THE RELEVANT AND RELIABLE LANGUAGE THEORY: DEVELOPING A LANGUAGE MEASURE OF TRUST FOR ONLINE GROUPS

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Declaration

I declare that the thesis is my own work, and has not been submitted in substantially the same form for the award of a higher degree elsewhere.

Steven Nicholson

25.04.2016

Abstract

This thesis investigated the link between trust and language in online dyadic, online group, and virtual community interactions. The first two empirical studies revealed that positive emotion is reliably linked to trust, that is to say that dyads and groups that produce more positive emotion words show greater trust. In addition, by priming group members to believe their group was either high or low in trustworthiness, the second empirical study revealed that group members produce more positive emotion words as a consequence of greater trust.

A third study revealed an additional important language phenomena to trust, this was a type of linguistic mimicry known as linguistic style matching (LSM). The study guided groups through established phases of group development (relational, task, and task resolution), findings revealed that LSM in the early, relational phase, predicted trust. Further analysis of the relationship between phase of development, positive emotion words and LSM revealed that when LSM was low in the relational phase, positive emotion once again became a cue used to trust in subsequent task phases.

The Relevant and Reliable Language Theory was proposed to explain the phase of group development dependent effects of LSM and positive emotion on trust. In short, the theory states that language must be relevant, i.e. the group is still undecided regarding trust judgements and still seeks trust relevant information, and reliable, i.e. in a given context, the language must be considered a genuine trust signal, and not one that appears 'faked' by 'opportunists'. Based on the novel theory, it was hypothesised in a forth study that disrupting LSM in an early relational phase, and positive emotion in a subsequent task phase (contexts where LSM and positive emotion were proposed to be most relevant and reliable to trust), would have the most

detrimental effect on trust. A confederate implementing these disruptions, relative to a comparable control, supported the theory; with groups who were subject to the 'strong' disruption producing lower trust behaviour than the control group.

A final study extended finding to real world online interactions in a virtual community focused on discussing credit card fraud, i.e. a criminal online group. The discussions were relational, rather than task focused, thus The Relevant and Reliable Language Theory predicted that LSM would be the most important language variable related to trust. The theory was supported as LSM, but not positive emotion, ebbed and flowed in line with predicted levels of trust.

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1. Chapter 1: An Introduction to Trust, Trust Online, and Trust Measurement

This thesis will study the link between language and trust in online group interactions. Computer text analysis will be a central tool in studying this link. Computer text analysis has been used to relate to other latent constructs, such as deception (Hancock, Curry, Goorha, & Woodworth, 2007) this thesis will be the first to explore its utility in relating to trust. A series of empirical studies will simulate group interactions using student participants. Finally, the language measure derived from these simulations will be utilized and its robustness tested by applying it to real world online criminal discussions.

1.1. What is Trust?

This Chapter seeks to answer a number of questions that are important to our understanding of what trust is and how it could be measured in remote groups. The questions addressed by this review include: what is trust?; what behaviours lead to and result from trust?; what are the benefits and problems of trust?; how does trust function online?; what methods have been used to measure trust?; and, how might language be a reliable indicator of trust? With regard to applications, the questions are designed to connect with operational and investigative concerns. For example, the question 'What are the benefits, and what are the problems of trust?' has potential value for teams that are thinking of using or manipulating trust as part of a disruption effort.

1.1.1. The Meaning of Trust

In line with classic attitude theory (Fishbein & Ajzen, 1977), most researchers argue that trust comprises two main components of beliefs and intentions (Bigley & Pearce, 1998; Hosmer, 1995; Kramer, 1999; Mayer, Davis, & Schoorman, 1995;

Rousseau, Sitkin, Burt & Camerer, 1998; Zand, 1972). These components have increasingly converged in researchers' conceptualisations of trust, and they are reflected in the often-cited definition provided by Rousseau et al. (1998), who propose that:

"Trust is a psychological state comprising the intention to accept vulnerability based upon positive expectations of the intentions or behaviors of another" (p. 395)

"Positive expectations" reflect a person's (i.e., trustor's) beliefs about another party (i.e., trustee), and "the intention to accept vulnerability" refers to their willingness to rely on that party. Inherent within this definition is the fact that trust is an underlying psychological condition of intention, which gives rise to a set of behaviours that may be regarded as risky (Rousseau et al., 1998). The risk that exists with trust is created by the fact that trust begins where rational prediction ends, and where another's behaviours cannot be predicted with certainty. Further, because it exists in situations that call for reliance on another party to achieve some goal, to trust another makes a person vulnerable to another's insincere behaviours. Risk, interdependence and vulnerability, are the cornerstones of trust.

Deutsch (1958) illustrates how risk, interdependence and vulnerability define situations of trust using a parent and baby-sitter example. In this situation, a parent is reliant on a baby-sitter to care for their child in order for them to complete some task. The parent is in a vulnerable position because they must rely on the baby-sitter but they cannot predict the baby-sitter's behaviour nor monitor his or her actions. The parent's decision to rely on the baby-sitter is based on their beliefs that the baby-sitter has positive intentions and is qualified for this role. If the baby-sitter does not live up to the parent's expectations (i.e., their trust beliefs), then the consequence for the parent (e.g., neglect of the baby) far outweighs the benefits of trust being fulfilled

(completion of some other task). The fact that the consequences from broken trust outweigh the benefits when trust is fulfilled makes the decision to trust a risky one.

1.1.2. Trust Components

Two main components of trust have been identified that relate to beliefs and intentions. The belief that another person is trustworthy informs intentions to rely on that person in a risky situation, which in turn predicts actual *behaviour*. In most situations, trust beliefs and in turn trust intentions, are informed through experiences with the other person. However, where this does not exist (i.e., in a novel situation), a person's trust in another may depend on their general *predisposition* to trust others. This view of trust as an intention, which is influenced by beliefs and dispositions, and in turn influence trust behaviours, marks the dominant theoretical model of trust (Mayer et al., 1995; McKnight & Chervany, 2001).

Trust beliefs. Trust beliefs are the extent to which one believes, with feelings of relative security, that the other person has characteristics beneficial to oneself (McKnight & Chervany, 2001). The belief that another person is trustworthy constitutes believing that they are both willing and able to act in the trustor's interests (McLain & Hackman, 1999). Another person's trustworthiness is indicated by their personal qualities, with as many as ten different qualities being implicated in the formation of trust beliefs (Butler, 1991; Lee & Turban, 2001; Peters, Covello, & McCallum, 1997). These qualities typically collapse into three main categories that reflect a person's ability, benevolence and integrity (Lewicki et al., 2006; Mayer et al., 1995). In isolation the beliefs formed about another in relation to each category may differentially influence behaviour. However, together they represent a trustor's beliefs regarding another person's trustworthiness.

A person's level of ability is inferred from the knowledge and skills that they are assumed to hold for a specific task, along with the interpersonal skills and general wisdom needed to succeed at the task (Gabarro, 1978). Perceived ability has been identified by a number of studies as leading to trust (Cook & Wall, 1980; Deutsch, 1960; Jones, James, & Bruni, 1975; Sitkin & Roth, 1993). It is captured through qualities such as ability, competence, knowledge, qualifications and experience (e.g., Butler, 1991; Butler & Cantrell, 1984; Kee & Knox, 1970; Lieberman, 1981).

Benevolence is the extent to which the trustee is believed to want to do good for the trustor, aside from an egocentric profit motive (Jones, James & Bruni, 1975; Mayer et al., 1995). The positive orientation of the trustee toward the trustor, often manifested as being helpful when one is not required to be helpful, is the essence of the benevolence characteristic. Numerous studies have examined similar constructs to benevolence as qualities leading to trust. These include altruism, loyalty and care (Butler & Cantrell, 1984; Frost, Simpson, & Maughan, 1978; McAllister, 1995).

Finally, integrity relates to the extent to which a trustee is believed to adhere to a set of sound moral and ethical principles, which the trustor finds acceptable (Colquitt et al., 2007; Mayer et al. 1995). Adherence is central to the concept of integrity. For example, for an individual to be perceived as having integrity, he or she must follow a set of personal principles consistently (personal integrity) and follow a set of principles in which the trustee judges acceptable (moral integrity) (McFall, 1987). Hence perceptions of fairness, justice, consistency and promise fulfilment all affect the degree to which another is judged to have integrity (Butler & Cantrell, 1984; Butler, 1991; Colquitt et al., 2007; Gabarro, 1986).

Trust intentions. Trust intentions, like trust beliefs, are a central component of trust. They have been identified as the most proximal predictor of trust behaviour and

the most proximal outcome of trust beliefs (Colquitt et al., 2007; Mayer et al., 1995). Trust intentions have often been conceptualised as synonymous with trust beliefs and trust behaviour due to their proximity. However, Mayer et al. (1995) suggested they exist independent of the other components. That is to say that, trust intentions do not assume vulnerability, as is the case with trust behaviour when an explicit act of trust occurs. Nor are trust intentions explicitly perceptions of another's trustworthiness (trust beliefs). That is to say that, a positive belief about a trustee's ability, benevolence, and integrity does not automatically translate into a trust intention, if, for example, risk in the situation is too high. Thus, trust intentions are conceptually separate to beliefs.

Trust intentions may be subdivided into a willingness to disclose (disclosure trust intentions) and a willingness to rely (reliance trust intentions) (Gillespie, 2003). Their existence as distinct, but related constructs, has been provided at both a theoretical and empirical level (Conchie, Taylor & Donald, 2012; Gillespie, 2003). Furthermore, it has been proposed, and empirically shown, that reliance trust intentions are more closely related to ability trustworthiness beliefs, while disclosure trust intentions are more closely related to integrity and benevolence trustworthiness beliefs (Conchie et al., 2012; Gilespie, 2003). Taken together, trust intentions operate as a distinct trust component that is informed by trust beliefs, and in turn, inform trust behaviours.

Trust behavior. Trust behaviour refers to actions that reflect a person's voluntary dependency on another in a risky situation (McKnight & Chervany, 2001). This behaviour is an observable choice a person makes by accepting risk and becoming vulnerable to the actions of another. For example behaviours include cooperation, information sharing, informal agreement, reducing controls, accepting

influence, granting autonomy, and transacting business (McKnight & Chervany, 2001). Crucially, these behaviours might only be described as trust behaviour when they occur under risky conditions; in essence, when the trustor does not control the actions of the trustee (Mayer et al., 1995).

Trust propensity. In addition to trust beliefs, intentions and behaviour, which are largely shaped through experiences that a trustor has with a potential trustee (i.e., situational factors), some researchers have examined trust propensity (Rotter, 1980). Trust propensity refers to a general belief regarding the trustworthiness or untrustworthiness of a broad spectrum of people and situations. It has been shown to shape behaviours in novel situations in which two parties are unfamiliar with each other (Rotter, 1971). However, within established relationships or contexts, research shows trust beliefs based upon the other party's actual behaviour and perceived intentions are a stronger determinant of behaviour than their trust propensity (Becker, 1996; Lewicki et al., 2006; Parks, Henager, & Scamahorn, 1996; Robert, Dennis & Hung, 2009). Nevertheless, trust propensity has frequently been cited as a key determiner of trust, especially in the early stages of novel contexts. Hence, it is necessary whilst studying trust from a situational perspective to control for possible dispositional factors influencing trust.

How do models help to answer the question of what is trust? Trust has been studied by a multitude of disciplines and has often focused on *either* trust beliefs, intentions, or behaviour. Like the story of the six blind men, who each described the elephant based on the portion of the elephant's body they touched, each approach has applied its own lens to one part of the trust elephant's anatomy, resulting in narrow conceptualisations which do not capture what trust is in its entirety. However, the challenge of explaining what trust is has been met through modelling its components,

situational and dispositional antecedents and outcomes. An understanding of trust in this sense has emerged as the most comprehensive means to answer the question "What is trust?" and the most promising grounds to continue to build our understanding of trust.

1.2. What behaviours lead to, and result from, trust?

Trust develops over time as one accumulates trust relevant knowledge about another person through experiences with them (Holmes, 1991; Lewicki & Bunker, 1995). Through this history of interaction, the trustor develops a general expectancy about the other person's trustworthiness, and whether they can be relied upon in uncertain situations (Lewicki & Bunker, 1996). To inform these expectations, a trustor uses the trustee's past and present behaviours to guide their decisions (Alge, Wiethoff, & Klein, 2003). Behaviours most relevant to trust formation are those that signal information about a person's ability, benevolence and integrity. As mentioned earlier, ability may be indicated through behaviours that illustrate knowledge of the specific job; benevolence is indicated through demonstrations of interest in the trustor, such as trying to protect the trustor from the ramifications of mistakes; and Integrity is demonstrated through honourable behaviour, consistent action, and an alignment between these actions and spoken word. It follows that knowledge of a person's behaviours, in respect to their trustworthiness, is a key process by which trust is formed.

The behaviours that result from trust are distinct from those that lead to trust in so far as they are either of a different nature, or are enacted by the trustor rather than the trustee. Specific behaviours that result from trust, as shown by meta-analyses, include increased task performance, citizenship behaviour, open communication, information sharing, and reduced counterproductive behaviour and conflict (Colquitt

et al., 2007; Dirks & Ferrin, 2001). One empirical difficulty with modelling some behaviours as resulting from trust is that they are also likely to garner trust, as they often demonstrate ability, benevolence or integrity (Mayer et al., 1995). This has led to confusion regarding the degree to which one can separate behaviours leading to trust from those resulting from it. Arguably, this confusion has largely resulted from the methodological limitations of existing research, which can be overcome through careful experimental design or by considering trust over time.

In their meta-analysis, Dirks and Ferrin (2001, 2002) classified behaviours as either antecedents or consequences of trust on the basis of how they were theoretically positioned in the existing literature. The limitation in this approach is that much previous research is cross-sectional, i.e. data collected at one specific time, which has made modelling behaviours that lead to trust, through to distinct behaviours which result from trust, difficult (Lewis & Wigert, 2012). For example, studies on peer trust have positioned trust beliefs as leading to information sharing behaviour. However, one-time measures are unable to determine if in fact information sharing behaviours led to trust beliefs, or that trust beliefs led to information sharing behavior (McKnight, Cummings, & Chervany, 1995). Simply put, cross-sectional research designs are unable to disentangle behaviours leading to trust from those that result from trust.

By contrast to cross-sectional designs, longitudinal designs establish temporal information for behaviours, so those leading to trust and those resulting from it are evident in their ordering. For example, Crisp and Jarvenpaa (2013) considered trust beliefs and team performance in global virtual teams across eight weeks. The research demonstrated early trust beliefs, formed on early ‘friendly’ and ‘considerate’ behaviour, related to subsequent overall higher quality and efficient team performance behaviours. Similarly, over a 3-week design, Wilson, Straus, and McEvily (2006)

demonstrated considerate language behaviour to relate to affective trust, which in turn led to more cooperative behaviours. Those studies that have considered trust longitudinally provide evidence for the distinction between behaviours leading to trust from those resulting from trust.

Another way to disentangle behaviours that lead to trust from those that result from trust is through experimental manipulation. Zand (1972) primed executive decision-making groups to expect either trustworthy or untrustworthy behaviour. They showed separable outcomes of trust such as lesser controlling behaviour, acceptance of influence and greater information sharing among those that expected trustworthy behaviours. Similarly, Robert, Alan, and Yu-Ting (2009) used vignettes to detail past behaviours of future group members. Members' behaviour was either characteristic of high ability, benevolence or integrity. Participant's knowledge of members' past behaviour reliably informed their trust beliefs and subsequent intentions. By forming actual groups a similar process was modelled by McCarter and Sheremeta (2013). They found that replacing two team members with newcomers had a detrimental effect on trust. However, this effect was mitigated if "old-timers" received information about positive past behaviours of newcomers, while the opposite was observed if negative past behavior information was distributed. Hence, through careful experimental control of either precursors or consequences, behaviours leading to trust are shown to be distinct from behaviours that result from trust.

1.3. What are the benefits and problems of trust?

Up until this point, the Chapter has modelled trust in relation to trust propensity, trust beliefs, trust intentions and trust behaviours, and sought to distinguish between antecedent and consequential behaviours. However, research

interest in trust has not been driven by a quest solely for conceptual clarity. Kramer (1999) observed that interest in trust over the previous 20 years had been fuelled, at least in part, by accumulating evidence that trust has a number of important *benefits*. Much activity in trust research has emerged from the organizational literature where early organizational scholars professed trust to be an important hallmark of effective organizations (e.g., Argyris, 1962; Likert, 1967; McGregor, 1967). Such claims have arguably led to a bias towards benefits and a neglect of potential problems of trust (Lewicki, McAllister, & Bies, 1998). Both benefits and problems of trust are reviewed in this section.

The benefits of trust have been listed with great specificity. Trust directly predicts sharing confidences and providing timely information in buyer-seller relationships (Smith & Barclay, 1997). It has also been shown to have a positive relationship on group performance. Trust in leaders amongst NCAA basketball teams predicted team success (Dirks & Ferrin, 2000), while priming groups with high trustworthiness perceptions of other group members elicited greater creative problem solving skills (Klimoski & Karol, 1976). Benefits of trust have also been demonstrated at an attitudinal and perceptual level. These include job satisfaction and employee's perceptions of accuracy of information (Benton, Gelber, Kelley, & Liebling, 1969; Roberts & O'Reilly, 1974), and goal/decision acceptance (Dirks & Ferrin, 2001).

Despite this positive evidence, trust does not always result in benefits. A review by Dirks and Ferrin (2001) revealed numerous studies where high trust and low trust interactions were characterised by equal degrees of information sharing and task performance. It is noteworthy that contemporary theories of workplace behaviour scarcely mention trust as a determinant of beneficial behaviours. Micro

theorists cite goals, needs or incentives (Kanfer, 1990) while macro theorists cite roles, rules and norms as beneficial workplace determiners (Perrow, 1986). Therefore, it follows that these constructs might produce the basis for benefit, while trust acts as the vehicle through which the benefit is realised only in risky situations. For example, a motivational construct may provide the drive for cooperation and under low risk circumstances will be sufficient to produce a benefit. However, under high-risk circumstances, trust helps facilitate the occurrence of benefit because trust mitigates the risk that one party may not reciprocate cooperation. The benefits of trust are not inherent in every context; it is only in situations of risk where trust benefits an interaction.

Benefits of trust have been exemplified in demonstrations of how trust can allow the trustor to cooperate, put oneself at risk to the other party, and perceive the other party's actions in a positive light. It is important to recognise, however, that the same behaviours, which result from high levels of trust and are considered beneficial, might also be considered a problem of trust. A significant potential downside of trust exists in providing a greater "opportunity for malfeasance" (e.g., Granovetter, 1985). The traditional view of trust has seen trust as good and distrust as bad. However, excessive trust, or trust without suspicion, can be dangerous. This perspective is now reviewed.

Problems of excessive trust have been exemplified in dyadic and group interactions. Erdem (2003) examined teams and found that as well as trust relating to positive aspects of group behaviour, namely synergetic "team think", it also positively correlated with numerous negative group behaviours. For example, team members were protective of shared knowledge against outsiders, which was thought to lead to groups becoming introverted. Hence groups suffered from the damaging effects of

information being unable to flow in and out of the group. One consequence of this is that group decisions are based on less information and so are relatively poor (Manz, Neck, Mancuso, & Manz, 1997). At a dyadic level, Benton, Gelber, Kelley and Liebling (1969) found that participants, despite being taken advantage of 25% of the time by a partner, continued to allow the partner to systematically take advantage of them if high trust was established. Such examples illustrate the potential problem of trust.

The benefits of trust have drawn on a large amount of research efforts to harness said benefits (Kramer, 1999). Arguably this has led to neglect of certain intuitive truths regarding the benefits and problems of trust. That is to say, benefits will only emerge under certain contextual conditions, namely risk and interdependence. The problems of trust are somewhat subjective. In the examples of trust problems given in this section, trust can be seen as benefiting or hindering interaction depending upon one's perspective. For example, high trust within dyadic relationships is highly beneficial to a party wishing to take advantage of another. While, problems of trust are inevitable where malfeasance exists or, additionally, from an outsider perspective when a group must be disrupted.

1.4. How does trust function online?

Trust has been studied in numerous online settings. These include trust in online purchasing, trust in recommendation agents, virtual health care settings and online groups (Robert, Denis, & Hung, 2009). Similar to the study of trust in face-to-face settings, the focus of trust in online settings has often been to model antecedents and outcomes. Trust online has also been juxtaposed to trust in face-to-face settings with regard to communication restrictions imposed by the medium. In the following section, research in how trust functions online is reviewed.

