errors'. This

suggests that whilst some persecutory ideation is related to an actual exploitative harm

(i.e. well founded), a proportion of persecutory conviction is associated with non-

optimal patterns of reciprocity and is therefore instrumentally irrational (i.e. paranoid).

The idea of instrumental rationality derives from the work of Spohn (2002) who

proposed that general assessments of rationality are based upon a subject's actions in

relation to both "her empirical beliefs or judgements about the happenings of the world,

and relative to her interests, desires, values etc. and thus according to her subjective

standards" p2. Spohn (2002) therefore suggests that rationality is not only relative to

one's beliefs about the world (an empirical rationality) but also assessed by one's

behaviours in relation to one's needs, values and desires (an instrumental rationality).

Such a distinction between rational and irrational distrust (i.e. paranoia) is

necessary, in that we have previously acknowledged that distrust has the propensity to

be well founded and adaptive. Paranoia may therefore be conceptualised as an irrational

form of distrust where persecutory beliefs are not only unfounded (e.g. Freeman and

Garety 2005; i.e. empirically irrational) but also associated with patterns of

interpersonal behaviour which are self defeating and/or have an overall detrimental

effect on the collective (instrumentally irrational).

Reciprocity errors were found to moderate the effect of familiarity with one's

opponent on persecutory conviction. This suggests that reciprocity errors were not only

integral to paranoia but served a role in maintaining persecutory conviction. When

these reciprocity errors were broken down into a number of subcategories, four of the six categories (non-retaliation, grudge, exploit, failure to repent) remained positively associated with persecutory conviction. One subcategory, oppositional disposition, was negatively associated with persecutory conviction. This latter relationship contradicts the commonly held idea that paranoia represents a low trust disposition. However upon closer analysis our findings suggested that an oppositional disposition not only related to self protective (distrustful) motives but also to self interested attempts to exploit the other person. The relationship between an oppositional disposition and lower persecutory conviction may possibly be explained by a tendency for an oppositional individual to make more internal attributions for an opponents lack of future cooperation, blaming themselves for their opponents lack of cooperation rather than attributing it to their opponent's malevolent intent. However, because attributions were not measured in this study, this remains a theoretical prediction that warrants further investigation. Penance errors, i.e. wrongly reacting to deserved retaliation, were found to be the only reciprocity error not significantly related to persecutory conviction.

Those reciprocity errors that did directly predict persecutory conviction were found to comprise of two distinct factors, 'provocative' and 'reactive' reciprocity errors. Upon closer inspection the 'reactive' category was found to be composed of two opposing dimensions, 'non-retaliation' paranoia and 'grudge' paranoia. In line with the ideas of high rank and low rank paranoia proposed by Gilbert et al. (2005), we predict that the occurrence of such reciprocity errors are likely to be determined by an individual's social comparison with their persecutor, with those comparing themselves as inferior to their persecutor being more likely to engage in non-retaliation errors,

whereas those comparing themselves as superior are more likely to engage in grudge errors. However, because there was no measure of social comparison to the simulated opponent, this is another hypothesis that warrants further investigation.

Persecutory conviction was found to be directly negatively associated with collective motivations. That is, the more collective an individual was in their motives, the less persecutory conviction they experienced. This may be explained by people with high collective motives tending to see the relative compromises involved in mutual cooperation as collectively beneficial, and therefore non-threatening, compared with those with low collective motives. Egocentric motivations only had an indirect effect on persecutory conviction, mediated through reciprocity errors. Greater egocentric motives were associated with greater reciprocity errors, whilst greater collective motives were associated with fewer reciprocity errors. It may be that collective motivations lead to fewer reciprocity errors because a collective interest is likely to promote beneficial mutual cooperation both in the short and long term. However egocentric motives are likely to prompt detrimental patterns of mutual competition in the short term whilst individuals will only begin to recognise the individualistic benefits of mutual cooperation with greater foresight. More generally, our findings suggest that an egocentric approach to relationships may be a vulnerability factor to paranoia. These findings support the common clinical observation that psychotic phenomena are often characterised by egocentricity (e.g. Harrop and Trower p. 43). We have therefore highlighted a possible mechanism (i.e. problems in reciprocity) by which egocentricity may translate into paranoia.