1.4.1. Face-to-face medium versus computer mediated communication

Trust between people online, including members of online groups (also referred to as online teams and virtual teams), has been researched in contexts where the predominant communication medium is email and instant message chat (Rusman, Van Bruggen, Sloep, Valcke, & Koper, 2010); commonly known as computer mediated communication (CMC). Compared to face-to-face communication, CMC differs in numerous ways, relevant to trust. CMC makes impression formation about another person difficult, as less information about the other person is available (Hancock & Dunham, 2001). Difficulties and delays in impression formation in CMC may be attributed to the lack of reputational information (e.g., fewer word of mouth or social characteristics information) (Riegelsberger, Sasse, & McCarthy, 2005). Furthermore, in CMC the same signs and signals important to relationship formation, such as nonverbal communication, are not available. There is also less time and opportunity for informal communication, which is known to facilitate trust (Rusman et al., 2010). In sum, in CMC there is reduced social information (Walther et al., 2005), and hence less information to form trust beliefs. Conventional wisdom has suggested it is difficult to trust online.

A more optimistic view of trust online comes from anthropological evidence. Studies in online relationship formation has found evidence of people claiming to "click" and trust more with people online than they could with people face-to-face (Henderson & Gilding, 2004). There are also examples of groups forming strong trust that is predictive of group resilience to failings in online gaming (Chen, 2009).

Empirically, studies have also suggested mechanisms as to how trust might function online. Reduced social information has been said to lead to equal status effects and greater information sharing (Dubrovsky, Kiesler, & Sethna, 1991; Kiesler,

Zubrow, Moses, & Geller, 1985; Siegel, Dubrovsky, Kiesler, & McGuire, 1986). There are also demonstrations of hyper interpersonal acts and task-orientated communication proximal to trust in online settings (Straus, 1997; Walther, 1996). In line with these findings, researchers have suggested that rather than trust formation being unattainable through CMC, it is simply delayed (Walther, Bunz, & Bazarova, 2005). In conclusion, despite early pessimism that interpersonal trust would not emerge in online settings, research efforts have found evidence that online settings are in fact fertile ground for trust.

1.4.2. Existing models of trust

Evidence of trust in online settings has led researchers to consider how existing models of trust, developed mainly for offline interactions, generalise to online settings. Such research has extended the relevance of each component of trust discussed earlier; highlighting the importance of trust propensity, trust beliefs, trust intentions and trust behaviours. The generalisation of existing models of trust, namely Mayer et al.'s (1995) model, to online settings would suggest we do not need to rethink our model of trust when considering trust online. Barriers to trust outlined above are in fact in line with Mayer et al.'s (1995) formulation of the relationship between trust and risk; where trust is more difficult to establish due to greater risk in online settings. As we attempt to build upon the existing prominent model of trust, a language measure of trust, it is important that we understand how this dominant model is suitable to online interactions, and be aware of the nuances of scaling this model up to an online domain.

Trust propensity. Trust propensity has been positioned as an antecedent of trust, which becomes less important as members of online interactions acquire knowledge of other member's trustworthiness characteristics (McKnight & Chervany,

1998). However, prior to knowledge of trustee's characteristics, trust propensity is an important determiner of trust (Mayer et al., 1995). Given the restricted channels of communication in CMC, and the proposition that impression formation takes longer to establish in CMC, trust propensity might play a more important role in trust development in online groups. Indeed, Jarvenpaa et al. (1998) found that trust propensity was a significant predictor of trust in early online meetings but became a less important predictor of trust at subsequent meetings. Robert et al. (2009) found a similar effect online but further noted that early dispositions to trust, to an extent, coloured trust beliefs for the duration of meetings. The role of trust propensity as a more important predictor of trust only prior to trustworthiness information also applies to interpersonal trust online. Hence it is important to control for the effects of this dispositional state on trust formation when seeking to understand other, more situational, influences.

Trust beliefs and trust intentions. Attempts to integrate theoretical models of trust to online interactions have generalised the importance of trust beliefs and trust intentions found in offline interactions. Hung et al. (2004) positioned ability, benevolence and integrity beliefs as the best predictors of trust intentions online. These beliefs are superseded in early stages of a relationship by trust propensity, rule-, category- and role- based judgements (Meyerson, Weick, & Kramer, 1996). Once trustworthiness knowledge is acquired about another through interactions, these latter "peripheral" routes to trust give way to "central" routes as members' personal attributes are assessed (Hung et al., 2004). Continuous interaction allows members of an online interaction to gain personal knowledge of others and continually reassess their trustworthiness attributes (Jarvenpaa & Leidner, 1999). Hence, trust online, as offline, changes as the perceived amount of trustworthiness in members change.

The importance of trustworthiness characteristics may vary as a group or dyad moves through its life cycle (Hung et al., 2004). When time pressures are salient, members may focus more on task goals than on relational development (Jarvenpaa et al., 1998; Mayerson et al., 1996). At these stages, therefore, perceived integrity and ability are more important than perceived benevolence. In sum, trust online is influenced by deliberate assessment of members' ability, benevolence and integrity, but also by the relative importance of each to specific stages of the group or dyad's life cycle.

Trust behavior. Research predominantly shows that among online group members and online dyads, trust predicts behavioural outcomes. For example, Mitchell and Zigur's review (2007) of 42 empirical studies of online trust revealed that trust has been shown to predict socio emotional outputs such as cohesiveness, commitment and team performance, as well as task outputs such as communication, knowledge transfer, project scripting, task performance, and transactive memory. However, there have been instances of trust not emerging as a strong predictor of behavioural outcomes online despite emerging in equivalent face-to-face conditions (Bos, Olson, Gergle, & Olson, 2002; Hancock & Dunham, 2001; Riegelsberger, Sasse, & McCarthy, 2005; Wilson, Straus, & McEvily, 2006). For example, studies have shown that zero-order teams (i.e., those with little knowledge of each other), exhibit higher trust and exchange more information in face-to-face interactions than online (Alge et al., 2003).

The differences between online and face-to-face findings have been explained in relation to the moderating role of risk (Wilson, Straus, & McEvily, 2006). Mayer et al.'s (1995) conceptualisation of risk and its relationship to trust behaviours, where as risk increases more trust is required in order for trust behavior (or 'risk taking in

the relationship') to occur, could explain instances of behavioural trust outcomes not emerging in online interactions. There is a compelling case that in online interactions there is greater 'risk' due to monitoring behaviours becoming more difficult and the time lag between exchanges leading to uncertainty, expecting the worst, and a "behavioural invisibility" (Sheppard & Sherman, 1998). Online, there is generally a slower transfer of trustworthiness information, which equates to trust decisions made on less information and therefore greater risk (Bos et al., 2002). However, it follows that with time, risk is reduced and trust behaviour should emerge parallel to how it would in face-to-face groups with equal risk. Evidence for this position is found in studies where online groups are given more time to converse. For example, Wilson et al. (2006) found that trust did not predict a group's trust behaviour in early stages of development, but after three meetings trust and trust behaviour was equivalent to that found in face-to-face groups. The role of risk in relation to trust behaviour operates in online interaction in much the same way as in face-to-face interaction.

Despite early pessimism in the literature, that trust could not emerge in online interactions, trust has become a central component to the fluidity of online dyads and groups. Models of trust devised in relation to face-to-face interaction transfer well to online interactions. As a result, trust components such as trust beliefs and intentions, and their varying salience across stages of interaction, remain useful concepts in our exploration of online trust. Furthermore, the role of trust propensity remains a personality construct that must be controlled for whilst trust behaviours remain a measurable outcome of trust. Risk would appear to be a noteworthy difference between face-to-face and online interaction. Yet, given how risk can be mitigated by *time* in online interactions, the differences between risk online and risk in face-to-face interactions are a matter of degree rather than kind.

1.5. What methods have been used to measure trust?

The dominant approach to measuring trust has been via self-report questionnaire surveys. This approach to measuring latent constructs, commonly known as the psychometric approach, typically takes the form of a multi-item survey that includes a variety of questions intended to capture different trust components (McEvily & Tortoriello, 2011). Broadly, such measures will ask to what extent people trust a specific other or group. This approach treats trust as a psychological state and so measures trust as individual level phenomena (Rousseau et al., 1999). Trust has been considered as a multi-faceted concept in this review, therefore measures that tap different components of trust (beliefs and intentions), as well as trust outcomes and trust propensity are reviewed. Finally, a divergence from the dominant psychometric approach is reviewed in the form of behavioural measures of trust, where trust outcomes are operationalized as trust decisions in experimental economic games (Berg, Dickhaut, & McCabe, 1995). This completes a review of the instruments available for measuring trust, which are the platform for a new language measure.

1.5.1. Trust propensity measures

Measures have been devised to assess the propensity to trust others in general, or ones disposition to trust. Like other measures of personality traits, questionnaires and survey items are used to measure trust propensity. Typical trust propensity items include positively and negatively scored items such as ‘I believe people are basically moral’ and ‘I am wary of others’ (Mayer et al., 1999). Given the possibility that an individual’s trust propensities will influence trust in online contexts, trust propensity survey items form a useful control measure for exploration of *situational* online trust in the present thesis.

1.5.2. Trust beliefs and trust intention measures

Trust toward another person or group has been measured via items designed to assess one's trust beliefs and intentions. A review by McEvily and Tortoriello (2011) revealed that questionnaire items to measure trust beliefs and intentions have become extremely fragmented. Their review identified 38 different dimensions of trust, with little replication and validation of many of these. To accommodate for this, McEvily and Tortoriello (2011) highlighted five noteworthy measures of trust that were developed with a great deal of rigour and were the most highly replicable. The five measures are those developed by McAllister (1995), Currall and Judge (1995), Cummings and Bromiley (1996), Mayer and Davis (1999), and Gillespie (2003). Of the five, Mayer and Davis' (1999) measure was found to have been replicated the most (McEvily & Tortoriello, 2011).

Mayer and Davis' measure, as one might expect, captures perceptions about trust beliefs. That is to say that, beliefs about a trustee's ability (e.g., my co-worker would be highly qualified in their field), benevolence (e.g., my co-worker would not knowingly do anything to hurt anyone) and integrity (e.g., my co-worker is guided by sound principles). Furthermore, the measure is the only one to capture two theoretical models of trust beliefs. That is to say that, the measure naturally captures the three trustworthiness factors of Mayer et al.'s (1995) model. However, ability and benevolence/integrity beliefs often converge, respectively, onto cognitive and affective trust beliefs of McAllister's (1995) model (McKnight & Chervany, 2001). Trust intention measures are also proposed in Mayer et al.'s (1995) inventory. Items in Mayer et al. (1995) relate to ones willingness to rely on another (e.g., I would be comfortable giving my manager a task or problem which was critical to me, even if I could not monitor their actions). For these reasons, Mayer and Davis' (1995) measure

of trust beliefs and intentions is proposed as the most complete psychometric measure of trust.

1.5.3. Trust behaviour measures

Research efforts have operationalized trust outcomes in social experiments, this is important to establishing a new language measure of trust as it offers standardized means to assess how varying language impacts trust with regard to *observable* trust behaviour. Thus offering an additional measure to comparing language to psychometrically reported trust. The first to propose that trust could be operationized in such a way was Deutsch (1958) in a series of prisoner dilemma style games. These experiments suggested that trust behaviour could be observed as cooperative moves in a risky situation. For example, in prisoner dilemma games two players play a game with monetary reward. The outcome with the highest pay off is for one party to defect while the other cooperates, next is cooperation by both players, followed by joint defect. Typically, in repeat games, cooperative behaviour is accepted as an observable manifestation of trust (Axelrod, 1984).

An alternative to prisoner dilemma style games has been proposed by Berg, Dickhaut, and McCabe (1995), and relates to 'trust games'. In the standard trust game, participants are divided into two groups: Senders and Recipients. Each Sender is anonymously paired with a Recipient. Senders are then given a sum of money and must decide how much of this money, if any, to transfer to the Recipient. The experimenter triples the amount of money transferred. The Recipient must then decide how much of the money, if any, to return to the Sender. The amount of money sent is interpreted as a measure of the Sender's trust in the Recipient, while the amount returned is interpreted as a measure of trustworthiness, or reciprocity (Bacharach & Gambetta, 2001).

Trust games are asynchronous (one party is the trustee while the other is the trustor) while prisoner dilemma style games are synchronous (each party is the trustee and trustor at the same time). As measures of trust outcomes this leads to two noteworthy advantages of the trust game over prisoner dilemma style games. First, the synchrony in prisoner dilemma style games limits their ecological validity. We rarely have to reach a trust decision at exactly the same time without knowing the other's decision (Riegelsberger et al, 2003). The trust game more closely replicates many everyday trust situations, where a trustee acts to fulfil or defect on the trust invested by the trustor. Second, using the trust game, behaviours leading to trust can be more precisely modelled. In the trust game the behaviour of the trustee and trustor that lead to trust can be explored separately. This feature is important to the thesis as it allows for the relationship between language and trust of *respective parties* to be analysed independently.

Importantly, performance on the trust game has been shown to associate with some of the psychometric measures of trust components described above. For example, decisions on the trust game have been shown to be mediated by perceived trustworthiness (Delgado, Frank, & Phelps, 2005) and trust intention (Brülhart & Usunier, 2012), and trust has been supported as the dominant factor in motivating behaviour even when compared to factors such as altruism (Brülhart & Jean-Claude Usunier, 2012). Interestingly, the trust game measure of trust behaviour and psychometric measures of trust have rarely been used in combination; despite offering a comprehensive means to assess trust propensity, trust beliefs, trust intentions and trust behaviour. Furthermore, such a combination of measures has yet to be used to assess trust in online interactions. As a platform for developing a novel language measure of trust, a combination of psychometric and behavioural trust measures, in

the form of instruments proposed in this section, is proposed for this thesis as the most holistic and robust means to assess trust.

1.6. How might language be a reliable indicator of trust?

1.6.1. The relationship between language and latent constructs.

Individuals differ in the words they use and it is reasonable to expect that this variation would reflect psychological differences (Fast & Funder, 2008). For example, in Hancock et al. (2007), word quantity, prounoun use, emotion words, and cognitive processes words, are shown to be language indicators of deceptive discourse. In this way, language can be used to indicate many latent constructs; this idea is the premise for identifying a language indicator of trust.

Developments in automated text analysis have offered a new instrument to measure language. Using automated text analysis, research has shown the value of language as a measure of various latent social factors such as personality (Pennebaker & King, 1999) and deceit (Hancock, Curry, Goorha, & Woodworth, 2007). Using programs such as linguistic inquiry and word count (LIWC), language use can be compared to a catalogue of word dictionaries to determine the proportion of a speakers language use characterised by specific word categories. This produces a language profile for a speaker. The said language profile can be correlated with constructs of interest. For example, analyses have demonstrated that the proportion of a speaker's language characterised by specific word categories reveal personality traits such as extraversion (e.g., positively related to social processes and positive emotion words) conscientiousness (e.g., positively related to achievement words and negatively to anger and negations) and emotional stability (e.g., positively related to articles and negatively to anger and anxiety words) (Yee, Harris, Jabon, & Bailenson, 2010). This example illustrates how by correlating a speaker's language profile with

established measures for the construct of interest, the language that reflects the construct is revealed.

Analysing language in this way has also been conducted to reveal language indicators of dyad and group dynamics. This involves assessing the degree to which speakers' language profiles are coordinated. A new measure called linguistic style matching (LSM) has been used to assess the degree to which people subtly match each other's speaking or writing style. This produces a measure of synchrony across various linguistic categories, matching on a subgroup of 'style' words (as opposed to 'content' words) have been shown to correlate with latent social constructs such as rapport (Chung & Pennebaker, 2007) and group cohesiveness (Gonzales, Hancock, & Pennebaker, 2010). The suggestion with LSM is that if language style use provides insight into how an individual is perceiving the world and if people are matched in their linguistic styles, then a measure of LSM could indicate when individuals are, or are not, experience harmony in the way they are perceiving and experiencing a situation (Niederhoff & Pennebaker, 2002).

The key to LSM is it's exclusive focus on function words, over content words. Unlike content words, sometimes referred to as the 'what' of discourse, function words communicate the grammatical structure of language and can be referred to as the 'how' of discourse. They are typically short (usually 1-4 letters) and produced quickly in speech (100-300 milliseconds) (Ireland et al. 2010). In LSM research the 9 most common categories of function words are adverbs, articles, auxiliary verbs, conjunctions, indefinite pronouns, negations, personal pronouns, prepositions, and quantifiers.

Function words are interesting to the study of latent constructs in social interaction for various reasons. First, function words have an incredibly high

frequency in everyday speech. Function words make up around 55% of all the words we speak, hear, and read in our everyday lives **(**Campbell & Pennebaker, 2003). This is despite the fact that only about 0.05% of all the words in the English vocabulary are function words (Chung & Pennebaker, 2007). Second, function words can be considered strictly 'social' words. That is to say that they are independent of both the context and content of communication. Content words such as '*table', 'blue'* or '*walking'* produce very clear pictures in the speakers mind. In contrast, trying to imagine words such as '*because'* or '*really'* is impossible (Richardson, Taylor, Snook, Conchie, & Bennell, 2014). Therefore these words have been considered as like the cement holding content words together **(**Tausczik & Pennebaker, 2010**).** Third, function words can be measured across different domains unbiased by the context of the interaction. For example, they are unbiased by whether the interaction is relational or task focused. Meaning that people can talk about identical topics in psychologically different ways.

Linguistic style matching has been linked to consciously reported constructs such as emotional state and connections with others **(**Gonzales, Hancock, & Pennebaker, 2010; Maddux, Mullen, & Galinsky, 2008; Scissors, Gill, & Gergle, 2008), however the extent to which individuals are conscious of the language processes underlying these social outcomes is debated. Broader behavioural mimicry research tends to support the *automatic* production of mimicry and suggests that, in social interaction, behavioural mimicry is the default response (Chartrand & Lakin, 2012). Mimicry is such an innate behaviour that it appears even when individuals are under extreme cognitive load **(**Lakin, Jefferis, Cheng, & Chartrand, 2003**)**.

In addition, one leading theory of mimicry, Interaction Alignment Theory (IAT) stresses the importance of the unconscious nature of alignment (Garrod &

Pickering, 2009). Alignment happens automatically and is idiosyncratic in nature. Alignment occurs for many different languages categories covering semantic expression, syntactic expression and lexical expression. IAT draws our attention to the importance of the success of communication. Alignment can be used to create a shared understanding of the situation leading to communicative success (Richardson, 2013). IAT states mimicry is simply a priming process that helps communication become more automatic, ego less conscious.

There is evidence for *LSM* similarly being an unconscious mimicry process. Research shows that function words are typically 'skimmed over' in reading tasks, whilst content words require more effort to produce and comprehend (Ireland & Pennebaker, 2010). For this reason, LSM theory and research has tended to view function words as being difficult or impossible to consciously control (Niederhoff & Pennebaker, 2002).

On the other hand, some researchers have suggested mimicry processes can sometimes become conscious. According to Lakin and Chartrand (2013) mimicry can occur either automatically, without conscious awareness, or through a deliberate intent to imitate. Communication accommodation theory (CAT) (Giles & Coupland, 1991) suggests that, while mimicry is typically unconscious, when a conversation is not going well, or when interactants dislike or are threatened by each other, divergence can be *consciously* used to create social distance through refusal to accommodate on linguistic behaviours (Richardson, 2013). In addition, CAT states that when a discrepancy occurs between speaker's expectations regarding accommodation and what actually happens, or when speakers are engaged in a novel situation (Langer, Blank & Chanowitz, 1978), our verbal and non-verbal behaviours enter more conscious awareness.

An interesting area of research that relates to this debate comes from experiments were a confederate has been used to encourage or discourage mimicry. For example Swaab, Maddux and Sinaceur (2011) asked individuals to match a targets language style and found an increase in mimicry, suggesting an individual can bring linguistic mimicry under conscious control. A more recent study, specific to the mimicry metric LSM, was novel in training a confederate to mimic on specifically function words, evidencing raised LSM relative to a control condition (Richardson, 2013). Such theories and experiments support the argument that mimicry, and specifically LSM, can become a conscious process in some circumstances.

In conclusion it appears mimicry, including LSM, is typically an unconscious phenomena. However, such processes might become more conscious in novel situations, when conversations negatively deviate from expectations, or when individuals are instructions to attend to features of language in experimental settings.

1.6.2. Using language to measure trust.

Using various combinations of the methods detailed above, language analysis has proved a useful measure of constructs where trust may have been implicit. For example, in online speed dating one's willingness to request a second date was positively predicted by LSM (Ireland, Slatcher, Eastwick, Scissors, Finkel, & Pennebaker, 2011). While Ireland et al. (2011) interpreted greater LSM and a willingness to meet partners again as relating to rapport and mutual understanding, it is plausible that LSM may have also been tapping a trust component, especially given that affective trust has been associated with relationship initiation (Bryant & Conger, 2002). Similarly, the usefulness of LSM as a measure of team performance, in online and offline groups, may have related to a trust component within or subsuming cohesiveness. Given the frequency at which trust is shown to be a predictor of team

performance (Dirk & Ferrin, 2001) it follows that LSM measures of team performance might tap a trust component. In each study above, trust was not experimentally isolated; however, given the covariance between the constructs reviewed and trust, we might expect similar results when trust is the primary construct of interest.

Some studies have used qualitative measures of language and drawn links to trust itself. For example, Donohue and Druckman (2009) reviewed public and private rhetoric from the Oslo peace accords: relating rhetoric to developments in the conflict, and so too trust. Rhetorical devices such as forward framing (addressing underlying, similarities, acknowledgements, and awareness of underlying reasons for conflict) was related to developments in trust while rhetorical devices such as backward framing (addressing previous wrong doings and justice) was related to impasses in negotiation. In a study by Donohue, Pugh, and Sabrie (2014) the authors discuss crisis negotiations with groups of Samali pirates. Interviews with two Somali pirates revealed insights into trust in the negotiation process, whereby the pirates report mistrusting not only the negotiator, but so too one another. It was said that by minimizing overt signs of threat in the communication style of the negotiator, this paradox could be resolved.

Similarly, in experimental online groups, Jarvenpaa, Knoll and Leidner (1998) used a post hoc content analysis and showed that high trusting group's language was characterised by optimism while low trusting group's language was characterised by pessimism. Hence, in real world and experimental contexts where language was studied using a qualitative method, there is evidence for a relationship between communication style and trust.

Rarely, but with the following few exceptions, automated text analysis has been used to directly investigate the relationship between language and trust. For example, an analysis of real-world historical interactions indicated higher levels of LSM on word categories such as prepositions, past tense, verbs, social, and insight during times of trust and cooperation between speakers during the Watergate scandal (Niederhoffer & Pennebaker, 2002). Similarly, analyses of hostage negotiations have revealed that successful negotiations, which establish trust between negotiator and hostage taker, were characterised by higher levels of turn by turn matching on word categories such as articles, prepositions, causation, present tense and insight (Taylor & Thomas, 2008). Due to the retrospective nature of these analyses, explicit measures of trust during interactions were unavailable. Nevertheless, this research demonstrates that where trust is theorised to be a central construct, language is a reliable indicator of trust.

The present review found only one example where automated language analysis was used and an explicit measure of trust was taken under experimental conditions. This was in an experiment conducted by Scissors, Gill, Geraghty, and Gergle (2009) where participants completed a repeat round version of the prisoner dilemma game in pairs. Hence, an explicit measure of trust behaviour was utilised. Analysis revealed matching on content word categories such as positive emotion, leisure and occupation, as well as on style words such as past, present and future tense, related to trusting behaviour as measured by cooperative moves. Arguably, in this study, trust might have been measured more precisely (i.e., by using psychometric and behavioural trust measures that are more ecologically valid), such as those discussed in this review. In addition, language measures might have utilized the validated LSM metric. Instead, the authors devised a novel matching metric,

albeit similar to LSM. In conclusion, language matching is again demonstrated as a measure of a behaviour that holds, at least, a component of trust.

To date, no research has isolated trust through comprehensive measures and correlated such measures with an individual or group's language use. This review has found that there are adequate valid and reliable psychometric and behavioural measures of trust. Furthermore, it has found automated text analysis to be a valid and reliable measure of latent constructs, many of which potentially subsumed by trust. Hence there is evidence that a language measure of trust is not only highly desirable but also within our reach.

1.7. Conclusion

We have seen that trust is a multifaceted construct. A dominant model of trust exists in Mayer et al.'s (1995) beliefs, intentions, and trust behaviour model, which also acknowledges the role of trust propensity. There is evidence to suggest that this model extends to online domains, despite some nuances. Thus, the model is a suitable starting point in establishing our novel language measure of trust and is represented in Figure 1.1. The benefits and problems of trust indicate that from an operational perspective, dangerous groups with high trust constitute a threat which are more likely to act, and more difficult to disrupt. Hence, the utility of establishing a reliable, remote measure of trust is clear. This review has concluded by discussing the existing measures of trust, and the ways in which computer text analysis has been used to measure psychological and group constructs, some close to trust itself. As well as considering how language has been related to trust in qualitative or ad hoc studies.

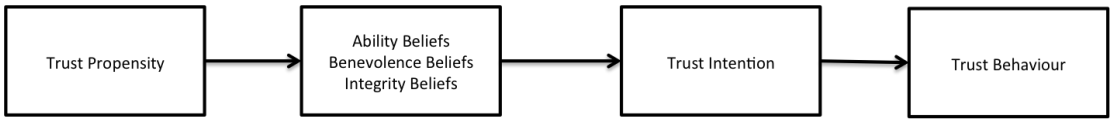

Figure 1.1 *Schematic representation of Mayer et al.'s (1995) trust model.*

Now, the following working model is proposed as the *starting point* to empirically test and quantify a novel language measure of trust.

Trust beliefs, intentions, and behaviour, whilst somewhat moderated by trust propensity, are situation derived through interactional history. These constructs can be measured using questionnaires and 'trust games'. The situational cues that trust components are based on, in an online domain, will largely be the trustee's (i.e. the party to be trusted) language use. Therefore, by quantifying the language of a trustee using computer text analysis, the situational basis of a trustor's (the party who trusts) trust will be revealed. This language will predict the trustor's beliefs, intentions, and trust behaviour. It is proposed that measuring language at the dyadic and group level will offer a second indicator of trust, i.e. the LSM between speakers will also inform trustor's beliefs, intentions and trust behaviour. Once these language behaviours that relate to trust are established, these will be further specified to the *varying contexts* where they might more or less so be related to trust, e.g. does LSM relate to trust in some, but not other, contexts. Finally, these language indicators will be validated in, real world, online settings.

2. Chapter 2: Language Basis of Trust in Online Dyadic Interactions

The study presented in this Chapter takes the first step to understand the relationship between language and trust in online groups. It does this by considering this relationship at the dyadic level, from which we may identify individual and collective language behaviour that relates to trust, to then be tested at the group level. Computer text analysis was used to measure language correlates of trust. Hypotheses were made regarding which language categories would predict trust. Results from 40 dyads indicated that positive emotion words, personal pronouns, perceptual and cognitive processes words were related to trust components.

2.1. Trust, trustworthiness, and propensity to trust

When an interaction history exists between two individuals, trust is often defined as 'situational' in nature, and is based on the actions of the specific other. These actions signal something about the other person's trustworthiness, and group into qualities indicative of ability, integrity and benevolence (Mayer et al., 1995; Poon, 2013; Yakovleva, Reilly, & Werko, 2010). Once trust begins to develop (through beliefs regarding another's trustworthiness), the person is said to engage in behaviours indicative of this trust. These behaviours reflect a person's increased vulnerability to another as they carry a cost to the person if trust is breached. For example, a person who trusts another may disclose sensitive information, share novel ideas with others, or rely on others to fulfill their role in achieving a collective goal without monitoring their actions. As a construct, then, trust is indicated by beliefs regarding another person's trustworthiness, the person's own intentions to engage in risky behaviour, and their actual behaviour. The question that remains is, how the language of others contributes to these different components.

2.1.1. Emotion words

A number of qualitative studies have focused on the relationship between language and trust (Crisp & Jarvenpaa, 2013; Wilson, Straus, & McEvily, 2006). These have shown the importance of *affective* language, i.e. language of positive or negative valance, in trust development. Wilson et al. (2006) tested communication styles in computer mediated communication (CMC) groups, and found that high counts of inflammatory remarks and antagonistic language were related to lower trust beliefs towards group members. Similarly, studies have reported that high trust CMC groups demonstrate elevated enthusiasm, agreement and general positivity in communication (Crisp & Jarvenpaa, 2013; Jarvenpaa & Leidner, 1999). These latter communication styles are indicative of support and predictability, and it is believed that it is this that leads to elevated trust (Gibson & Manuel, 2003). Drawing on this research, it was predicted that:

> *H1:* Trust in another will be positively predicted by positive affect language (e.g., positive emotion words) and negatively predicted by negative affect language (e.g., negative emotion words).

2.1.2. Cognitive process words

Other than emotion word use, no direct evidence exists for a link between any other word category and trust (owing to the lack of research in this area). However, research looking at what may be considered trustworthy behaviour suggests other possible links. Research shows that a confident demeanor communicates honesty, whilst an uncertain, tense and nervous demeanor communicates dishonesty (van Swol, Braun, & Kolb, 2013). Given that honesty (a quality indicative of integrity) is a strong determinant of trust (Lind, 2001; Moorman & Grover, 2009), it follows that

language which communicates an honest or dishonest demeanor will influence perceptions of trustworthiness.

One indication of a person's level of honesty is the use of cognitive processes words. Cognitive processes words include tentativeness (e.g., maybe, perhaps), exclusion (e.g., but, without) and discrepancy words (e.g., could, would) (van Swol et al., 2013), amongst other subcategories. Cognitive processes words relate to cognitive complex thinking, and in some circumstances, dishonesty. For example, research shows that cognitive processes words are used when a person is considering alternative scenarios (Junghaenel, Smyth, & Santner, 2008), being deceptive (ten Brinke & Porter, 2010) or describing imagined rather than experienced events (Masip, Sporer, Garrido, & Herrero, 2005). Given the link between actual (and perceived) dishonest behavior and cognitively complex language, it was predicted that:

H2: Cognitive processes words (e.g., but, could, perhaps) negatively predict trust.

2.1.3. Personal pronouns

Personal pronoun use has been related to numerous social phenomena. Elevated personal pronoun use has been shown to demonstrate the inclusion of others in one's focus, which may suggest an awareness of other's needs (Pennebaker, 2012). This was exemplified in Cohn, Mehl, & Pennebaker's (2004) study which found that the use of plural pronouns increased in the weeks following the September 11 attacks as people developed a heightened community focus to deal with the crisis. In sum, personal pronoun use may be considered a powerful tool in focusing communication on the relational aspects of an interaction. This is important given that a focus on relational needs of others has been considered a positive mechanism to build trust. For instance, Rempel, Holmes and Zanna (1985) described a deep level of trust, built on

an emotional investment of caring for others, which forms the foundation of a strong relationship and affective attachment. Therefore it was predicted that:

H3: Personal pronouns (e.g., I, we, you) positively predict trust.

2.1.4. Perceptual process words

A final language category that may predict trust is perceptual processes word use. Perceptual words relate to an individual's processing of environmental cues (e.g., feel, hear, see) (Pennebaker, Booth, & Francis, 2007). Studies report that a lack of perceptual cues in CMC, such as a lack of non-verbal communication or a shared environment, can lead to greater feelings of risk, and consequently reduce one's willingness to trust (Walther, Bunz, & Bazarova, 2005). However, priming perceptual information, such as by allowing short face-to-face meetings or communication in a public location, has been shown to foster trust (Jarvenpaa & Leidner, 1999; Swaab, Kern, Diermeier, & Medvec, 2009). It follows that individuals who can substitute the lack of perceptual cues in CMC interactions with elevated perceptual word use may be able to produce a similar priming effect eliciting a higher trust. It was predicted that:

H4: Perceptual process words (e.g., see, hear, feel) positively predict trust.

2.1.5. Linguistic style matching

As well as language communicating potential trustworthiness information about an *individual*, language might play a role in trust formation at the level of synchrony between two interlocutors. Mimicry in face-to-face interactions, on such domains as facial expressions and posture, typically increase liking, rapport, and trust (Chartrand & Bargh, 1999). Therefore it would be reasonable to expect that, in the absence of non-verbal mimicry, language mimicry would serve a similar function to build trust in online interactions. Indeed, this is exactly what Swaab, Maddux and

Sinaceur (2011) concluded from their study which found that when individuals where instructed to mimic partners in online interactions, they were able to build a greater foundation of mutual trust and facilitate greater joint outcomes. Dominant theories of communication accommodation, such as communication accommodation theory (Giles & Ogay, 2006), state that one function of language accommodation is to establish trust. Although the mechanisms as to *how* language mimicry builds trust are unclear, there is extant research to suggest that this is the case.

What is remarkable about research into the relationship between language mimicry and positive social outcomes is that it appears to occur, or can at least be reliably measured, not at the level of absolute word matching but at the level of matching in function words (Taylor, Dando, Ormerod, Ball, Jenkins, Sandham, & Menacere, 2013). Hence, LSM was the metric used to assess the relationship between mimicry and trust.

H5: LSM positively predicts trust.

Figure 2.1 shows a summary of the conceptual model tested in the present study. The lower half of the figure represents Mayer's (1995) original trust model, and was not retested in the present study. Key causal paths from language variables (represented in the upper half of the figure) to each node of Mayer et al.'s (1995) situational trust variables were tested. Trust propensity is modeled to affect trust prior to participant's interaction in the study.

2.2. Method

2.2.1. Participants

The sample comprised 80 participants from two Universities located in the North-West of England. Participants were 17 males and 60 females (M age = 20.75 yrs, *SD* = 3.08), Range 18 - 30 yrs). All participants self-reported English as their first

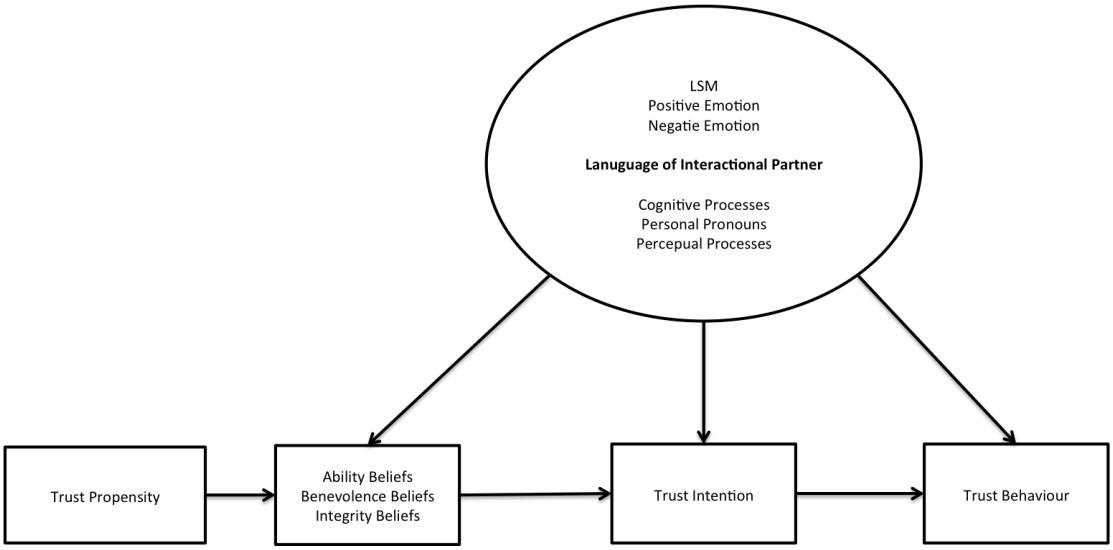

Figure 2.1 *Schematic representation of a conceptual model linking the language of an interactional partner to an individual's trust beliefs, trust intentions and trust behaviour.*

language. Participants took part in the study in return for course credits. Participants were randomly allocated to pairs to give a total of 40 dyads. Of these, one dyad was removed as they reported knowledge of the aim of the study prior to participating. This left a total of 39 dyads for use in the final analysis.

2.2.2. Materials

The survival game. Dyads were tasked with completing the survival game (Brett & Thomson, 2008). The survival game is an interdependent task that requires players to imagine a scenario in which they have survived a plane crash. They are instructed to imagine that they are the only two survivors, and are given written details about their surroundings (e.g., temperature, terrain, points of interest) and a list of twelve items that might be used to aid their survival. The task objective is for dyads to agree and submit a list of items in rank order of importance for survival, as well as stating a use for each item.

Pre-experiment measure. Trust propensity was measured using five items taken from Costa and McCrea's 1992 scale ($\alpha = .68$). McEvily and Tortoriello's (2011) recent review of trust measures notes three popular measures of trust

propensity (Rotter, 1967; Costa & McCrea 1992; Yamagishi, 1986). The Costa and McCrea measure was chosen because it was the most recently devised; also, the measure had previously been used in group contexts (Kichuk & Wiesner, 1997).

An example item is *'I believe that people are basically moral.'* To minimise participants guessing the true nature of the study, trust propensity items were embedded with 10 self-report measures of extraversion and conscientiousness; taken from the IPIP (Goldberg, 1999). Responses to all items were made on a 5-point scale that ranged from "strongly disagree" (1) to "strongly agree" (5).

Behavioural trust. The extent to which participants displayed trusting behaviours towards their partner was measured using an adapted version of the Trust Game (Berg, Dickhaut, & McCabe, 1995). The game requires one person (the sender) to send up to ten points to the person they have been interacting with (the receiver), with the belief that this number will be tripled before reaching the receiver. The receiver then decides how much of the tripled amount they wish to send back to the sender. A high number of points allocated is indicative of high levels of trust, as this potentially leads the sender with very few points. Participants believed that the points used were those earned previously in the survival game, hence participants were incentivised to maximise points as to increase their chances in the raffle. In the present study, the trust game was adapted such that *both* members of the dyad were lead to believe that they had been randomly selected as the sender and that their dyadic partner was the receiver. Hence, a measure of trust behaviour (i.e., the number of points they sent to the other person from zero to 10) was taken from both dyad members.

Post-experiment measure. Trust beliefs and trust intentions were measured by using items from Mayer and Davis' (1999) trust scales. Items were adapted to the experimental context, for example Mayer and Davis' (1999) item; "top management has a strong sense of justice" was adapted to "the person I interacted with has a strong sense of justice." Six items measured beliefs about the other's ability (α = .78; *'The person I interacted with is skilled'*), 5 items measured beliefs about the other's benevolence (α = .80; *'The person I interacted with is concerned with others welfare'*), 6 items measured beliefs about the other's integrity (α = .71; *'The person I interacted with sticks to their word'*), and 4 items measured trust intentions (α = .67*; 'I would feel comfortable giving the other person complete responsibility'*). Responses were made on a 5-point scale that ranged from "strongly disagree" (1) to "strongly agree" (5).

2.2.3. Design

Independent variables were taken at the individual and dyad level. At the individual level, independent variables were the use of personal pronouns, positive emotion, negative emotion, cognitive processes, and perceptual processes words as measured by LIWC. At the dyad level, the independent variable was LSM scores for each dyad. Participants propensity to trust was a control variable. The dependent variables were trust beliefs (ability, integrity and benevolence), trust intentions, and trust behaviour.

2.2.4. Procedure

Two participants attended each testing session and were each instructed to go to a different testing room to meet with the experimenter (this was to ensure participants never met face to face). On arrival, participants were asked if they had

signed up individually or with someone they knew, to ensure no friends or acquaintances had signed up to the same timeslot. All participants stated that they had signed up individually.

Participants were prepped for the task. Participants were instructed that they would be interacting online with another participant to complete a survival game and a short decision-making task, after which they would be asked to complete a short questionnaire on their experience. After giving their consent to take part, participants completed the pre-interaction questionnaire and were then provided with instructions for the survival game. Each participant received their own paper response sheet with three columns listing the items, their rank number and use.

Participants were informed that there was a correct order to each item's importance, and that survival experts have established a use for each item. Their goal, as a dyad, was to rank as many items as possible in the 'correct' order. Participants were informed that points were awarded for each item correctly ranked with the correct use, and that points would be transferred into raffle tokens and entered into a prize draw for the chance to win a £10 voucher. The point structure was as follows; five points allocated for the most important item correctly ranked, five points for the least important item correctly ranked, and one point each for the remaining items if ranked in the correct order. The task was made interdependent by informing participants that points were only awarded for items ranked in the same, correct, order by both members of the dyad. Participants submitted their own list independently and relied on the other participant submitting the same order.

Participants had 17 minutes to complete the survival game. They did so using the open source instant message program 'Yahoo! Messenger.' This program allowed instant text messages to be exchanged in real time. Video and audio messaging was

disabled as the study was interested only in text-based online interactions. The experimenter informed participants when to begin the game, when 5 minutes remained, and when the game had ended.

After the 17 minutes, the conference chat window was disabled so that participants could no longer communicate with one another. The experimenter collected the paper response sheets from each of the participants. They were then informed, in a private chat window with the experimenter, that the order they proposed had collectively earned them 10 raffle tokens for the prize draw. In reality, as there was no correct solution to the survival game, *every* dyad received 10 raffle tokens irrespective of participants' responses.

Each participant was given instructions to complete the trust game as the 'sender' using the 10 raffle tokens that they had been awarded. The participant communicated how many points they wished to send via a private chat window with the experimenter. They were then asked to complete the post-interaction questionnaire, while they believed that the other person was being informed of their choice and deciding how many tokens to return. Once both participants had completed the post-interaction questionnaire, they were informed that the experiment had ended and were debriefed about the deception and nature of the study. Each participant was given the same chance to win in the prize draw regardless of how many tokens they stated they wanted to transfer to the other person.