Overall the study introduced a novel methodology for differentiating rational

distrust from irrational distrust (i.e. paranoia). By carefully controlling the amount of

exploitative harm a simulated opponent poses, it was possible to differentiate the degree

to which persecutory beliefs in a student sample are associated with actual exploitative

harm, and to what degree they are related to non-optimal patterns of cooperation. The

use of such a methodology offers an advantage over questionnaire studies in that not

only does it allow for experimental control over the amount of exploitative harm in the

environment, it also allows for the measurement of interpersonal behaviours related to

persecutory beliefs. One of the limitations in generalising from the prisoner's dilemma

to relationships in general is not only the prisoner's dilemmas use of an individual

opponent, but also that in its traditional form, the Prisoner's dilemma depicts an

interaction in which the contingencies for each player are equal. In many situations in

life, the contingencies of cooperating may be unequal i.e. they may benefit one

individual more than another. For this reason, our findings will need to be generalised

using more global measures of reciprocity. Future studies may wish to use more global

measures of reciprocity dimensions such as submissiveness, assertiveness, forgiveness,

a tendency to exploit others, a tendency not to repent, and a low trust disposition. A

number of studies have already demonstrated the generalisability of a proportion of our

findings in that paranoia has been found to be related to self-reports of submissive

behaviour in student populations (e.g. Freeman et al., 2005) and in a mixed clinical

population (Gilbert et al., 2005). Paranoid personality style has also been found to be

positively associated with measures of enduring resentment, an overall willingness to

avenge and negatively with overall willingness to forgive, using self report measures of

forgiveness in a general population sample (Munoz Sastre et al 2005).

If our findings are robust, it might be important to consider how they generalise

to clinical populations. Our conceptualisation of paranoia as an instrumentally irrational

form of distrust provides a fully dimensional view of paranoia which bridges the gap

between persecutory ideation in the normal population and clinical paranoia in which

persecutory ideation is assessed in relation to measurable self-defeating interpersonal

behaviour. This conceptualisation has its advantages over those based on foundedness

of the belief alone as measuring the foundedness of a belief is problematic. Our

conceptualisation of paranoia as an irrational form of distrust also draws together a

number of previously disparate concepts such as distrust, paranoia, and persecutory

ideation. Up until now clinical psychology research on paranoia has rarely drawn on the

wealth of social psychology literature on distrust (e.g. Kramer and Messick, 1998). This

is likely to be because researchers have tended to view distrust and clinical paranoia as

phenomenologicaly independent concepts, being unaware that a perception of

malevolent intent is central to both. Relating persecutory beliefs to distrust highlights

how beliefs about another's malevolence (i.e. persecutory beliefs) are also closely

related to beliefs about another's predictability, honesty, and competence. It may

therefore be useful to view persecutory beliefs (malevolence) as a sub-component of

overall distrust. A broadening of the definition of paranoia it seems is called for in

which not only the cognitive features of paranoia are elucidated, but also the

behavioural, emotional and interpersonal components. Given that paranoia is essentially

an interpersonal phenomena (requiring beliefs in a relationship with a persecutor), our

conceptualisation of paranoia as an irrational form of distrust encourages persecutory ideation to be viewed within its historical and social context, as well as in relation to its interpersonal and behavioural consequences. Clinically paranoia is well known for its detrimental social consequences, including social isolation, a disabling fear of others and at times increased hostility towards others.

To finish, our study is the first to our knowledge to use the prisoner's dilemma game as a method to differentiate persecutory ideation related to previous exploitative harm from persecutory ideation related to patterns of behaviour which are disadvantageous both for the individual and their collective. This confirms that persecutory ideation can be a rational reaction to exploitative harm and prepares the individual for the reality of competitive and exploitative encounters, not to mention the possibility of retaliation. It is when an individual reacts to such ideation in ways which are relatively detrimental to them and their collective that persecutory ideation may be considered as paranoid. This view of paranoia informed by the notion of instrumental rationality, we believe complements the more traditional view of paranoia as 'unfounded' persecutory beliefs.

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Appendices   **Page**

Appendix ai) Information sheet for participants

Study of Social Strategies
Consent Form for Research Participants

Information sheet

I am **Ben Frayne**, a postgraduate student at the University of Southampton. I am requesting your participation in a study looking at people's social strategies in relationships.

The study is in 3 parts.

Summary

Part 1: Internet based questionnaire	Maximum	50 minutes	Complete in your own time and send to experimenter
Part 2: Computerised strategy game	Maximum	20 minutes	Consecutive parts: arrange by booking single time at least a week later
Part 3: Computerised cognitive task	Average	20 minutes	
Total for all 3 Parts	Average	1 hr 30mins	
Course credit given	Exactly	1hr 30 minutes (upon completion)	

Parts 2 and 3 will involve being part of a group of 4 other participants. You will be randomly paired with one of the participants to play a computerised strategy game. The amount of time you will spend in the subsequent Part 3 varies between 0-30 minutes dependent on the results of your game in Part 2. You will be given 1 hour and 30 minutes worth of credit (irrespective of the time it takes you to complete the whole study).

Personal information obtained within the study will not be released to or viewed by anyone other than researchers involved in this project. Results of this study will not include your name or any other identifying characteristics. Should you wish to have more information about the design of the study we will endeavour to answer your questions where possible. A debriefing statement will be supplied on request. To request a debriefing statement please contact me on **023 80595321** or by e-mail at **bff103@soton.ac.uk**. We regret that we will not be able to give you a comprehensive account of the specific research questions until all data collection is complete. We apologise for this delay

Your participation is voluntary and you may withdraw your participation at any time. *[For students: If you choose not to participate there will be no consequences to your grade or to your treatment as a student in the psychology department].*

If you have any questions please ask them now, or contact me **Ben Frayne** at **023 80595321** and/or **bff103@soton.ac.uk**
Ben Frayne: Postgraduate student (University of Southampton)

Appendix aii) Consent form for study

Statement of Consent

I _____ have read the above informed consent form.
   [participants name]

I understand that I may withdraw my consent and discontinue participation at any time without penalty or loss of benefit to myself. I understand that data collected as part of this research project will be treated confidentially, and that published results of this research project will maintain my confidentially. In signing this consent letter, I am not waiving my legal claims, rights, or remedies. A copy of this consent letter will be offered to me.

I give consent to participate in the above study.
(Circle below)

Yes   No

....
Signature   Date

....
Name

I understand that if I have questions about my rights as a participant in this research, or if I feel that I have been placed at risk, I can contact the Chair of the Ethics Committee, Department of Psychology, University of Southampton, Southampton, SO17 1BJ. Phone: (023) 8059 3995.

The role of trust, violations of trust and verification of trust in persecutory ideation

Debriefing Statement

The aim of this research was to look at the relationship between trust (behaviours and beliefs) and violations of trust with persecutory ideation (thoughts that others are out to get you). It is predicted that persecutory ideation is closely related to experiences of having been betrayed. Your data will help our understanding of persecutory ideation as it exists within a student population. Once again results of this study will not include your name or any other identifying characteristics. The experiment did use deception. You were made to think you were playing the computer strategy game against a fellow participant when in actual fact you were playing against the computer. This deception was necessary to investigate how you would react to carefully controlled experiences of violations of trust and experiences of honoured trust. We were recording the strategies you used for each game, and your perceptions of your opponents intent from the questionnaires you completed after each game. Part 3 of the study was also fictitious i.e. there was no tedious cognitive task for you to stay behind and complete. We deceived you by saying that the computer programme for this task wasn't working properly. This deception was necessary to make you believe that your opponent intended to harm you i.e. make you stay behind afterwards to complete a tedious cognitive task. Rather than give you a tedious cognitive task we felt it to be kinder to let you go at this point. We realise how much many people dread those tedious cognitive tasks! If you have any further questions please contact me Ben Frayne at 023 80595321 and/or bffl03@soton.ac.uk.