2.2.5. Analysis

The language used by participants during the survival game was analysed using the automated text analysis program Linguistic Inquiry and Word Count (LIWC, Pennebaker et al., 2007). LIWC searches for over 2,300 words or word stems within a text file. The search words are categorised into over 70 linguistic

dictionaries, which capture language at a basic linguistic and psychological level. A person's linguistic profile contains one score per linguistic dictionary. In the current study, transcripts of each dyad's online interaction were split into two single text files; one for each dyad member. The output from linguistic dictionaries positive emotion, negative emotion, pronoun, cognitive processes and perceptual processes words were recorded per text file.

LSM scores were calculated using the procedure described by Ireland, Slatcher, Eastwick, Scissors, Finkel and Pennebaker (2011). LIWC output within the dictionaries of nine main categories of function words (adverbs, articles, auxiliary verbs, conjunctions, indefinite pronouns, negations, personal pronouns, prepositions, and quantifiers) were compared between dyad members. The degree to which the proportion of one dyad member's function word use matched the other member's function word use was calculated per category using the formula (the category 'articles' is used for illustration):

$$LSM\text{article} = 1 - [(\,|\, articleA - articleB \,|\,)/(articleA + articleB + 0.0001)]$$

ArticleA is the proportion of a dyad member's discourse that was articles, while articleB is the proportion of the other member's discourse that was articles. The denominator, 0.0001, is added to prevent division by zero in empty sets. The nine category-level LSM scores are averaged to produce a composite LSM score of overall matching in each dyad. The LSM score is bounded between 0 and 1; where higher numbers represent greater style matching between speakers. Language used at both the individual level and dyad level (i.e., LSM) were analysed in separate hierarchical linear regression models to identify predictors of each set of trust beliefs (ability, integrity and benevolence), trust intentions and trust behaviour. Trust

propensity was entered at step 1 in each model, language variables were entered at step 2.

2.3. Results

Table 2.1 shows the means and standard deviations of trust and language variables. Of the language categories analysed cognitive mechanism words and personal pronouns were used most frequently. Negative emotion word production was sparse; on average participants used less than one negative emotion word during the task.

Hypotheses 1 though 4 predicted that higher trust would be positively associated with personal pronouns, positive emotion words and perceptual processes words use, and negatively associated with negative emotion words and cognitive processes words.

Table 2.2 shows the regression coefficients for the mean change in trust variables predicted by individual level word categories. The results of regression analyses, as shown in Table 2.2, offer partial support for these predictions. Consistent with Hypothesis 1, positive emotion words positively predicted beliefs about the other's integrity (β = .25) and the person's own trust behaviour (β = .24). However, negative emotion words did not significantly reduce trust on any of the measures. Consistent with Hypotheses 2, cognitive processes words negatively predicted beliefs about the other's benevolence (β = -.37). Consistent with hypothesis 3 personal pronoun use positively predicted beliefs about the other's benevolence (β = .35). Consistent with Hypothesis 4, perception process words positively predicted trust behaviour (β = .26). In addition to these main effects, the results show that beliefs about the other's integrity was also predicted by a person's own propensity to trust (β = .24).

Table 2.1 *Means and standard deviation for trust and language measures.*

	M	*SD*
Trust Propensity	17.16	2.96
Ability Beliefs	21.97	2.62
Integrity Beliefs	22.34	2.63
Benevolence Beliefs	18.73	2.48
Trust Intention	13.66	2.74
Trust Behaviour	7.01	3.18
Positive Emotion	5.54	1.68
Negative Emotion	0.91	0.73
Personal Pronoun	6.43	1.96
Cognitive processes	18.57	3.46
Perceptual Processes	3.57	1.31
LSM	0.81	0.06

Hypothesis 5 predicted that higher trust would be expressed towards those who had experienced a greater level of LSM during their interaction. Table 2.3 shows the regression coefficents for the mean change in trust variables predicted by LSM. This analysis showed that LSM was not a significant predictor of trust on any of the measures.

2.4. Discussion

The current study examined the use of language as a possible determinant of trust in dyads working on an online joint game. The results showed that a person's beliefs and behaviour indicative of trust towards another were related to the word categories used by an interactional partner. Specifically, the results showed that the

Table 2.2 *Results from hierarchical regression analyses (Hypotheses 1 to 4)*

	Ability beliefs	Integrity beliefs	Benevolence beliefs	Trust intention	Trust behaviour
Step 1					
Trust Propensity	0.15	.30**	0.11	0.19	0.09
Step 2					
Trust Propensity	0.20	.24*	0.11	0.19	-0.01
Positive Emotion	0.06	.25*	0.11	0.15	.24*
Negative Emotion	0.14	-0.10	0.01	0.01	-0.17
Personal Pronoun	0.17	0.11	.35**	0.05	-0.01
Cognitive processes	-0.15	-0.17	-.37**	0.19	-0.12
Perceptual Processes	-0.06	0.03	-0.11	0.16	.26*
Adjusted R^2	0.01	0.12	0.13	0.03	0.13

Note. Parameter estimates are standardized coefficients. *p<.05 **p<.01 (one-tailed)

Table 2.3 *Results from hierarchical regression analyses (Hypothesis 5)*

	Ability beliefs	Integrity beliefs	Benevolence beliefs	Trust Intention	Trust Behaviour
Stage 1					
Trust Propensity	0.15	.30**	0.11	0.19	0.09
Stage 2					
Trust Propensity	0.16	.30*	0.11	0.19	0.09
LSM	-0.09	0.02	-0.1	0.06	-0.01
Adjusted R^2	0.01	0.06	-0.01	0.01	-0.02

Note. Parameter estimates are standardized coefficients. *p<.05 **p<.01 (one-tailed)

frequency by which a person used positive emotion words (but not negative emotion words), personal pronouns, cognitive processes words and perceptual processes words was related to how much they were trusted.

These observations are consistent with a number of hypotheses described earlier. As predicted by H1, individuals who interacted with someone using more positive emotion words reported higher integrity beliefs and demonstrated greater trust behaviour. This is consistent with past research that has demonstrated that 'positivity' in communication style relates to trust (Crisp & Jarvenpaa, 2013; Wilson et al. 2006) when analysed qualitatively, and extends the observation to quantitative analysis where language is measured at the individual word level.

The observation that negative emotion words were not associated with trust, however, is inconsistent with some previous research that suggested that increased negative emotion word use lead to reduced ratings of warmth and ability by an interactional partner (Berry et al., 1997). The lack of effect of negative emotion in the present findings may have been due to the context of the interaction. Whilst all language variables were normally distributed, the frequency of negative emotion words was lower than any other linguistic category, which may have reduced the ability to detect an effect for this language category. This is somewhat supported by the fact that words that occurred with the highest frequency also emerged as the strongest predictor of trust. If true, we might expect the inverse effect of negative emotion words in interactions where the overall rate of negative emotion word production is higher and therefore more salient. Alternatively, negative emotion could simply be a variable less useful for a measure of trust when considered at the individual word level. That is to say that, negative affect might relate to trust

passively (e.g. through sarcasm or lack of engagement) and hence does not emerge at the *explicit* individual word level.

As predicted by H3, individuals who interacted with someone using more personal pronouns reported higher benevolence beliefs. This is consistent with past research that demonstrated that elevated use of personal pronouns reflected increased concern for the social dynamics within the interaction (Pennebaker, Mehl & Neiderhoffer, 2003). Hence the present findings indicate that this relationship between pronoun use and engagement in social dynamics might translate into greater benevolence trustworthiness beliefs in online interactions.

As predicted by H2, cognitive process words negatively related to trust. This was in line with research that shows cognitive complex language to relate to deceptive (and thus less trustworthy) speech (see earlier discussion). However, cognitive processes words negatively related to benevolence trustworthiness beliefs, as opposed to integrity trustworthiness beliefs which presumably would be most effected by language which communicates dishonesty. That said, given the context of the interaction, where there was no incentive to be deceptive, cognitive complex language alternatively might have communicated a greater *task focus*. Cognitive processes words have previously been linked to task focus (Junghaenel, Smyth, & Santner, 2008) – and so in line with the finding that an *increase* in focus on social dynamics related to greater benevolence beliefs (H3), an increase in focus on the *task dynamics* might relate to lesser benevolence beliefs.

As predicted by H4, individuals who interacted with someone using more perceptual processes words demonstrated greater trust behaviour. This is consistent with past research which has suggested that priming perceptual information can substitute the lack of perceptual cues online and garner trust (Jarvenpaa & Leidner,

1999; Swaab, Kern, Diermeier, & Medvec, 2009). As with the support for H1, this findings extends the finding by demonstrating that a substitute for perceptual cues may be created at the individual word level.

The observation that LSM was not related to trust was unexpected. Counter to H5 and past research, LSM did not relate to any of the trust measures. LSM has frequently been related to social dynamics such as cooperation, cohesion and performance, which are constructs associated with trust (Gonzales, Hancock, & Pennebaker, 2010; Niederhoffer & Pennebaker, 2002; Swaab et al., 2011). The relationship between LSM and trust might be more likely to emerge in online group, rather than dyadic, interactions. In dyadic interactions, where individual's need only attend to a single interactional partner's utterances, individual content words can easily be processed, and trust judgements appear to emerge based on *what* people are communicating, rather than *how* they are communicating. In the absence of the latter, we may expect to see an absence of effect for LSM as this is processed unconsciously (Niederhoffer & Pennebaker, 2002). It follows that in an online group context, where attending to multiple speakers places higher demands on cognitive processing, LSM might emerge as a more salient cue to trust, because the explicit processing of consciously interpreted content words becomes more difficult.

The data suggests that whilst individuals communicate online, their use of individual word categories are utilized by interactional partners to inform trust beliefs and behaviour. Mayer's et al.'s (1995) model of trust suggested that when partners have little interactional history, their preexisting propensity to trust will play a more dominant role. Only once individuals have gleaned enough information from social histories or interactional history, will individuals base trust judgements on situational information, as opposed to an internal disposition. It is therefore striking that each

language category was related to trust judgements, suggesting that situational cues to trust (i.e. the language of an interactional partner) played at least as important role in individuals trust judgements as their own trust dispositions, which predicted integrity trust beliefs only.

It has been debated how much time is required for individuals to shift from forming trust based on dispositions, to situational factors in online domains (Wilson et al., 2006). Wilson et al. (2006) suggested that the shift is comparable to face-to-face interaction, however will take longer to emerge. The present findings imply that when language is examined closely, using computer text analysis, this shift might not need time to develop at all, and that individuals process trustworthiness relevant information immediately.

From an operative perspective, investigators are challenged with determining which online interactions translate into actualized dangerous or criminal behaviour. The present study addresses this challenge by nominating specific categories of language, measured by computer text analysis, which relate to trust behaviour, or risk taking in the relationship. Trust behaviour was predicted by positive emotion words and perceptual processes words. Hence, the measure shows promise not just to predict parties trust intentions, as they ebb and flow within an interaction, but also the outcome of an interaction.

2.4.1. Limitations and future research

Whilst the role of language in shaping trust was tested in the present study, the role of *trust shaping language* was unexplored. This is noteworthy given the possibility of a reciprocal relationship whereby language behaviour increases trust, and in turn, trust increases the language behaviour that facilitates trust. Indeed, Zand (1972) was able to show that by priming trust, communication in small work teams

could be significantly altered (as judged by trained observers). Future research might similarly manipulate trust, to observe the effects on language as measured by computer text analysis. Thus offering a means to further validate the present measure.

The present study focused on dyadic interactions; therefore it is unclear if results will generalize to group interactions. The majority of the findings are expected to replicate in groups, such was the design of the experiment; to scale up to group contexts. However, as noted, we might expect LSM findings to differ based on the increased cognitive load of monitoring discourse from multiple group members. Future research will address this limitation in chapter 3.

2.4.2. Conclusion

In expanding previous findings on language and trust, computer text analysis supports the role of positivity (H1), a social focus rather than task focus (H2 and H3), and reducing a feeling of distance (H4) in the development of online trust for dyadic interactions. The use of computer text analysis expands the large body of research of how trust is formed online. Much of the research suggests that trust takes a long time to develop online and will be built on dispositional, rather than situational cues, early in the interaction. However, individuals appear to use language (the only situational cue available) to form trust beliefs and intentions, as well as to base actual trust behaviour on. It is striking that such ideas on how communication might garner trust, as speculated by previous authors, has been translated into quantifiable word frequencies. Future research should continue to explore links between language and trust in group online interactions to determine the role of language as measured in this way in the larger body of research on online group dynamics.

3. Chapter 3: Language Basis of Trust in Online Group Interactions

The experiment described in the last Chapter established a relationship between specific language categories and trust in dyads. The study presented in this Chapter aimed to expand this focus to consider this relationship in online *groups*. The experiment in this chapter studies 40 groups, with the language contained within group discussions used to predict subsequent trust behaviour and group trustworthiness ratings. In addition, individual's beliefs about their group's level of trustworthiness was manipulated using a priming method. This aimed to further validate the language hypothesised to be important to trust online by observing language differences in groups were members were primed to either believe other group members were high or low in trustworthiness. Positive emotion word use was found to reliably relate to trust as a predictor of trust *and* as an outcome of primed high trust.

The study in the previous chapter examined individual word categories and LSM as relating to trust in online dyadic interactions. In line with the main focus of the thesis this start point is now extended to *group* online interactions in a parallel paradigm. Up to now, it has been predicted that both individual word categories and LSM would relate to trust. However ,only individual word categories emerged as relating to trust in the previous study. The lack of LSM effect was explained by low demands on individuals cognitive processing. In dyads, individuals need only attend to one partner, leading to individual word categories being primary in informing individual's trust. Conversely, in groups, it was speculated that this might not be the case, and LSM, which is processed unconsciously, was proposed to take a more significant role in the relationship to trust.

3.1. Trust formation in online groups

Conventional wisdom holds that trust is essential for cooperation between individuals and individuals within a group (Cook, Levi, & Hardin, 2009). Trust is essential to the loose couplings of individuals that allow online groups to function, but it is the tight coupling (dense relations built over repeated face to face interactions) that is often said to be the necessary ingredient for trust to develop (Wilson et al., 2006). This represents a critical paradox for trust formation in online groups, which is to say that the nature of online groups makes trust both necessary and difficult to form. Despite this potential difficulty, research has shown that trust development is still possible, and there is good evidence to suggest that it is through specific communication styles that trust formation is facilitated. A number of researchers have examined communication behaviours ad hoc (e.g., Cramton, 2001) and post hoc (e.g., Jarvenpaa, Knoll, & Leidner, 1998) to discover that online groups are able to achieve trust via strategies such as message explicitness and acknowledging each other's messages. The most systematic examination of the role of communication in the development of group trust has come from Walther and Bunz (2005). They showed that implementing specific rules on formal communication procedures, like overtly acknowledge reading one another's messages, systematically induced trust. Hence, in online groups, adaptive communication styles exist as one means by which a *lack* of trust can be overcome.

Potential barriers to trust are general restrictions of computer mediated communication, rather than specific difficulties in group communication. Hence, this suggests that the language behaviours, which facilitated trust in *dyadic* online interactions (as in Chapter 2), would similarly facilitate trust in group online interactions. That is, affective words (positive and negative emotion) would predict

trust through communicating support (or a lack of support in the case of negative emotion) (Gibson & Manuel, 2003); personal pronoun use would predict trust through communicating a focus on the persons within the interaction (Pennebaker, 2012); cognitive mechanism words would negatively predict trust through communicating a dishonest demeanor (Van Swol, Braun, & Kolb, 2013), or strong task focus (Chapter 2); and, perceptual processes words would communicate trust via substituting a lack of explicit perceptual cues, which help facilitate trust in online interactions, with perceptual words (Jarvenpaa & Leidner, 1999; Swaab, Kern, Diermeier & Medvec, 2009).

> *H1:* Positive emotion, personal pronoun, and perceptual processes words will positively predict trust beliefs, intentions and behaviour, whilst negative emotion and cognitive processes words will negatively predict trust beliefs, intentions and behaviour.

Study 1 failed to find any support for the importance of linguistic style matching (LSM) in trust development within dyads. However, there are a number of reasons to believe that LSM might emerge as a predictor of trust in *group* interactions. Firstly, as previously discussed, LSM has been shown to predict both group cohesion and group performance in online group interactions (Gonzalez, Hancock, & Pennebaker, 2010); each of these social outcomes have frequently been associated with trust (Dirks, 1999; Furumo & Pearson, 2006). Therefore, we might expect LSM to also have effects on trust itself in online group interactions where the experimental design explicitly positions trust as a dependent variable. Secondly, it is proposed that LSM plays an important role in trust formation as it allows information to be processed unconsciously. As noted in the previous Chapter, this may be important when there are multiple speakers, as processing the word categories used by each

member places a high cognitive load on the person. Relying on subconscious cues provides one way to address this.

H2: LSM will positively predict trust beliefs, trust intention, and trust behaviour.

Figure 3.1 shows a summary of the conceptual model testing Hypothesis 1 and 2 in the present study. The model was identical to the model in the previous chapter but for one detail. That is to say that, language variables (positioned as holding causal relationships to trust beliefs, intentions and behaviour) were of the *group* the individual interacted with, as opposed to an individual partner.

3.2. Priming trust in online groups

Research into the relationship between language and social dynamics have frequently positioned language as a causal factor of social dynamics, *as well as* a potential outcome of social dynamics. However, few studies have directly manipulated language or social dynamics to investigate the direction of the effect between the two variables. As such, inferences regarding the direction of effects have remained speculative. For example, Fischer, McDonnell, and Orasanu (2007), in their discussion of direction of effects between positive emotion expression and team performance, suggested that expressions of positive emotion likely facilitated greater performance through demonstrating support and mitigating the negative effects of disagreements. At the same time, they speculate that higher performance itself likely induced a more positive social climate. Other researchers, specifically in trust research, have grappled with the direction of effects between communication and trust. Correlational, rather than causal, relationships between communication and trust have been established using ad hoc (e.g., Cramton, 2001) and post hoc (e.g., Jarvenpaa, Knoll, & Leidner, 1998) designs. Therefore, it is possible that the

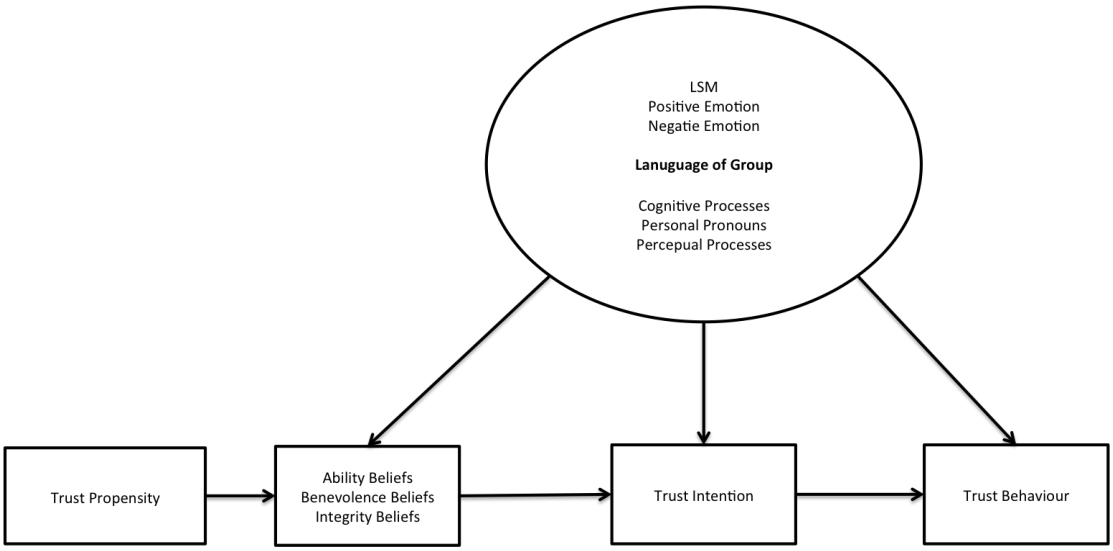

Figure 3.1 *Schematic representation of a conceptual model linking the language of a group to an individual's trust beliefs, trust intentions and trust behaviour.*

relationship between language (as studied by computer text analysis) operates in both directions also, with language effecting trust and trust effecting language. However, this is unclear at present and is thus included in the design of the current study.

Zand (1972) was one of a few to explore how varying levels of initial trust might causally relate to communication styles. He notes evidence from psychotherapy, which shows that trust is a crucial *initial* factor to facilitate effective subsequent communication. That is, trust increased emotional stability and decreased defensiveness in communication, thus demonstrating the role of trust in effecting communication style. Building on this, he primed groups to be either high or low on trust and found that high trust group members communicated more openness and feelings, and also clarified problems and goals; more so than group members primed in the low trust condition. Hence, there is evidence to suggest that trust shapes the language behaviour of individuals in interaction in such a way that may further increase trust.