Thank you for your participation in this research.

If you have questions about your rights as a participant in this research, or if you feel that you have been placed at risk, you may contact the Chair of the Ethics Committee, Department of Psychology, University of Southampton, Southampton, SO17 1BJ. Phone: (023) 8059 3995.

Appendix b) Pre-training sheet for prisoner's dilemma game

Social Strategy Task- Possible outcomes for each player

Each player has two possible strategies X and Z
There are four possible outcomes:

These outcomes are represented in the diagram below

	OTHER PLAYER'S STRATEGY	
	X	Z

		X	Z
Y O U R S T R A T E G Y	X	1 / 1	0 / 5
	Z	5 / 0	3 / 3
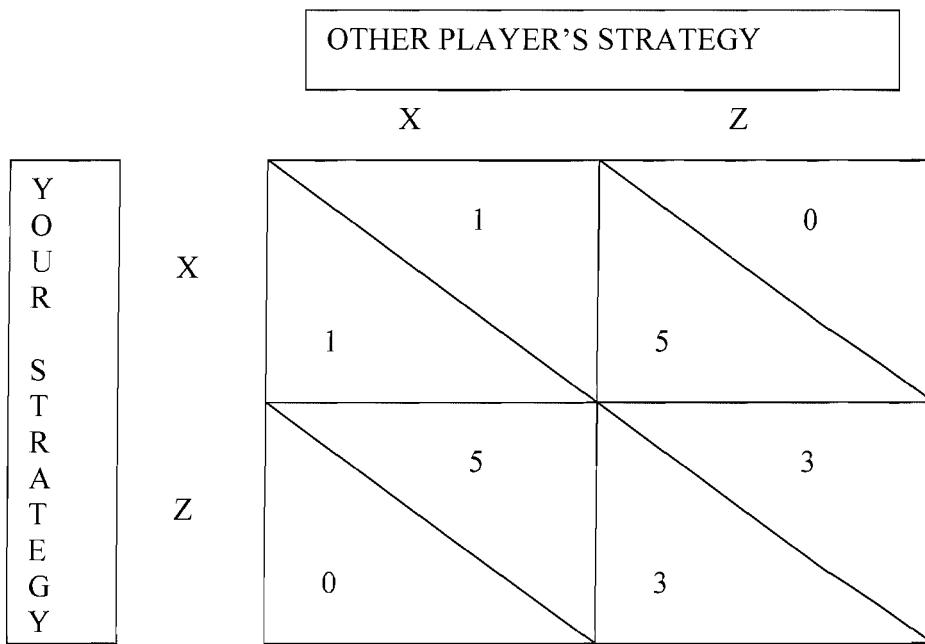
Please complete the 'Your outcome' and 'Opponents outcome' columns to show that you understand the rules

Your Strategy	Other Players Strategy	Your Outcome	Opponents Outcome
X	Z		
Z	Z		
Z	X		
X	X		

Appendix ci) Outline of information presented to participants on the computer programme prior to commencing the iterated prisoner's dilemma game.

Social Strategies

Please read the following instructions carefully.

Welcome to Parts 2 and 3 of the experiment called '**Social Strategies.**'

You should have previously completed a number of questionnaires for Part 1. If you have not already completed these questionnaires please inform the experimenter now.

Parts 2 and 3, today, will both be lab-based computerised tasks.

Part 2

In part 2 you will take part in an interactive computerised strategy task with another participant in a neighbouring lab. Both computers have been networked to allow you to participate head to head online.

The outcome of this task in Part 2 will determine how long each of you will be asked to stay behind to complete Part 3.