The present study is novel because it systematically manipulated trust to examine its effects on communication in online groups. With the exception of Zand's

(1972) study, research has not since directly manipulated trust to observe its effect on language. Nor has such a research design been applied to online communication, or using contemporary measures of language (as opposed to trained observers). However, there is evidence to suggest that communication, as measured by computer text analysis, can be altered via implementing manipulations prior to an interaction. For example, Taylor, Dando, Ormerod, Ball, Jenkins, Sandham, and Menacere (2013), showed that when participants are given the instruction to act as a disruptive insider in online group interactions, the individual's subsequent linguistic style (in terms of pronoun, emotion word, and cognitive complex language use) altered significantly as compared to coworkers with no insider instruction. This research supports the possibility that a pre-interaction manipulation of *trust* could produce variation in one's language behavior. Hence, the possibility to manipulate trust in order to observe its effects on language.

The present study introduced high or low trust primes to each participant prior to any group interaction via a simulated trust game. That is to say that, individuals interacted with a computer they believed to be a participant, who behaved either trustworthy or not, with the aim to effect the participants subsequent communication style in the survival game (used in the previous study). Previous research has shown this to be a validated way to influence trust, creating predictable trust behaviour, as well as reliable neural responses (King-Casas, Tomlin, Anen, Camerer, Quartz and Montague (2005). Therefore, it was hypothesized that increases or decreases in trust, brought about by the trust prime, could effect individual's language behavior. Specifically, the same language behaviour that has been proposed to *facilitate* trust formation.

H3: Greater positive emotion, personal pronoun and perceptual words, and fewer negative emotion and cognitive mechanism words will be observed in the high trust prime condition as compared to the low trust prime condition.

H4: Greater LSM will be observed in the high trust prime condition as compared to the low trust prime condition.

Figure 3.2 shows the conceptual model testing Hypothesis 3 and 4. This model explored the possibility of a causal path from trust *to* language. Ego, the reverse of the causal path explored in the conceptual model for Hypotheses 1 to 2 and model in the previous chapter. As in previous models, trust propensity is modeled to affect trust prior to participant's interaction in the study.

3.3. Method

3.3.1. Participants

Participants were 196 undergraduate students, postgraduate students and university staff recruited from three UK Universities in the North West of England. Sixty-eight participants were male and 128 participants were female. The average age of the sample was 21.62 years (*SD* = 5.77; Range 18 – 59 yrs). Participants were recruited from different disciplines, year groups and university societies. Participants took part in the study voluntarily or for course credits.

3.3.2. Materials

Pre-experiment measure. Prior to the main task, participants were asked to complete a short questionnaire that collected information on their trust propensity, availability and demographics. Consistent with Chapter 2, trust propensity was measured using five trust items taken from Costa and McCrea's scale (1992). To reduce participant's attention to the fact that the research was interested in trust, these

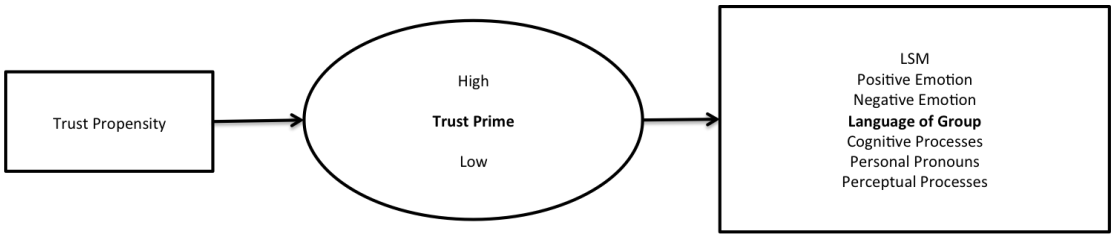

Figure 3.2 *Schematic representation of a conceptual model linking primed trust to the individual's language use.*

items were embedded with 20 items measuring self-reported levels of extraversion and conscientiousness. These items were taken from the IPIP (Goldberg, 1999).

Participants provided details of their availability as days of the week and times to assist scheduling participant groups. Days of the week rather than specific dates were used to reduce the opportunity for groups of friends to sign up to the same slots. Finally, demographic details were collected relating to participants' university college, discipline, year cohort and where they had heard about the study. This was to further mitigate the risk of scheduling groups with members who had pre-existing relationships.

Trust prime game. Based on the repeat trial trust game (Berg, Dickhaut, & McCabe, 1995; see Chapter 2 for a description), a software programme was developed to prime low and high trust in participants. Put simply, participants were informed that they would interact with another participant from their group (who was in fact a pre-scripted computer programme) online to play the trust game in which one of the participants would be assigned the role of 'sender' and the other the role of 'receiver'. In reality, the participant was always assigned the role of 'sender'. A text box space was available for participants to assign how many points they would like to send to the other participant. Each time the participant sent points, they were presented with a message that read "waiting for participant to respond." A few minutes later (the exact time varied between exchange rounds to mimic a real

interaction), the participant received a message from the receiver that was either trustworthy or untrustworthy.

When the participant was in the low trust condition, they were given the response that the receiver had returned 20% of what they had received. When the participant was in the high trust condition, they were given the response that the receiver had returned 50% of what they had received. For all participants, the program reported information to the participant under a few simple response templates. These included how much the participant had themselves sent, the tripled total their partner had received, the percentage and exact amount of points returned and finally the accumulative total of points the participant had. These figures were reported to the participant at the end of each round. After the final round the program also displayed a message informing participants that this part of the experiment had concluded.

Computer mediated communication (CMC). Participants conversed using text on CMC through the program 'Campfire' (https://campfirenow.com), which had video and audio messaging disabled. The messenger programme allowed 4 to 6 participants, plus a researcher administrator, to interact in a conference chat window. The software allowed for multiple conference rooms, each with a unique web addresses, so that group members could only access their own groups discussions. The software automatically saved transcripts of group interactions.

The survival game. To stimulate conversation and generate language that could be used for analysis, the survival game used in Chapter 2 was used again here (Brett & Thomson, 2008). An online form (Google Drive) allowed participants to access survival game instructions and submit rank position and rank order responses for each item. The game rule that both parties must rank items in the same position to gain credit was altered to the group context as follows. First, *all* group members had

to rank an item in the same position to gain credit, as opposed to just two participants. Second, the amount of points for correctly ranked items increased by 5 times so that the distribution of points to be gained *per person* was comparable to the study in Chapter 2. Hence, the point structure was as follows; 25 points for the most important item correctly ranked, 25 points for the least important item correctly ranked and 5 points per item for the remaining items if ranked in the correct order. As in chapter 2, points were to be transferred into raffle tokens for a prize draw.

Post-interaction trust game. An adapted version of the trust game (Berg, Dickhaut, & McCabe, 1995) was used to measure trust behaviour from individual participants towards the group. Each participant was assigned 10 points. An individual could submit any proportion of these points into a 'group pot'. Any points submitted would be tripled in value. Afterwards the total number of points in the group pot would be divided between all players. The description of the game made it clear that all group members were given the same decision, and each would decide how many points to submit to the group pot independently. Therefore the game created a scenario in which individuals submitting higher amounts of points would make personal gain only if other group members similarly contributed high amounts of points. Hence, the amount of points contributed could be used as a behavioural metric of trust, in that submitting greater amounts of points is profitable only if other group members act trustworthy, and similarly submit a greater amount of points.

Post-experiment measure. Participant's trust beliefs and trust intentions towards the rest of the group was measured using items from Mayer and Davis' (1999) trust scales. Items were adapted to the experimental context, for example Mayer and Davis' item; "top management has a strong sense of justice" was adapted to "the group I interacted with has a strong sense of justice". Six items measured

beliefs about the group's ability (e.g., "The group I interacted with are skilled' α = .86), 5 items measured beliefs about the group's benevolence (e.g., "The group I interacted with are concerned with others welfare" (α = .81),, 6 items measured beliefs about the group's integrity (e.g., "The group I interacted with sticks to their word" α = .78), and 4 items measured trust intentions toward the group (e.g., "I would feel comfortable giving the group complete responsibility", α = .67),. Responses to all trust belief and intention measures were made on a 5-point likert scale that ranged from "Strongly disagree" (1) to "Strongly agree" (5).

3.3.3. Design

Participants propensity to trust was a control variable. To test hypothesis 1 and 2, the dependent variables were trust beliefs (ability, integrity and benevolence), trust intentions and trust behavior. The independent variables were the six language categories (cognitive mechanism words, pronouns, positive emotion words, negative emotion words, perceptual processes words), which were calculated at the mean group level whilst controlling for the individual's contribution to each score (H1). Similarly, a second independent variable was group LSM minus the individual's contribution (H2). This approach was chosen to ensure that group variables were positioned as perceptions of group language without being confounded by the individual's contribution. For example, consider a situation where an individual's language style is characterised by high positive emotion, but their group's average style is of low positive emotion. In such circumstances the group language score, minus the individuals contribution, is the most accurate representation of the individual group member's experience.

To test hypothesis 3 and 4, trust prime was the independent variable, with two levels of high and low trust. The dependent variables were the six language

categories (H3) and an individual's Linguistic Style Matching (LSM) (H4). This approach was chosen to best describe the effect of the prime on individual group member's language style, as opposed to aggregating LSM to the group level. This approach also increased statistical power by avoiding unnecessary aggregation.

3.3.4. Procedure

A study advert was posted to an internal online recruitment website which allowed first year psychology students at Lancaster University to participate in the study for partial course credit. Other students and staff members, from any discipline at Lancaster University, could also use the website to sign up to participate in return for compensation of £3.50. Those interested in taking part were directed to an online information sheet and consent form and from here, the pre-test questionnaire. Once completion of the pre-test questionnaire and consent form, participants were informed that they would be contacted within two weeks via email with details of their testing slot.

Participants were allocated to one of 40 groups of 6 group members. Groups were created with attention to participant's college, discipline, year group and where they had heard about the study. Those who gave similar responses to these items were allocated to different groups. Participants were emailed with a web address, testing time and alias name to be used to access the online chat room where the study would take place. Alias names were nonsense words followed by an initial (e.g., Cas M). They were also emailed a link to the online Survival Game.

Participants were told that they could review the game, but that they should not complete the form until they were with other participants in their group (i.e., during testing time). Access to the survival game was allowed to reduce the time

participants spent reading instructions during the group interaction. All participants could accept or decline invitations via email.

On the day of study, participants were given until 3 minutes past the arrival time before being excluded from the study. Once all participants had arrived, or 3 minutes had passed, the study would proceed with a minimum of 4 group members. Attending participants were invited to play the trust prime game (i.e., the prime). They were instructed that they would be paired with a random fellow group member to play the trust prime game in a separate website window, and that they would be directed back to the group chat window on completion. If a group contained an odd number of participants (e.g. five members) they were informed that one group member would be selected (at random) to be paired with a person from another online group taking place simultaneously.

Once all participants had completed the prime, they played the survival game. In the group chat window, participants were provided with the link to the survival game and advised to keep this link open while discussing with the group. From this moment participants were given 20 minutes to complete the task. The researcher reminded the group, via the group chat window, when 5 minutes remained. At 20 minutes, the experimenter required participants to stop discussing the task and submit their responses, however complete or incomplete these may be. The researcher then asked the participants to wait while their group score was calculated. One minute passed before the researcher informed the group that they had earned 10 raffle tokens each.

The researcher informed participants that they would play one final game. They were instructed that from this moment onwards they would not have any further communication with other group members. Participants were then directed to the

trust game followed by the post-interaction questionnaire. Participants completed the trust game and trust belief and intention measures. Once participants had completed these, they received a written debrief.

3.3.5. Analysis

To test hypothesis one and two, i.e. the effect of group language on individual group member trust, group minus individual contribution scores were calculated for individual word categories and LSM. The individual word category scores were calculated by simply taking, per group member, the average of the rest of the group's individual word category use, e.g. in a four person group, to calculate positive emotion, the language score used to predict group member 1's trust, was the average of group member's 2,3 and 4's positive emotion word use.

To calculate LSM scores, an adapted method from previous group research was used (Gonzales et al., 2010). Each group member's function word use was compared with the overall percentage of the remaining group members. This resulted in a separate LSM score per group member, which reflected the extent to which an individual's language style matched their group. LSM was then calculated using the following formula. The article category, in a group of four, is used as an example here:

$$articles1 = 1 - (|article1 - articleG|/(article1 + article + 0.0001))$$

$$articles2 = 1 - (|article2 - articleG|/(article2 + article + 0.0001))$$

$$articles3 = 1 - (|article3 - articleG|/(article3 + article + 0.0001))$$

$$articles4 = 1 - (|article4 - articleG|/(article4 + article + 0.0001))$$

Where articleN is the percentage of articles used by an individual group member as a proportion of their total word count. ArticleG is the percentage of articles used by the remaining group members as a proportion of their word count.

The addition of .0001 in the denominator is used to prevent division by zero. Recall that there are nine separate dimensions of function words that make up the overall LSM score. Comparable calculations were made for each function-word category, for each group member. Resulting in an LSM score per participant by taking the average of all categories. As with individual word categories, to test hypothesis 2, *the group LSM minus individual's contribution* scores were calculated by simply taking, per group member, the average of the rest of the group's LSM scores.

To test hypothesis 3, i.e. the effect of the prime on individual word category language use, each individual word category was measured by simply taking the proportion of words used in each category as a percentage of an individual group member's overall word use. To test hypothesis 4, i.e. the effect of the prime on LSM, LSM was calculated as described above *per participant*, however the final stage of analysis was omitted, i.e. individual LSM scores were not averaged across the rest of the group.

Hypotheses in the present study, and group studies in the remaining chapters of the thesis, were tested using linear mixed effects models. Data from the study in the present and remaining chapters had two random within factors, these were individual participant trust propensity (or just individual participant identity in Chapter 6) and group membership. Since each participant can only belong to one group, the grouping factors of individual or individual trust propensity and group membership are said to be nested.

In the studies in Chapters 4 and 5, language measurements came from a single group of participants who interacted in repeat interactions across various phases of group development. Therefore language scores are a within participant factor. These measures cannot be considered independent because they were collected per

participant. This phenomenon, known as pseudoreplication, is common in neuroscience experiments and leads to the use of repeated measures (rm) ANOVAs (Magezi, 2015). However, rm ANOVAs require various additional assumptions about covariance (see Maxwell and Delaney, 2004; Nimon, 2012). Corrective procedures do exist if these assumption are violated, however these can lead to further problems with missing data which either must be excluded or imputed. In contrast to rm ANOVA's, linear mixed effects models can accommodate missing data and do not depend on limiting covariance assumptions.

As mentioned, in the group studies in the present thesis, data is often nested and group membership and language variables are often a within participant factor. In addition, missing data is a common occurrence where experimental groups are asked to return to an online meeting place up to three times across up to 7 days. Missing data is also an issue in studying real world online groups, where participants might naturally cease to exist in the group at various phases (see Chapter 6). Therefore, for the reasons outlined above, linear mixed effects models offered the best analysis for studying groups in the remainder of the thesis.

Despite the utility of linear mixed effects models one limitation must be noted. Using a different method to previous similar studies meant that the effect size was unknowable a prior. Therefore, a power calculation was not appropriate. Sample size was instead chosen based on similar language studies using groups (Gonzales et al., 2010; Taylor et al., 2013). Therefore a feasible target for the number of groups studied was chosen at approximately 20 groups per experimental condition.

3.4. Results

Table 3.1 gives the means and standard deviations for trust and language variables. As in the study in chapter 2, cognitive mechanism words and personal

Table 3.1 *Means and standard deviations for trust and language variables*

	M	*SD*
Trust Propensity	16.57	3.08
Ability Beliefs	20.15	.4.27
Integrity Beliefs	20.52	3.76
Benevolence Beliefs	16 .59	3.50
Trust Intentions	11.54	3.38
Trust Behaviour	5.67	3.38
Positive Emotion	6.27	3.09
Negative Emotion	0.97	1.02
Personal Pronoun	7.43	2.76
Cognitive processes	18.87	4.22
Perceptual Processes	3.67	3.67
LSM	0.81	0.09

Note: Missing values on trust belief and trust intention scales reflected participants failing to submit survey answers. 18 failed to complete (or incorrectly completed) the trust game. Trust propensity: N = 193. Ability beliefs, integrity beliefs and benevolence beliefs: N = 191. Trust intentions: N = 190. Trust behaviour: N = 178. All language variables: N = 196.

pronouns were used most frequently. Likewise, negative emotion word production was sparse; on average participants used less than one negative emotion word during the task.

Hypothesis 1 and 2 were tested using a series of linear mixed effects models—one per language variable—that tested for the effect of language on trust and controlled for the random effects of group and individual trust propensity, as well as the trust prime. Table 3.2 gives the results of these models. Positive emotion words

Table 3.2 *Results from individual language category linear mixed effects models (Hypotheses 1 and 2)*

	Ability beliefs	Integrity beliefs	Benevolence beliefs	Trust intention	Trust behaviour
Positive Emotion	0.20	0.30*	0.26*	0.12	0.21*
Negative Emotion	0.88	-0.44	-0.49	0.44	0.26
Personal Pronoun	-0.84**	-0.64**	-0.66**	-0.47**	-0.55**
Cognitive Processes	-0.22	0.08	0.02	-0.04	0.10
Perceptual Processes	0.04	0.01	0.06	-0.13	0.28
LSM	11.35	3.16	3.94	1.30	1.94

Note. *p<.10 **p<.05

positively predicted trust behaviour (β = .21, *SE* = .14, *df* = 176, t = 1.53, p = .07, one-tailed tests), benevolence beliefs (β = .26, SE = .16, *df* = 53.86, t = 1.64, p = .06, one-tailed test), and integrity beliefs (β = .30, *SE* = .19, *df* = 64.69, t = 1.60, p =.06, one-tailed test). However, personal pronoun use *negatively* predicted ability beliefs (β = -.84, *SE* = .29, *df* = 96.2, t = -2.91, p = .001, two-tailed test), integrity beliefs (β = -.65, *SE* = .25, *df* = 100.26, t = -2.56, p = .01, two-tailed test), benevolence beliefs (β = -.66, *SE* = .22, *df* = 81.37, t = -2.95, p = .001, two-tailed test), trust intentions (β = -.47, *SE* = .20, *df* = 66.25, t = -2.32, p =.02, two-tailed test) and trust behavior (β = -0.55, *SE* = .20, *df* = 176 , t = -2.81, p = .01, two-tailed test). LSM did not predict any trust variables. These results offer partial support for Hypothesis 1 and fail to support Hypothesis 2.

A second series of linear mixed effects models tested hypothesis 3 and 4. Table 3.3 gives the results of these models. Six models in total were tested, comparing the effect of the trust prime on group members' positive emotion, negative emotion,

Table 3.3 *Results from trust prime linear mixed effects models (Hypothesis 3 and 4)*

	Positive emotion	Negative emotion	Personal pronoun	Cognitive processes	Perceptual processes	LSM
Trust Prime	1.06**	-0.01	-0.40	-0.88	0.07	-0.01

Note. *p<.10 **p<.05

personal pronoun, cognitive mechanism, perceptual processes word use and linguistic style matching. Each model controlled for group and individual random effects as in the first series of models. The results showed that the trust prime predicted positive emotion word use (β = 1.06, SE = 0.51, df = 42.8, t = 2.09, p = 0.02, one-tailed test), such that the high trust prime lead to greater positive emotion word use. The trust prime did not significantly predict any of the other language variables. Thus offering partial support for Hypothesis 3 and no support for hypothesis 4.

3.5. Discussion

The current study aimed to extend the findings from Chapter 2 to a group context, and further test this by examining if the language that emanates from trust, is the same as that which gives rise to it. At the group level, there was little evidence that language variables (other than positive emotion words), which related to trust in dyads, operate similarly for groups. Similarly, the results show support for the link of positive emotion words with trust, showing that this word category is generally used more when people are primed to have trusting attitudes towards others.

3.5.1. Individual word categories

It was striking that the positive emotion effect as an outcome and predictor of trust was the *only* individual word category relating to trust in the direction predicted. This suggested that individual word categories are not of equivalent importance for individual group members trust towards their group. This is perhaps unsurprising as,

as stated in chapter 2, positive emotion words had the most direct support for its relationship with trust in past research. Whereas the hypotheses regarding other language categories were formulated due to there *indirect* relationships with trust via their effect on constructs thought to relate to trust online, i.e. perceptual process words relationship to environmental cues, which was thought to reduce the feeling of geographical distance online (Swaab et al., 2009). However, it is not obvious why this process of making some word categories more relevant to trust than others happens in groups but not in dyads.