Part 2 should last no longer than 15 minutes.

Part 3

Part 3 involves participating in an incredibly tedious cognitive concentration task which may cause you a degree of mental discomfort.

NOTE: The amount of time you will each be asked to participate in Part 3 (the cognitive concentration task) will vary from:

a minimum of **0 minutes** to a maximum of **30 minutes.**

When this amount of time is up you will have completed the study and will receive your credit/payment for having participated.

Remember: Your own individual performance in Part 2 will dictate how long you will be asked to stay behind to participate in Part 3. Do you understand the instructions so far?

Yes/No

Appendix cii) Outline of information presented to participants on the computer programme prior to commencing the iterated prisoner's dilemma game.

Interactive Social Strategy Task

You will now be playing head to head against another participant in a neighbouring lab in a **Social Strategy Task**.

You will not be able to commence the task until both you and the other participant have read these instructions carefully and have clicked below to say that they understand the rules.

Please take a few minutes to read the rules of the game and make sure you understand them.

Instructions

NOTE: Your performance on this task determines how long you will need to stay behind in Part 3 to complete the tedious cognitive concentration task.

You will play between 0 to 10 games (to be randomly determined by the computer)

You both have the choice of two strategies X and Z.

The outcome of each game will be determined by the combination of both your's and the other player's strategy.

The scoring criteria will follow

Click below to continue

Continue

Appendix ciii) Outline of information presented to participants on the computer programme prior to commencing the iterated prisoner's dilemma game.

Social Strategy Task- Possible outcomes for each player

There are four possible outcomes:

- If **you chose an 'X'** strategy and
  the **other player chooses an 'X'** strategy
  then **both of you will stay behind an extra 1 minute.**

- If **you choose a 'Z'** strategy and
  the **other player chooses a 'Z'** strategy
  then **both of you** will **stay behind an extra 3 minutes**

- If **you choose an 'X'** strategy and
  the **other player chooses a 'Z'** strategy
  then **you will stay behind an extra 5 minutes**
  and **the other person** will **not have any time added on.**

- If you choose a **'Y'** strategy and
  the **other person chooses an 'X'** strategy
  then **you will not have any time added on**
  and **the other person** will **stay behind an extra 5 minutes**

These outcomes are represented in the diagram below

OTHER PLAYER'S STRATEGY

		X	**Z**
Y O U R S T R A T E G Y	**X**	1 / 1	0 / 5
	Z	5 / 0	3 / 3
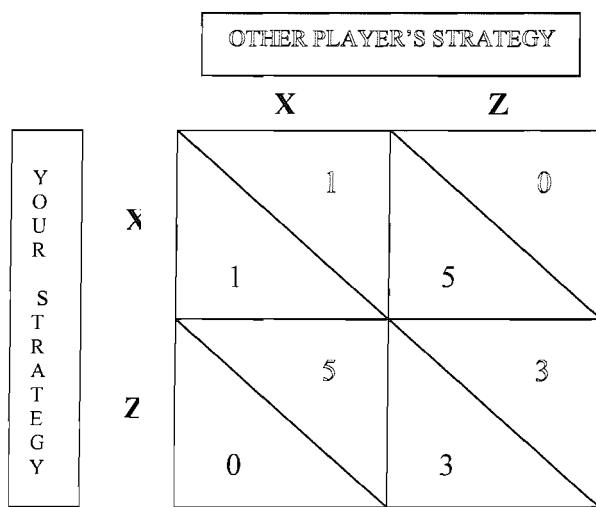
-These outcomes will be presented before each trial. Try and make yourself familiar with them now for the next two minutes before the task commences.
-You have 5 minutes to make yourself familiar with these rules
-After each game you will be asked to complete 2 computerised questionnaires.

Appendix civ) Outline of information presented to participants on the computer programme prior to commencing the iterated prisoner's dilemma game.

Opportunity to confer instructions *(only for confer conditions)*

You will now be asked to confer with the other player with regards to the strategy you will choose overall. Whether you decide to stick with that strategy is your own choice.