As stated in chapter 2, the challenge of forming trust in groups, as compared to dyads, might be the increase in cognitive load owing to the need to monitor more sources (group members) for trust relevant information. This was speculated to impact the relationship between LSM and trust. However, based on the present findings, the same process might have impacted the relationship between individual word categories and trust. That is to say that, greater cognitive load meant that individuals could process fewer trust relevant language categories. Resulting in individual's focusing on certain language cues over others in forming trust judgements.

3.5.2. Linguistic style matching

The experimental hypotheses were not supported with regard to the relationship between LSM and trust. Following the results from the previous chapter, it was suggested that LSM held no relationship to trust because of the nature of the dyadic interaction. That is to say that, individuals were presumably under less cognitive load in processing language, relative to processing language in a group context, hence individuals favored processing individual word categories, as opposed to holistic language variables such as linguistic style matching. Further, it was

proposed that in a group situation, cognitive load would be greater and people may rely more on LSM for, unconsciously, deciding whether or not to trust another person. The results of this study do not support that explanation, however, suggesting that variance in cognitive load does not account for why LSM was not used as a trust signal in the dyadic interactions.

The absence of an effect of LSM was surprising given the positive association LSM has with social dynamics such as cooperation, cohesion and performance. These constructs are frequently associated with trust, and LSM has been associated with positive social functioning in dyads, face-to-face groups, and online groups (Gonzalez et al., 2010; Richardson et al., 2014; Swaab et al., 2011; Taylor & Thomas, 2008). Lastly, prominent theories of human mimicry, such as communication accommodation theory (Coupland & Giles, 1998), state that a central function of language mimicry, or accommodation, itself is to signal trust. It is therefore useful to consider why the present results are counter to the empirical evidence and theory.

Traditional theories of mimicry have tendered to favour interpretations that mimicry engenders positive social outcomes. Ireland (2011), however, noted that LSM has been associated with negative, as well as positive, social outcomes. For example, LSM has been shown to lead to impasse in negotiations in competitive experimental contexts (Ireland & Henderson, 2014). She therefore proposed that LSM reflects engagement in the most salient feature of the interaction, which might not necessarily translate into positive social outcomes. This explains how LSM results in very different outcomes when comparing an interaction where the interlocutors primary aim was to find common ground (Taylor & Thomas, 2008) compared to defeating one another within a negotiation (Ireland & Henderson, 2014). Ireland's hypothesis implies that LSM in the present study reflected engagement in the task,

given that the interaction was entirely task focused. This could explain why LSM, in this context, communicated nothing about the trustworthiness of the group. The implication of this is that LSM might still relate to trust, but only at a group phase where LSM would reflect engagement in the relationship, rather than the task itself. This possibility is tested in the next Chapter.

3.5.3. Language outcomes of trust

By priming individuals to expect either high or low trustworthy behaviour in the survival game, the current study found that positive emotion words not only lead to more trust, but also result from primed trustworthiness expectations. This finding is consistent with Zand's (1972) feedback model whereby more disclosure and less defensive communication *resulted from* previously established trust among group members. Such communication styles might then engendered further trust, and so on. Similarly, Ireland et al. (2011) proposed a bidirectional relationship between language style matching and relationship engagement, with each reciprocally increasing one another. By explicitly testing each direction in a single study, and finding effects for each direction with regard to positive emotion word use and trust, the present research is novel in providing evidence for a reciprocal relationship between language and trust. The bi-directional nature of the findings provides further support for language as a useful measure of trust, both retrospectively and as a predictor of future trust. That is to say that, finding positive emotion in an interaction would indicate the willingness of participants to trust in the present, owing to previous interactions, and the likelihood of continued trust in the relationship in the future.

Demonstrating that a trust prime can influence a group member's language style has interesting theoretical implications. Priming trust presumably leads to altering an individual's internal state of trust. Previous research has speculated and

found evidence for the existence of a 'trust module', which can be activated via priming, and demonstrate reliable neural responses (King-Casas et al., 2005). The present findings are novel in evidencing that influencing an internal trust state, or trust module, produces observable changes in an individual's language behaviour. This is in line with numerous findings by Pennebaker and colleagues, which have indicated that phenomena, at the internal state level, can be revealed via expressions in language use (see Pennebaker, 2012). For example, people experiencing depressed episodes are found to use more negative emotion words and personal pronouns (Rude, Gortner, & Pennebaker, 2004).

The dominant model of trust formation has positioned an individual's trust intention as the central trust facet, which is informed by trust beliefs and results in various forms of trust behaviour, such as risk taking (Mayer et al., 1995). The present findings suggest a potential additional facet of trust to the traditional trust model, which is trust intentions *expressed in language*. Such a component would appear to result from an internal state of trust (as primed in the present study), and occur before necessarily observing any trust behaviour. Given that language has also been shown to *influence* trust behaviour, this facet of trust, which could be described as a manifestation of a trust intention in language, is arguably a critical component in trust formation. The present study offers insights into *how* individual trust intentions might be transformed into trust at the interactional level. That is to say that, it is through specific language behavior that allows individual trust intentions to be transformational at the collective group level.

3.5.4. Limitations and future research

The design of the present study shed light on the direction of effects between language and trust. It is argued that *both* trust can predict language behaviour and

language can predict trust. Studying the relationship between language behaviour and other social outcomes, research has suggested that the temporal order of 'language before outcome variable' favours an interpretation that language engendered the social outcome (Richardson et al., 2014). This interpretation is relevant to the present findings, as opposed to interpreting the results such that the relationship between trust and language operated entirely at the level of trust predicting language behaviour. In addition, the present analysis controlled for possible independent factors, such as trust propensity and the trust prime, which may have effected both language and trust outcome. Nevertheless, the possibility of another independent factor, such as an individual's decision to cooperate, accounting for variance in *both* language and trust, could not be ruled out entirely. Directly manipulating language variables, and observing the effect on trust offers a means to shed further light on the precise nature of the relationship between trust and language.

The generalizability of the present findings to other contexts is limited. There are good reasons to believe that context, such as task focused versus relational focused contexts, might interact with language in its relationship with trust. Communication scholars argue that meaning derived from communication is not possible without a processing of the context in which the communicative act occurred (Brown & Levinson, 1987). Similarly, research from trust repair indicates that the same communication act can have varying effects on rebuilding trust, depending on the context of the initial trust breach (Kim, Cooper, Dirks, & Ferrin, 2013). The present findings were observed within the context of an entirely task orientated discussion.

As discussed above, the lack of LSM effect on trust could be owing to the task focused nature of the interaction. In addition, the positive emotion effect could be

dependent on the task focused nature of the interaction. Positive emotion word use has been proposed as useful to trust in mitigating task disagreements and showing support as groups move towards a common goal. Each function of positive emotion could be absent during interactions where task goals are less salient, and therefore the need for disagreement mitigation and mutual support is less present. Indeed, it is noteworthy that the relationship between positive emotion and trust in previous research has always existed in task-orientated interactions (Fischer et al., 2007; Javenpaa et al., 1998; Wilson et al., 2006). Therefore, manipulating context is a critical future research endeavor for exploring both the relationship of LSM and positive emotion with trust.

A final limitation of the present study was the lack of a manipulation check of the trust prime. That is to say that, trust was not measured directly following the prime. Therefore it was not certain that the prime had the desired effect on participant's trust. A manipulation check was not conducted because directly questioning a participant's trust toward the group, prior to any interaction, may have induced unwanted demand characteristics. In future research, a manipulation check might be conducted by creating a condition with an independent group of participants where the effectiveness of the trust prime could be tested in isolation of the main hypotheses tests.

3.5.5. Conclusion

It was concluded that positive emotion is an important language variable related to trust in online groups. It was proposed that increased numbers of participants, i.e. a group relative to a dyad (Chapter 2), made processing various language categories as signals to trust more difficult. Put simply, cognitive load increased. It was speculated that this resulted in group members selecting fewer

language categories to guide their trust. A novel trust prime also shed light on how language might be *an outcome* of trust. Whereby positive emotion words were used more in group members primed with high trustworthiness, compared to low trustworthiness.

The null effect of LSM in relating to trust was accounted for within the framework of Ireland's (2011) engagement theory. This would suggest that the context of the interaction, task focus, might render the role of LSM irrelevant to trust, given that engagement in task activities communicates neither high or low interpersonal trustworthiness. However, in more relational focused phases of interactions, it was speculated that LSM might come into play. Manipulating the context of online group interactions was proposed as the best way to further understand the relationship between positive emotion, LSM, and online trust.

4. Chapter 4: Language Style Matching and Positive Emotion as Predictors of Trust in Online Groups: The Importance of Phase of Group Development

In the previous study we considered the relationship between positive emotion and LSM and trust in a one-time interaction. However, many online groups will meet over repeat interactions (Wilson, Straus, & McEvily, 2006) and will move through distinct phases of development, for example from relational to task phases (Arrow, Poole, Henry, Wheelan, & Moreland, 2004). This has important implications for understanding the language mechanisms that underlie trust formation, as phase of interaction might interact with language to produce varying effects on trust. For example, positive emotion words might not have universal positive effects on trust, rather positive emotion might facilitate trust more or less depending on the phase of interaction when it occurs. In this Chapter, models of phase development are considered to enrich our understanding of the roles of LSM and positive emotion in online trust. A study is then presented that aimed to induce contextual variation through manipulating three distinct phases of group development; these were relational activity, task activity, and problem resolution phases. Analysis revealed LSM was critical to trust formation in the early relational focused phase; and that only in groups who did not establish high LSM in the early relational focused phase, did positive emotion emerge to facilitate trust formation in the latter, more task focused phases.

In research on 'trust repair,' there is evidence to suggest that the relationships between different communication acts and trust is moderated by context. This body of research considers the mechanisms by which individuals or groups can repair trust once it has been broken. A central finding is that the nature of the trust breach (i.e., the context) moderates the effectiveness of the repair strategy (Kim, Dirks, Cooper, &

Ferrin, 2006; Kim, Ferrin, Cooper, & Dirks, 2004). For example, Kim et al. (2013) showed that an apology is effective for repairing trust following an act of *incompetence* (e.g., committing an accounting related transgression due to negligence), but that denying responsibility for a wrong-doing is more effective following a demonstration of low *integrity* (e.g., *deliberately* committing an accounting related transgression) (Kim, Cooper, Dirks, & Ferrin, 2013). Hence, the language used to facilitate trust *repair* will be less or more effective depending on the context (nature of transgression) in which it occurs. Similarly, the language used to facilitate trust *formation* might be less or more effective depending on the context in which it occurs.

Direct support of this notion comes from Swaab, Maddux, and Sinaceur's (2011) study of online dyadic negotiations. They found that individuals gained greater trust from their counterparts when instructed to mimic their counterpart's language *early* in the interaction. The same was not true of individuals who were instructed to mimic language at the end of the interaction, who received less trust from their counterpart's. The research illustrates how variance in communication—mimicking or not mimicking in this instance—has varying effects on trust depending on the *context* (phase of interaction) in which it occurs.

In summary, the first two studies of this thesis focused on trust formation in a single phase of interaction that was task orientated. This nature of the phase might explain why positive emotion, but not LSM, consistently underlies trust formation. However, research has not explicitly tested the possibility of the positive effect of positive emotion words on trust being moderated by context. Therefore, examining the relative effects of positive emotion on trust, in contexts beyond those that are task

focused, might reveal different effects. A non-directional hypothesis with regard to the effects of positive emotion on trust was proposed:

H1: The effect of positive emotion on trust variables will be different depending on which phase of the interaction the positive emotion is observed.

Unlike positive emotion word use, the role of LSM on social functioning has been tested in varying phases of interaction. Whilst the common view is that LSM facilitates positive social functioning by communicating harmony in the way two or more individuals are experiencing the world (Niederhoff & Pennebaker, 2002). A more recent position has been that LSM may also predict negative social outcomes in certain situations, for example, Ireland and Henderson (2014) found that LSM positively predicted impasse in lab-based negotiations. They explained this effect as when individuals enter into interactions with proself (egoistic) motives, LSM reflects increased focus on the antagonistic and selfish aspects of the interaction, such as opposing goals. According to the authors conclusions, social engagement mediates the relationships between LSM and both its positive and negative correlates. Put more simply, the more engaged a person is in a conversation, the more that his underlying positive or negative attitude towards another is likely to manifest itself in behaviour. As an explanation, this shows how LSM reflects or leads to impasse, or resolution, in negotiations where the primary goal of negotiators is either to defeat their partner (Ireland and Henderson, 2014), or establish a relationship (Ireland et al., 2011; Taylor & Thomas, 2008). The engagement hypothesis suggests that as an individual's goals, motivations, and focus change; so too may the nature of the effects for LSM on social outcomes.

Based on the above research, it was hypothesised that when groups interact in a task focused phase (such as in studies one and two) LSM will reflect engagement in

the task, but not necessarily the relationship, and so not facilitate trust formation. However, when groups interact in a relational focused phase, LSM will reflect engagement in the groups relational needs, and so:

H2: LSM, specifically in a relational activity phase, will positively predict trust variables.

4.1. Context as Group Phase Development

Context, with regard to group online interactions, may be characterised by the phase of group development that the group is in at any one point. Crucial to the present study was to induce phases which were not entirely task orientated, as LSM might be moderated by a task/ relational distinction, and positive emotion has only ever been tested in task. The present study, then, attempted to guide groups through typical phases of development. There is much debate surrounding which phases consistently emerge in groups. Nevertheless, three phases that are commonly identified in the group literature are a relational phase, a task phase, and a resolution phase (Poole, 1981; Poole & Roth, 1989; Hirokawa, 1990; Orlitzky & Hirokawa, 2001).

A relational phase is characterised by group members attempting to manage interpersonal relationships and identify acceptable interaction behaviour; whilst suspending discussion of the task (Mann, Gibbard, & Hartman, 1967; Poole & Roth, 1989). A task phase is characterised by group members directing their behaviours towards successful completion of the problem, or task, at hand (Arrow et al., 2004). Poole and Roth (1989) describe this phase as a task activity phase, which is dominated by activities dedicated towards managing the task, where group communication becomes more goal orientated. This is akin to Tuckman's (1965) work stage, where task orientation is high and ideas regarding the task are exchanged.

For groups working with a time constraint, groups will enter a resolution phase as the deadline looms closer (Arrow et al., 2004). In the resolution phase, group members consider the actions of others in order to converge the entire group to agree on the outcome (Bales & Strodtbeck, 1951).

These established phases of group development, replicated for the present study, create enough contextual variation to test our hypotheses. That is to say that, compared to the studies in the previous two chapters, the phases create an additional two phases to test the effects of positive emotion on trust (relational and problem resolution). While the relational phase allows a test for the hypothesis that LSM will facilitate trust, where it has previously failed to in task focused discussions.

Figure 4.1 shows a summary of the conceptual model tested in the present study. The model builds on the models in the previous two chapters by including the effect of group phase in the relationship between language and trust. In addition, language variables of interest are specified to LSM and positive emotion. As in the previous models, key causal paths from language variables to each node of Mayer et al.'s (1995) situational trust variables were tested. Trust propensity is modeled to effect trust prior to participant's interaction in the study.

4.2. Method

4.2.1. Participants

Participants were 103 students who made up 20 groups of 4 to 6 people. Participants were from UK University in the North West of England. Participants were invited to a three-part online study. Participants who failed to attend a meeting were restricted from attending subsequent meetings. Thus, 103 participants attended the first online meeting, 98 participants attended the second meeting, and 96 participants attended all three meetings, group size never dropped below 4

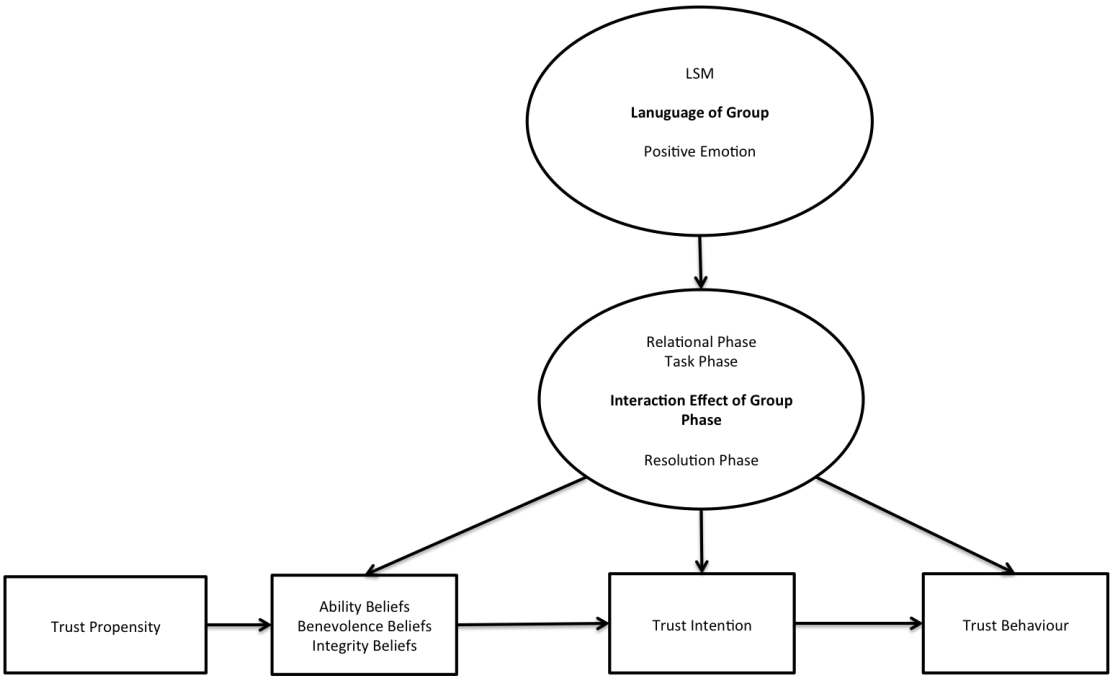

Figure 4.1 *Schematic representation of a conceptual model linking the language of a group to an individual's trust beliefs, trust intentions and trust behaviour including the effect of phase of group development.*

participants. Twenty-two participants were male and 81 participants were female. The average age of the sample was 19.67 years (*SD* = 2.08; Range = 18 – 28 yrs). Participants took part in the study for course credits or for a cash payment of £10.

4.2.2. Materials

Hidden Profile Task. An adapted version of the hidden profile paradigm (Stasser & Stewart, 1992) was used as the main problem solving group task. In its original form, the hidden profile paradigm involves groups of people trying to solve a murder mystery puzzle (namely who committed the crime) using information that is provided to them by the experimenter. The pattern of information distribution is biased, such that some information is available to all participants (common information) and some information is available only to individual members of the group (unique information). The common information favours a suboptimal decision, as it lacks 'critical evidence' that relates to evidence against the perpetrator and exonerating evidence for other suspects. The critical evidence reveals the correct

solution to the mystery, and is only contained within the 'unique information'. Consequently, the correct solution is more likely to be discovered as more individuals share their unique information.

The current study used an adapted version of the hidden profile task. As with the original task, the current task centered on a fictitious murder with a number of characters as potential suspects. The information distributed to participants related to witness statements, suspect statements and maps. In total, 18 pieces of information were 'unique' (i.e., available only to an individual group member), and one piece of information was 'common' and made available to all group members. Fourteen to 18 pieces of unique information were used in the task, depending upon the group size (e.g., in a group of 6 each group member would receive 3 pieces of unique information each). Of these, eight pieces of information contained critical evidence about characters within the murder mystery story. The distribution of information ensured that each group member received between 1 and 2 pieces of this critical information. The remaining pieces of material contained non-critical evidence about the characters. The single piece of common information existed in the form of a news report outlining the mystery itself, but did not contain any critical or non-critical evidence about characters. The single piece of common information served to give all participants the same "back-story" to the mystery.

The current task diverged from the original hidden profile task in the amount of common information available. Unlike the original task, the amount of common information did not match the amount of unique information. By adapting the task so that all but one piece of information was unique, the task became more interdependent. The task was also made more risky by providing an individual, self, incentive to succeed. In the original hidden profile task, participants are incentivised

to reach the correct group decision, which is to say that that the group agrees and submits a single group solution. However, in the present study, participants submitted solutions independently, and anonymously. This gave participants the opportunity to submit an answer conforming or deviating from the solution discussed by the group. Participants were incentivised to provide the correct solution with a £25 prize, which was split between the participants who provided the correct solution. Hence, there was greater individual gain if fewer group members provided the correct solution. Therefore, in addition to the incentive to share information for the strategic group benefit, there was an incentive to withhold information if it was believed that other group members were using other's information for their own gain (i.e., to optimise the chances of fewer people reporting the correct solution). The game structure avoids determining participants to automatically trust (as there is a potential greater reward for monovalent behaviour), whilst maintaining an incentive to trust, and work collectively (as an individuals information alone is insufficient to solve the problem).