That is will you work in your joint interests i.e. **COOPERATE** with the other player
OR   will you **COMPETE** with the other player.

The computer will now randomly toss a coin for one player to make the first call.

Appendix cv) Outline of information presented to participants on the computer programme prior to commencing the iterated prisoner's dilemma game.

The computer has selected the other player to make the first call. You can decide whether you agree or disagree with them. Please wait whilst the other player decides what strategy they will call. This will appear in the form of a message to you once they have sent it.

Please wait for the other player to make their call.

Appendix cvi) Outline of information presented to participants on the computer programme prior to commencing the iterated prisoner's dilemma game.

The other player has made their decision. Please click below to open the message to see what they have decided and respond to the message as to whether you agree or not.

Open Message

Appendix cvii) Outline of information presented to participants on the computer programme prior to commencing the iterated prisoner's dilemma game.

The other player's message reads

> I've looked at the decision matrix and think we can both get out of this experiment quicker if we both work in our joint interests and both cooperate. Therefore I think we should both cooperate. Do you agree?

Please write your response to the other player in the box below and click send to respond to them

Your response...

>

When you are satisfied with your response click below.

Send
Message
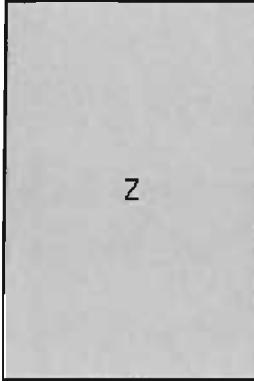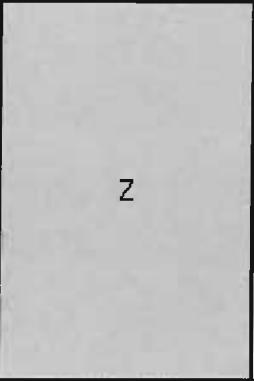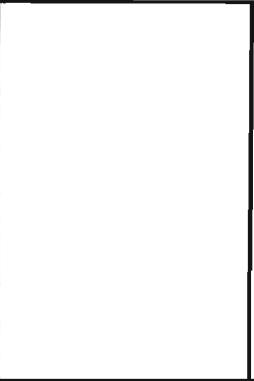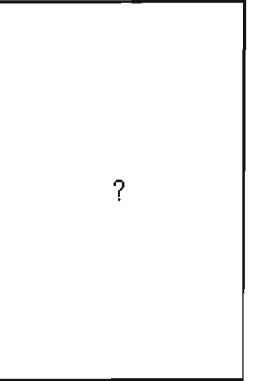
Appendix cviii) Outline of information presented to participants on the computer
programme prior to commencing the iterated prisoner's dilemma game.

Thank you. Your message has been received by the other player.

Please wait a few minutes whilst they read it.

Get ready to play.

Appendix d) Example of prisoner's dilemma game strategy selection screen

Game 1		Game 2	
Z	Z		?
Your Move	Other Player's Move	Your Move	Other Player's Move

Please choose your strategy
(N.B. At this point the other player will not be able to see your strategy selection.)

X ⌐   Z ⌐

Time up.
Please choose your strategy

Amount of time YOU
will be staying in Part 3

3 minutes

Rule Reminder

Amount of time YOUR OPPONENT
will be staying in Part 3

3 minutes

Appendix e) Iterated Prisoner's Dilemma Motive Scale (IPDMS)

	Not at all						Very Much
1. I wanted to encourage the other person to cooperate	1	2	3	4	5	6	7
2. I wanted the other person to stay longer than me	1	2	3	4	5	6	7
3. I wanted the other person to stay behind for as short a time possible	1	2	3	4	5	6	7
4. I wanted to minimise the amount of time we both stayed behind	1	2	3	4	5	6	7
5. I wanted the other person to stay behind as long as possible	1	2	3	4	5	6	7
6. I wanted to defend myself against the actions of the other person	1	2	3	4	5	6	7
7. I did not want the other person to stay behind longer than me	1	2	3	4	5	6	7
8. I wanted to stay behind for as long as possible	1	2	3	4	5	6	7
9. I wanted to minimise the amount of difference between the amount of time we both stay behind	1	2	3	4	5	6	7
10. I wanted to stay behind longer than the other person	1	2	3	4	5	6	7