Successful completion of the task required participants to identify the primary suspect (the character who committed the murder), secondary suspect (one of two characters who had substantial evidence against them) and a piece of exonerating evidence for the secondary suspect (one of three pieces of evidence for each secondary suspect). To achieve this, the task was dependent on two processes; group members disclosing their own valuable information and group members relying on other's information to be genuine. These types of processes have been respectively referred to as 'disclosure' and 'reliance' behaviours in the trust literature (Gillespie, 2003). In sum, the extent to which groups are proficient in honestly disclosing information and relying on others information is proportional to the difficulty in

submitting the correct solution. Simply put, the task was operationalised such that more trust equaled higher performance.

Pre-experiment measure. Participants' propensity to trust was measured through an online questionnaire. All items were responded to on a 5-point likert scale that ranged from "strongly disagree" (1) to "strongly agree" (5). Trust propensity was measured using five items taken from Costa and McCrea (1992). An example of an item is, 'I suspect hidden motives in others' (reverse scored). To reduce participant's attention to the fact that the research was interested in trust, these items were embedded with 20 items measuring self-reported levels of extraversion and conscientiousness. These items were taken from the IPIP (Goldberg, 1999). As in the study in the previous chapter, demographic and availability information was also taken at this stage in order to assist group selection.

Post-experiment measure. Trust beliefs and trust intentions were measured by using items from Mayer and Davis' (1999) trust scales. Items were adapted to the experimental context, for example Mayer and Davis' item; "top management has a strong sense of justice" was adapted to "the group I interacted with has a strong sense of justice". Trust toward the group was measured rather than trust toward individuals, as all communication and behaviour was directed towards the group (i.e., text communication and sharing information was received by all group members). Six items measured beliefs about the group's ability (e.g., 'The group I interacted with are skilled'), 5 items measured beliefs about the group's benevolence (e.g., 'The group I interacted with are concerned with others welfare'), 6 items measured beliefs about the group's integrity (e.g., 'The group I interacted with sticks to their word'), and 4 items measured trust intentions toward the group (e.g., 'I would feel comfortable

giving the group complete responsibility'). All items were embedded in an online questionnaire, per meeting.

In addition, following the final meeting, the online questionnaire held three items asking participants to provide their solution to the murder mystery. These were 'Who is the primary suspect?', 'Who is the secondary suspect?', and 'What is the exonerating evidence surrounding the secondary suspect?'.

4.2.3. Design

Independent Variables. Positive emotion words and LSM were the two independent variables. Both were calculated at the mean group level whilst controlling for the individual's contribution to each score. This was achieved by using the same formula as in chapter 3.

Moderating Variable. Phase of group development acted as a moderator variable. Phase of group development had three levels; relational activity phase, task activity phase, and resolution phase.

Dependent Variables. Dependent variables were beliefs regarding the groups' trustworthiness, individual's trust intentions towards the group, and behavioural trust. Trust beliefs and trust intention were measured three times, once following each meeting. The behavioural trust measure was operationalized as an individual's performance score, which was calculated using the following formula:

$$\text{Performance} = PS*.5 + SS*.25 + SSE*.25$$

Where PS is the primary suspect, SS is the secondary suspect, and SSE is the secondary suspects exonerating evidence. Each variable is scored as a binary measure, 0 or 1 (incorrect or correct). Whilst performance could be scored by simply adding the three scores together, secondary suspect and exonerating evidence were weighted less

due to the partial dependencies between them (i.e., correctly identifying SS made correctly identifying SSE more likely). Participants could thus score zero to one.

4.2.4. Procedure

A study advert was circulated to potential participants by contacting various university departments and society administration staff. The advert was also posted on an online study system for first year psychology students, participating for course credit. Those interested in taking part were asked to contact the researcher via email, at which point they were sent an information sheet and consent form; the latter of which was to be returned to the researcher prior to the start of the study. Once the consent form was returned, participants were emailed a web link to an online form, which provided access to the main study materials. The first set of materials asked participants to state their availability to take part in the online chat and to complete the pre-interaction questionnaire that measured their trust propensity, age, gender, first language and where they had heard about the study.

Participants were sorted into groups of 6. Each group was scheduled to meet at intervals at least 24 hours apart over a period of not longer than 5 days. Per time slot, groups were created with attention to participant's college, department, year group and where they had heard about the study. Those who gave similar responses to these items were sorted into separate groups. This was important to mitigate the risk of scheduling groups with members who had pre-existing relationships. Participants were then invited, via email, to participate at the three meeting times selected for their particular group. A web link and alias name, to access the online chat room, was provided. Alias names consisted of a three letter nonsense word followed by an initial, e.g. Ada J. This was important to ensure that the same

participant could be identified through each stage of the interaction, whilst ensuring their actual identity remained confidential.

Participants attended three, thirty minute, group chat meetings, where they interacted using computer mediated communication via the group chat software 'campfire' (https://campfirenow.com/). No face-to-face communication was permitted, and so microphone and video chat were disabled. Participants communicated in a group chat window where their instant messages were identifiable to their alias names. Participants were able to communicate with the researcher via a private chat window. Participants were only able to log in and communicate during designated study times; the group chat windows were disabled outside of these times.

The first group chat session was a relational activity phase. Participants were provided with the single piece of common information, the news article. This was to give participants an idea of the task they would be asked to undertake in subsequent meetings. Participants were given a brief description of what to expect from the remaining two meetings, including the concept of 'unique' information, and how prize money would be distributed. Participants were instructed that the first session was an 'ice breaker', and that investigating the mystery would not begin until the following meetings. They were informed that they could use the rest of the session to get to know one another, discuss personal strengths and weaknesses that might relate to the task, and discuss ideas regarding the best way to function as a team.

During the relational activity phase, it was expected that most groups would speculate about the task and allude to the possibility of group members not sharing all the information in an attempt to personally gain more prize money. Groups who did not discuss these issues were prompted to do so at the half way point of the meeting. The prompts consisted of short statements about relational aspects of the task (e.g.,

only members who provide the correct solution will receive a share of the £25 prize money), followed by a suggestion to discuss this further (e.g., If you anticipate any problems with the way prize money is distributed then now is the time to discuss with your group). This eliminated unwanted variance which might have arose if some groups, but not others, had fully understood the special prize structure, which made the task 'risky'. The researcher gave a 5 minute warning before ending the first, and subsequent, meetings. At the end of the session participants were instructed to follow a link to complete an online post interaction survey items that measured trust beliefs and trust intentions. Finally, participants were reminded of their next meeting time.

Following the relational activity phase, participants were emailed their unique information. Participants were instructed that they could read this information either before or during the next meeting. At the beginning of the task activity phase participants were reminded of the interdependent nature of the task by making clear that each participant had different information relating to the murder mystery. They were also reminded of the risky nature of the task in 3 distinct ways. Instructions read that participants could share as much or as little of their information as they wished to do so; that solutions would be submitted individually and may differ from the general consensus of the group; and that the £25 prize would only be split between the participants who provided the correct solution. Finally, participants were instructed that their goal was to identify the perpetrator, a second suspect, and the exonerating evidence surrounding the second suspect. Groups had 30 minutes to engage in this 'task activity' phase before the researcher ended the session and instructed participants to follow a link to complete the online post interaction survey. Participants were again reminded of their next meeting time.

At the beginning of the problem resolution phase participants were given similar instructions to those given in the task activity phase. The only difference in instructions was that participants were reminded that they had only thirty minutes to complete the task. At the end of the problem resolution phase, participants were asked to submit their solution and were provided with a link to the online post interaction survey. Unlike at the end of the previous 2 meetings, the online form contained questions regarding the solution to the murder mystery in addition to the other measures. After participants submitted their post interaction survey responses they were directed to an online debrief sheet, which concluded the study.

4.3. Results

Table 4.1 shows means and standard deviations for questionnaire trust measures, including participant's beliefs about the groups ability, benevolence and integrity, as well as participant's reported trust intentions towards the group. This is reported at each of the three phases of group development. Whilst each variable was relatively consistent across each phase of group development, positive emotion was markedly higher in the relational phase compared to the subsequent task and resolution phases.

4.3.1. Hypothesis testing

To test each hypothesis all models, including post hoc analyses, entered group and trust propensity as random effects (as in the study in Chapter 3). Positive emotion was the single predictor variable of each trust belief variable, and trust intention measure, in a series of models designed to test hypothesis 1. Positive emotion did not predict ability (β = .08, p = .62), integrity (β =.06, p = .73), benevolence (β = .06, p = .67) or trust intention (β = .04, p = .77). Each trust variable was subject to a positive emotion by phase of group development interaction, however no interaction terms

Table 4.1 *Means and standard deviations for trust measures and language variables across phases of group development.*

	Pre-Interaction		Relational		Task		Resolution	
	M	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
Trust propensity	16.13	3.32	-	-	-	-	-	-
Ability beliefs	-	-	20.55	3.19	20.69	3.67	21.07	3.63
Integrity beliefs	-	-	21.75	3.19	21.17	3.72	21.7	4.17
Benevolence beliefs	-	-	17.28	3.39	16.75	3.01	16.7	3.81
Trust Intention	-	-	12.42	2.94	12.43	3.23	12.45	3.36
Trust Behaviour	-	-	-	-	-	-	0.44	0.36
LSM	-	-	0.79	0.12	0.82	0.10	0.82	0.10
Positive Emotion	-	-	7.99	4.27	2.08	1.53	2.30	1.46

Note: There were 3 cases of missing responses at the relational activity phase, and 2 cases at the task activity phase. Additional decrease in N between the relational activity and task activity phases reflected participant drop out (e.g., groups of 6 decreasing to groups of 4). Trust propensity: $N = 103$. Ability beliefs, integrity beliefs, benevolence beliefs and trust intentions: $N = 100$ (relational), $N = 96$ (task), $N = 96$ (resolution). Trust behaviour: $N = 96$. LSM and positive emotion: $N = 103$ (relational), $N = 98$ (task), $N = 96$ (resolution).

were significant. Positive emotion at the relational, task, and resolution phase were predictor variables of trust behaviour as a function of performance. Positive emotion at the relational, task, and resolution phase in either the relational ($\beta = -.02$, $p = .26$), task ($\beta = -.05$, $p = .33$), or resolution phase ($\beta = .04$, $p = .46$) did not predict trust behaviour.

LSM was the single predictor variable of each trust belief variable, and trust intention measure, in a series of models designed to test hypothesis 2. LSM did not predict ability ($\beta = 1.04$, $p = 0.82$), integrity ($\beta = 1.81$, $p = .70$), benevolence ($\beta = 1.70$, $p = .69$) or trust intention ($\beta = 1.90$, $p = .64$). Each trust variable was subject to

a LSM by phase of group development interaction, however no interaction terms were significant. LSM at the relational, task, and resolution phase were predictor variables of trust behaviour as a function of performance. LSM in the relational phase significantly predicted trust behaviour (β = 1.12, p = .03), with an increase in LSM predicting an increase in trust behaviour. LSM was not a significant predictor at the task (β = .27, p = .66) or resolution phase (β = -.70, p = .48).

In studies 1 and 2, positive emotion emerged as a significant predictor of trust, while LSM did not. However, the opposite was found in the present study. Trust (trust behaviour) was not predicted by positive emotion but was predicted by LSM in the relational phase. One possible explanation for this difference is that LSM 'replaced' positive emotion as a signal to trust. That is to say that, first, LSM in the *relational* phase had context dependent effects which meant that LSM was judged as a more reliable signal to trust than positive emotion; second, that once trust had been established in the early relational phase; positive emotion in the subsequent task phases did not 'add' anything to group members trust decision, which had already been made in the prior relational phase. In accordance with this, we might expect that groups who do not establish high LSM at the relational phase will rely on positive emotion at later phases to predict trust behaviour.

To test for this possibility, an LME model was examined in which two interaction terms were created between LSM at the relational activity phase and positive emotion in the task phase, and between LSM at the relational activity phase and positive emotion in the problem resolution phase, and entered as predictors of trust behaviour as well as with their main effects. As before, group and trust propensity were entered as random effects. The results showed partial support for the proposal. Specifically, the interaction between LSM at the relational activity phase

and positive emotion at the problem resolution phase approached significance, β = -1.35, p = .08 (one-tailed test), while the interaction between LSM at the relational activity phase and positive emotion at the task phase was non-significant.

The nature of the LSM at relational activity phase and positive emotion at the problem resolution phase interaction was explored by splitting the group members into 'High LSM relational' (n=23) and 'Low LSM relational' (n=25). This was done by using the upper and lower quartile range of LSM scores in the relational activity phase. Next, two models examined the relative effects of positive emotion on trust behaviour in high and low LSM groups. The results, as presented in Table 4.2, show that for groups with *low LSM*, positive emotion was a significant predictor of trust behaviour in the problem resolution phase.

4.4. Discussion

4.4.1. Linguistic style matching

The current study showed the importance of context (specifically, group phase development) in moderating the effects of language behaviour on trust. However, this effect was specific to trust behaviour, and not the beliefs or intentions that, in part, give rise to this behaviour. The results showed that LSM related to an increase in trust behaviour when it is developed in the relational phase of group development, but not when it occurs at other phases. The results also showed that when LSM is not used at this phase, a group might rely on positive emotion, in subsequent phases, to guide their trust behaviour. That is, positive emotion seems to be a proxy for LSM when the latter is absent.

The present findings demonstrated the value of LSM in shaping trust behaviours when an individual's focus is on relational aspects of group dynamics.

Table 4.2 *Effect of positive emotion on trust behaviour for groups with high or low LSM in the relational activity phase.*

		Trust behaviour				
	Group phase	*B*	*SE*	*df*	*t*	*P*
Positive emotion (Low LSM)	Relational	-0.03	0.03	25.00	-1.12	0.27
	Task	0.17	0.12	25.00	1.31	0.20
	Resolution	0.32	0.13	25.00	2.61	0.02
Positive emotion (High LSM)	Relational	0.03	0.69	21.31	0.37	0.72
	Task	0.00	0.14	22.17	0.03	0.98
	Resolution	-0.08	0.10	22.46	-0.80	0.43

This is consistent with research in hostage negotiation (Taylor & Thomas, 2008) and speed dating (Ireland et al., 2011), which show LSM to have positive effects in what may arguably be said to be 'relational interactions'. According to Ireland et al. (2011), the specificity of LSM effects to relational contexts is due to a process of engagement. Ireland's engagement hypothesis (Ireland, 2011; Ireland & Henderson, 2014) proposes that LSM reflects social engagement, such that when a group show high LSM at the relational phase they are demonstrating their commitment to develop quality relationships. Communicating engagement in the relational aspects of the interaction demonstrates a willingness to form attachments, and concern and care for the group's needs, which transpire into the belief that the other person can be trusted (McAllister, 1995; Rempel, Holmes & Zanna, 1985). This also could explain why LSM at the task or resolution phase is ineffective at generating trust.

Put simply, if engagement (as indicated by LSM) has its positive effect on trust because it shows caring for the group, then LSM in either the task or resolution

phases will not lead to the same beliefs as the behaviours here will be task-focused and not necessarily indicative of care and concern. In such circumstances, engagement cannot be perceived as trustworthy because it is ambiguous as to whether increased task engagement is for the benefit of the group or for the self. It is noteworthy that in studies one and two, when the interaction was exclusively task orientated, LSM was similarly a null predictor of trust. Therefore, it is argued that a distinction between relational activities and task activities moderates the role of LSM in trust formation.

The interpretation of the LSM effect on trust was that a positive effect was observed because LSM reflected engagement in the relational needs of the group. However, a second interpretation could be proposed. Swaab et al. (2011) similarly found that linguistic mimicry in the earliest phase of the interaction had the largest effect on trust relative to other phases. The authors argue that the early temporal position accounted for the findings. Swaab et al. (2011) proposed that the beginning of an interaction is the most critical time for people to develop trust. This work offers an alternative interpretation of the present findings.

Swaab's temporal order explanation is a plausible one. However, evidence from the studies in Chapters 2 and 3 suggest that it may not explain the context dependent effects in relation to LSM. That is to say that, in the previous studies, each contained an online *task orientated* interaction, followed by a trust decision. LSM in the initial interaction did not predict subsequent trust. This suggests the nature of the interaction is more important than its temporal position to a trust judgment, as early LSM in a task phase did not predict trust. That is not to say that the temporal position of LSM is irrelevant, it is logical to presume that the sooner groups establish trust the sooner groups can experience the benefits of trust. Thus, it is acknowledged that in

the present study the effect of LSM on trust in the relational phase may have been exaggerated by the temporal position in which the relational activity phase was completed. Future research might explicitly test for this by reversing the order of group phase development, i.e. a task phase proceeding a relational phase, or by considering groups which exist exclusively in a relational phase, where one would expect LSM to hold a relationship to trust throughout the *entire* interaction (see Chapter 6).

4.4.2. Relevance and reliability

In contrast to LSM, the results show that positive emotion has minimal impact on trust within the group, unless it occurs in the absence of LSM, in task focused phases. This goes against research that shows positive emotion characterising trusting groups universally (Crisp & Jarvenpaa, 2013; Gibson & Manuel, 2003; see also Chapter 2; Chapter 3) and requires explanation. The following section proposes that this may be accounted for with trust and communication theory, these were trust reliability (Bacharach & Gambetta, 2001) and language relevance (Sperber & Wilson, 1986).

Trust reliability relates to the genuineness of signs that communicate trust. For example, a sign of benevolent intent may be an altruistic act, which can be easily observed and regarded with some confidence as genuine trustworthiness. However, there will be some situations in which trustworthiness signs are less observable and need to be inferred through whatever actions are available. In most cases, these signs will be interpreted correctly. However, when there is the possibility of 'opportunists' who 'mimic' trust-warranting properties, the individual may be duped into believing an act signals trustworthiness when in fact it does not. According to Bacharach and

Gambetta (2001) the trustor must therefore always ask themselves if the observed behaviour is a reliable sign of the trust-warranting property.

LSM and positive emotion were two possible trust signals in the current study. During the relational activity phase, LSM appeared as a more reliable trust signal than positive emotion, as evidenced by the positive and null effects on trust respectively. Niederhoffer and Pennebaker (2003) state that the production and processing of function words, which are the basis of LSM, is subconscious, while the production and processing of content words, such as positive emotion words, is conscious. Therefore, it may be argued that LSM is the unconscious product of *engagement in the relational needs of the group*, whereas positive emotion words are *consciously produced illustrations of support*. This distinction between unconscious and conscious processing might underlie why, in this particular phase, LSM was considered a more reliable trust signal than positive emotion. That is to say that, positive emotion, produced consciously, could be interpreted by trustors as the result of 'opportunists' who are mimicking trustworthy signals. Whereas LSM, produced subconsciously, is less likely to be interpreted as a 'strategy' being used by opportunists, and rather as genuine engagement and thus genuine trustworthiness.

The emergence of engagement, or lack of engagement, in the relational activity phase (as indicated by LSM) moderated the effects of positive emotion at latter phases. In these later phases, positive emotion emerges as a stronger predictor of trust than LSM, as it signals support and rapport (if regarded as genuine and not opportunistic). As stated earlier, LSM in the task or resolution phase indicates engagement in the task and thus manifest as less relational (benevolent) focused. This distinction between an ambiguous and less ambiguous trust signal might underlie why, in the task phases, positive emotion became the most reliable trust signal.

Sperber and Wilson (1986), in relevance theory, discuss how individuals constantly seek to understand communication through a search for the relevance of utterances. This is cognitively demanding, thus, a path of least effort is always taken to interpret meaning from communication. As part of this corollary, it is proposed that processing stops once expectations of relevance are satisfied. In the present study, a significant part of the relevant information, which individuals were presumably motivated to process given the risk within the task, was trust-warranting properties. It follows that once an expectation is met with regard to this type of communication, further trust-warranting properties were not necessarily processed. Relevance theory would suggest that in the absence of a reliable trust signal at the relational activity phase (i.e., groups with low LSM) groups continued to process trust relevant communication in the latter phases. This helps explain the positive emotion effect exclusively in the latter phases of interaction for those groups with low LSM in the early relational phase. Put another way, positive emotion word use as a reliable trust signal in task phases appears irrelevant to group trust if sufficient trust warranting properties had already been processed.

In sum, evidence from the first three studies develop a theoretical model of the link between language (LSM & Positive emotion) and trust driven by reliability and relevance; henceforth *The Relevant and Reliable Language Theory*.

4.4.3. Limitations and future research

The challenge to the present study was to induce three distinct contexts, ensuring that group communication remained relevant to the group phase imposed by the study design. In this regard, there was mixed success. The design manipulated the relational activity phase such that there was no task material to discuss; therefore communication remained exclusively relational orientated. However, the task activity

and problem resolution phase may have been less exclusive in communication topic. Firstly, there were no explicit restrictions to prevent communication outside the topic of solving the problem or resolving the problem in the task activity and problem resolution phases respectively. Secondly, the proximity of the task activity phase to the other two phases permitted the possibility of relational communication spilling over into the task activity phase, and problem solving continuing into the resolution phase. Although this is likely true of real world online groups, that phases are neither entirely relational or entirely task focused, experimental control over ensuring three *entirely* distinct phases was nevertheless limited.