Appendix f) Experimental Trustworthiness of Other Scale (E-TOS)

Please tick the boxes which describe how you experience the other participant

	Definitely	Probably	Maybe	Unsure	Maybe	Probably	Definitely	
Honest								Dishonest
Predictable								Unpredictable
Reliable								Unreliable
Trustworthy								Untrustworthy
Is friendly towards me								Is hostile towards me
Wants to please me								Wants to upset me
Wants to help me								Wants to harm me
Wants to play fair								Wants to exploit me
Respects me								Has it in for me

Appendix g) Paranoia Checklist (Freeman et al 2005) (Used with permission)

Paranoia Checklist

Please rate **how often have you had the thought**

		Rarely	Once a month	Once a week	Several times a week	At least once a day
1.	I need to be on my guard against others.					
2.	There might be negative comments being circulated about me.					
3.	People deliberately try to irritate me.					
4.	I might be being observed or followed.					
5.	People are trying to make me upset.					
6.	People communicate about me in subtle ways.					
7.	Strangers and friends look at me critically.					
8.	People might be hostile towards me.					
9.	Bad things are being said about me behind my back.					
10.	Someone I know has bad intentions towards me.					
11.	I have a suspicion that someone has it in for me.					
12.	People would harm me if given an opportunity.					
13.	Someone I don't know has bad intentions towards me.					
14.	There is a possibility of a conspiracy against me.					
15.	People are laughing at me.					
16.	I am under threat from others.					
17.	I can detect coded messages about me in the press/TV/radio.					
18.	My actions and thoughts might be controlled by others.					

Appendix g) Paranoia Checklist (Freeman et al 2005) (Used with permission)
Please rate **how strongly you believe it**

	Do not believe it	A little	Somewhat	A lot	Absolutely believe it
19. I need to be on my guard against others.					
20. There might be negative comments being circulated about me.					
21. People deliberately try to irritate me.					
22. I might be being observed or followed.					
23. People are trying to make me upset.					
24. People communicate about me in subtle ways.					
25. Strangers and friends look at me critically.					
26. People might be hostile towards me.					
27. Bad things are being said about me behind my back.					
28. Someone I know has bad intentions towards me.					
29. I have a suspicion that someone has it in for me.					
30. People would harm me if given an opportunity.					
31. Someone I don't know has bad intentions towards me.					
32. There is a possibility of a conspiracy against me.					
33. People are laughing at me.					
34. I am under threat from others.					
35. I can detect coded messages about me in the press/TV/radio.					
36. My actions and thoughts might be controlled by others.					

Appendix g) Paranoia Checklist (Freeman et al 2005) (Used with permission)
Please rate **how upsetting it is for you**

	Not distressing	A little	Somewhat	Moderately	Very distressing
37. I need to be on my guard against others.					
38. There might be negative comments being circulated about me.					
39. People deliberately try to irritate me.					
40. I might be being observed or followed.					
41. People are trying to make me upset.					
42. People communicate about me in subtle ways.					
43. Strangers and friends look at me critically.					
44. People might be hostile towards me.					
45. Bad things are being said about me behind my back.					
46. Someone I know has bad intentions towards me.					
47. I have a suspicion that someone has it in for me.					
48. People would harm me if given an opportunity.					
49. Someone I don't know has bad intentions towards me.					
50. There is a possibility of a conspiracy against me.					
51. People are laughing at me.					
52. I am under threat from others.					
53. I can detect coded messages about me in the press/TV/radio.					
54. My actions and thoughts might be controlled by others.					