An alternative conceptualisation of the three distinct phases into two phases of group development, task and relational, might be more fitting to the findings. Such a conceptualisation would be in accordance with the observation that statistically significant effects were observed between the relational and the other two phases, i.e. LSM was a significantly related to trust in the relational phase but not in either the task or problem resolution phase. In addition, trends were observed with positive effects of positive emotion words on trust in the low LSM groups in *both* the task and problem resolution phases, although only in the problem resolution phase did this effect reach significance. Nevertheless, future research might consider the moderating role of group phase at the broader levels of relational orientation compared to task orientation.

The current study failed to find any effects of positive emotion and LSM on trust beliefs and intentions. This was surprising given that these language measures related to trust behaviour, to which beliefs and intentions are closely related (Mayer et al., 1995). One possible explanation for these findings is that the trust belief and trust intention scales measured the wrong type of trust suited to the trust behaviour

measures. Trust beliefs were measured in relation to the groups' ability, integrity and benevolence. However, the engagement hypothesis (Ireland et al., 2011) suggests that trust as defined by cognitive and affective processes might be more appropriate. Cognition-based trust refers to expectations about individual's or group's competencies and responsibilities; and affect-based trust refers to expectations about the extent to which the individual or group expresses care and concern for the welfare of the trustor (McAllister, 1995). Based on the findings reported here, together with Ireland's engagement hypothesis, we may argue that LSM and positive emotion influences a form of affect-based trust, but not cognition-based trust. As stated, the relevance of LSM, reflecting engagement, in a relational phase is that it acts as a reliable trust signal for engagement in the relational needs of the group; intuitively, such a signal is based on care and concern for the group (affective based trust), as opposed to communicating reliability (cognitive based trust).

Similarly trust intentions were measured in relation to reliance on another (Mayer & Davis, 1999). However, the trust behaviour (performance on the group task) relied on intentions of disclosure, as well as reliance (Gillespie, 2003). Trust behaviour was performance on the task, which required groups to disclose information honestly and openly, to encourage mutual sharing of information. This was critical to success on the task. Such behaviour, in addition to an individual's willingness to rely on others information, was the proxy to our behavioural trust measure. Hence, the value of utilizing a trust intention measure that accounts for disclosure, as well as reliance, intentions.

The direction of effects between language and trust are not conclusive, as is the case in most communication research (Richardson, Taylor, Snook, Conchie, & Bennell, 2014). Whilst some position language mechanisms as a predictor of social

outcomes (Pickering and Garrod, 2004), others contend that individual goals cause changes in language behaviour (Brennan & Hanna, 2009; Lakin, Chartrand, & Arkin, 2008). A third possibility is that language and social outcomes are bidirectionally linked. Niederhoffer and Pennebaker (2002) suspected that LSM and engagement reciprocally increased to facilitate positive relationship outcomes in their dyadic relationship studies. In a similar way, language mechanisms such as LSM and positive emotion might reciprocally increase with trust to facilitate greater performance. Whilst the study in Chapter 3 shed light on the direction of effects between language and trust by manipulating trust itself, future research might consider directly manipulating language to further understanding of the direction of effects between the two.

4.4.4. Conclusion

Communication theorists have long emphasised the role of context in establishing meaning of utterances. The present study is the first to take up this proposition in the domain of how context might shape the impact of specific language styles on trust within online groups. Specifically, it showed that LSM is important in relational phases of group development, whereas positive emotion (in the absence of previous high LSM in a relational phase) is important in task and resolution phases of group development. This was accounted for in a novel theoretical framework explaining the link between language and trust in online groups, called The Relevant and Reliable Language Theory. The exact trust components through which trust behaviour is impacted was unclear, given that none of the psychometric measures related to language. It was speculated that affective trust measures and disclosure trust intention measures could be better suited to tap the exact trust components through which language effects trust. An open question regarding whether language effects

trust, trust effects language, or the relationship is bidirectional persisted. This is an area for future research.

5. Chapter 5: Disrupting Two Language Paths to Trust in Online Groups

The study in the present chapter will test the assumptions of the theoretical framework, The Relevant and Reliable Language Theory, to offer further support for the context dependent role of LSM and positive emotion to trust development. In addition, the study will make headway in disentangling the causal role of language in trust formation from the role of language reflecting trust. Specifically, the study will manipulate the language of a group to see its effects on trust. Constructing groups containing a single confederate will do this. The confederate will implement phase dependent manipulations on each language variable. That is to say that, LSM and positive emotion will be disrupted during the phases were said language is thought to be most crucial to trust development according to the assumptions of The Relevant and Reliable Language Theory (LSM in the relational phase and positive emotion in the task phase). Forty-four groups were studied. A confederate was successful in disrupting LSM and positive emotion during the planned phases. Effects of disruption confirmed the importance of LSM in a relational phase, and positive emotion in a task phase, for trust formation.

5.1. From Language to Trust

Trust theory, and empirical findings, have demonstrated that the relationship between trust warranting properties (such as demonstrations of benevolence) and trust, flow from the former to the latter (see chapter 1). However, when language is the 'trust warranting property' in question – the direction of the relationship between language and social outcomes, including trust, is more difficult to 'pin down'.

One perspective professors the importance of language in *shaping* social dynamics. First, within communication literature it is generally accepted that positive social dynamics emanate from communication styles such as mimicry, including

increased liking, rapport, communication efficiency and relationship stability (Chartrand & Van Baaren, 2009; Giles & Coupland, 1991; Ireland & Pennebaker, 2010; Ireland, Slatcher, Eastwick, Scissors, Finkel & Pennebaker, 2011; Pickering & Garrod, 2006). Second, there is much evidence implicating the positive social dynamics emanating form positive language, including team performance and trust (Crisp & Jarvenpaa, 2013; Fischer, McDonnell, & Orasanu, 2007; Wilson, Straus, & McEvily, 2006).

One study that directly examined causality through direct manipulation of language suggests that language leads to social outcomes (Swaab, Maddux, & Sinaceur, 2011). In this study, participant instructions were manipulated such that individuals actively mimicked the interlocutor's language characteristics. The result was greater gain in a negotiation task and increased trust when mimicry occurred in the early phase of the interaction. Hence demonstrating support for the idea that language – at least in part – plays a causal role in trust formation.

On the other hand, researchers have acknowledged both directions of effects. For example, Fischer et al. (2007), in their analysis of computer simulated search and rescue missions, acknowledged that positive emotion word use could have been the result of task success *or* one of the prerequisites for successful performance. The authors note the fact that providing encouragement was a response *to failure* as well as success. Such findings illuminate the possibility of language and social outcomes linked in a bidirectional fashion. For example, language variables such as LSM and positive emotion might reciprocally increase to facilitate positive relationship outcomes (Niederhoffer & Pennebaker, 2002).

Clearly, the classic view that trust warranting properties lead to trust is complicated when language is the trust warranting property in question. Therefore, an

interesting extension of previous findings in the present thesis was to determine the effect of a direct manipulation of language on trust. If, by systematically manipulating LSM in an initial relational phase and positive emotion in a subsequent task phase, direct effects on trust are observed, this will provide direct support for a causal link between language and trust. If, on the other hand, a manipulation does not effect trust; the limit of the current language measure could be found at the level of being useful to *reflect* trust, without existing as a metric which can produce systematic effects *on* trust when language is altered at will.

5.2. Manipulating language

The first challenge of the present study was to devise a strategy to manipulate language. Tausczik and Pennebaker (2013) noted that group research has historically manipulated inputs to a group (e.g., group composition), rather than communication itself, for the reason that is has been experimentally difficult to directly manipulate group communication. However, some attempts at manipulating language have been made. Research has shown that by implanting a confederate, or by giving an incognito participant instruction to use certain language with increased frequency (i.e. positive affect language), communication can be systematically changed (Swaab et al., 2011; Van Baaren, Holland, Steenaert, & Van Knippenberg, 2003).

Confederate or participant instruction techniques to manipulate language rely on human's to consciously alter their language use. This is difficult to implement in the context of LSM, as increasing language on this measure would require a participant to attend to, and produce, nine categories of function words on an utterance-by-utterance bases. This is made more complex when studying groups because a confederate or participant would be required to attend to and replicate such words from multiple group members.

Tausczik and Pennebaker (2013) note that attempts to increase certain communication styles often have the opposite effect, and in fact *disrupt a* group's natural language dynamics. The implication of these findings was that disrupting language behaviour, rather than facilitating it, could be a more viable means to manipulate language, i.e. by an individual deliberately reducing, rather than increasing, production of certain word categories. At a practical level, this would be easier to implement successfully as an individual could use the *same* strategy (i.e. reducing word production) for multiple group interactions, rarther than attending to the unique linguistic style per group. In addition, a disruption technique would produce the same desired experimental conditions as if a confederate had facilitated certain language behaviours, that is; a high or low language behaviour group, e.g. a high LSM group (control) and low LSM group (disruption).

Research suggests that linguistic matching effects occur largely at the level of adjacent utterances (Branigan, Pickering, Stewart, & McLean, 2000). Studies using specifically LSM as the metric for matching have supported this view (Richardson et al., 2014; Taylor & Thomas, 2008). In the present study, a confederate would reduce their production of function words, in turn reducing the opportunities for group member's to match linguistic style in adjacent utterances. Thus, the disruption would theoretically create a 'stutter' in the natural turn-by-turn matching process; thereby negatively impacting group level LSM.

Group level positive emotion would be disrupted by the confederate lowering his production of positive emotion words in group discussions. This strategy was informed by research exploring antecedents of online positive emotion expressions. Kramer (2012) found that on the social network 'facebook', individuals' positive emotion expressions, through status updates, primed positive emotion expressions

amongst users in people's social network. Crucially, contagion of emotion words was 'valance' specific (i.e., greater negative emotion increased negative emotion, but did not decrease positive emotion). Similarly, Hancock, Gee, Ciaccio, and Lin (2008) found evidence for valence specific emotion contagion. After inducing a sad state, they found that participants increased their production of negative emotion words but there was no effect on participant's use of positive emotion words. These studies suggest that in order to decrease positive emotion word use, manipulations should rest specifically on positive emotion language changes, not affective language changes per se. Hence, the above research led to a hypothesis that a disruption of the language behaviours LSM and positive emotion could be successful.

H1: In a condition designed to lower LSM; LSM will be lower than a control condition. In a condition designed to lower positive emotion; positive emotion will be lower than in a control condition.

The results of Study 3 showed that different language categories were important to trust at different phases of group development. This lead to the theoretical framework The Relevant and Reliable Language Theory, which would suggest that, firstly; greater levels of LSM affected trust when it was present in a relational phase and secondly; greater levels of positive emotion affected trust in a task-orientated phase, but only when LSM had been low in an earlier relational orientated phase. Therefore this could be tested by disrupting LSM in a relational phase, and positive emotion in a task phase, which would represent a 'strong disruption,' such that the disruption that would have the most detrimental effect on trust. In contrast, a 'weak disruption' (which was not confounded by number of disruptions to a group per se) would be one in which LSM is disrupted in the task

phase, and positive emotion is disrupted in the relational phase. Hence the following hypothesis.

H2: Disruption condition (strong versus weak) will affect trust behaviour such that the strong disruption condition will produce lower trust behaviour than the weak disruption condition. Phase dependent effects of LSM, and positive emotion will be responsible for the effect.

5.3. Trust beliefs and intentions

In the previous study, language failed to have a significant effect on any of the trust belief or intention measures. In line with engagement theory (Ireland, 2011), it was suggested that this might be due to these measures being taken at the wrong level. That is, beliefs were measured in relation to the qualities of ability, integrity and benevolence, whereas a more appropriate approach may have been to measure them at the cognitive and affective level (McAllister, 1995). Moreover, intentions were measured in relation to reliance, with no regard for intentions to disclose. This is a problem because, as discussed in Chapter 4, LSM was thought to impact affective trust, by showing care for the group in a relational stage, and affective trust has been shown to predict disclosure intentions more closely than reliance intentions (McEvily & Tortoriello, 2011).

To address this in the current study, trust beliefs were measured using McAllister's (1995) affective trust scale, which was contained within the affective and cognitive trust beliefs scale. Trust intentions were also changed to measure both reliance *and disclosure* (Gillespie, 2003). Given the reasons previously stated affective trust and disclosure intention scales, contained within each measure, were the main variables of interest.

The present study aimed to test the role of trust beliefs and trust intentions as mediators in the relationship between language variables and trust behaviour. As previously stated, LSM was said to effect trust via a path of affective trust. Hence, there were reasons to believe that measures of 'affective based trust' would emerge as stronger mediators of any language effects on trust than 'cognitive based measures'. Our measures of trust beliefs were divided into affective and cognitive; hence it was predicted that the affective trust belief measure would be a significant mediator. Whilst our trust intention measures was divided into reliance and disclosure intentions; only the latter is said to be predicted by affective trust beliefs; hence it was predicted that disclosure intentions would be a second significant mediator. Based on the above reasoning the following hypothesis was proposed.

> *H3:* Affective trust beliefs and disclosure intentions will mediate the effect of manipulation and phase dependent language variables on trust behaviour; such that the effect of the strong disruption, and the resulting effects on LSM and positive emotion, will be decreased affective trust beliefs and decreased trust disclosure intentions.

Figure 5.1 shows the conceptual model tested in the present study. The model builds on the model in the previous chapter. As in the previous model, language is thought to affect trust variables differently depending on the phase of the interaction in which it occurs. However, rather than naturally occurring language, manipulated high and low levels of LSM and positive emotion are represented and positioned to hold causal paths to trust beliefs, intentions and behaviour. Affective trust beliefs and disclosure trust intentions are represented in bold, while cognitive trust beliefs and reliance trust intentions are italicized. This was to represent stronger causal paths between language and trust behaviour via the former rather than the latter trust

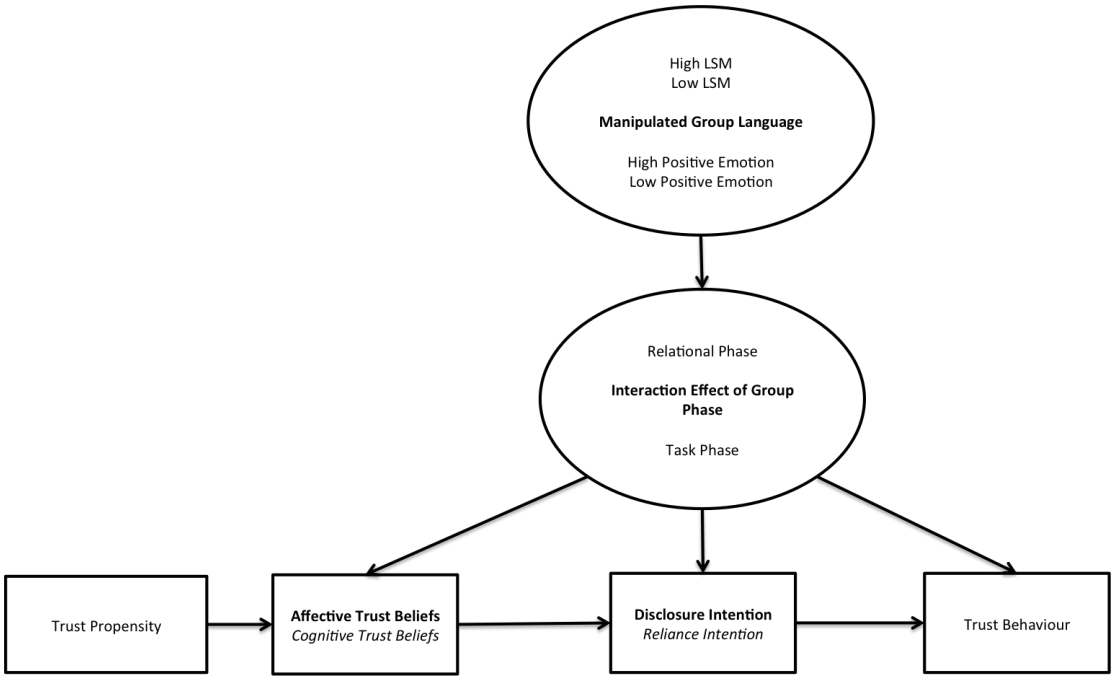

Figure 5.1 *Schematic representation of a conceptual model linking the experimentally manipulated language of a group to an individual's trust beliefs, trust intentions and trust behaviour including the effect of phase of group development.*

variables. As in previous models trust propensity is modeled to affect trust prior to participants interaction in the study.

5.4. Method

5.4.1. Participants

Participants were 167 students who made up 44 groups of 3 to 5 genuine participants (each group included a confederate). Participants were from a UK University in the North West of England. Participants were invited to an online two-part study. Participant drop out meant that while 167 participants started the study, 155 participants completed both meetings, group size never dropped below 3 genuine participants (plus a confederate). Fifty-nine participants were male and 108 were female. The average age of the sample was 20.24 years (*SD* = 2.81; Range = 18 – 38

yrs). Participants were recruited from different disciplines and year groups. Participants took part in the study for course credits or for a cash payment of £7.50.

5.4.2. Materials

Hidden Profile Task. The hidden profile paradigm, as outlined in Chapter 4, was used in the current study. Two adaptions were introduced in the current study. First, the task was completed over 2, instead of 3, 30-minute meetings. This was done by merging the task phase and resolution phase from chapter 4 into a single phase. Therefore distinguishing the interaction based on relational and task, which as the interpretation of the study in chapter 4 suggested, was the crucial contextual factor. Second, key characters names and details were changed to mitigate the risk of participants having heard the solution details from friends who had completed the previous study.

A 5 minute interaction, following the task phase, was permitted for groups to reach a conclusion. The confederate did not disrupt this interaction, nor was languagefrom this phase entered into the final analysis. Given that the present study contained one less meeting to interact, compared to the study in chapter 4, the additional 5 minutes was to ensure groups reached a conclusion.

Pre-experiment measure. Trust propensity was measured as in the previous studies from the thesis using the 5 items (α =.73) taken from the Costa and McCrea (1992) in a pre-interaction survey and disguised in items from the IPIP (Goldberg, 1999).

Post-experiment measure. Participants' trust beliefs towards their group was measured using seven items adapted from McAllister's (1998) cognition and affect-based trust scales. An example cognition-based trust item was "I see no reason to doubt the groups competence and preparation for the task" (α =.84). An example

affect-based trust item was "We have a sharing relationship. We can freely share our ideas, feelings, and hopes" (α =.86). All trust belief items were responded to on a 7-point likert scale that ranged from strongly disagree (1) to strongly agree (7).

Trust intentions were measured using ten items from Gillespie's (2003) reliance and disclosure scales. An example reliance item was "Rely on your group's task-related skills and abilities" (α =.89). An example disclosure item was "Share your personal feelings with your group" (α = .80). All trust intention items were responded to on a 7-point likert scale that ranged from not at all willing (1) to completely willing (7). All items were adapted to the experimental context, for example the disclosure intention item "share your personal feelings with your *leader*" was adapted to "share your personal feelings with your *group*".

5.4.3. Design

Independent variables. The disruption manipulation, LSM and positive emotion word use were predictor variables of trust behavior. Disruption manipulation was a single, dichotomous, between group variable; 22 groups were in the strong disruption condition, and 22 groups were in the weak disruption condition. As in chapter 3 and 4, LSM and positive emotion were continuous variables measured at the mean group level, and controlling for the individual's contribution to each score. Language variables were measured at both the relational phase and task phase. Phase of interaction therefore formed a within group factor. Trust belief, and trust intention measures were within participant measures taken following the relational phase, and once again following the task phase.

Dependent Variables. The dependent variable was behavioural trust. Behavioural trust was operationalized as an individuals' performance score, which was calculated using the following forumula:

$$\text{Performance} = PS + SS + SSE / 3$$

Where PS is the primary suspect, SS is the secondary suspect, and SSE is the secondary suspects exonerating evidence. Each variable is scored as a binary measure (incorrect or correct). This formulation differed slightly from that used in chapter 4, which weighted SS and SSE less, because identifying SS was believed to make identifying SSE more likely. In the present study, all variables were weighted equally. This was implemented as participants had one less meeting to interact, making task completion more difficult. Hence, the formula above, which produced a higher performance average, was favoured in the present study.

5.4.4. Procedure

Confederate disruption training and procedure. The aim of the LSM disruption training was to devise a workable method for the confederate to reduce his production of function words. The first practical consideration related to the high frequency of function words; function words make up an estimated 50% of naturally occurring speech across 9 main subcategories of word types (Rochan, Saffran, Berndt, & Schwartz, 2000). In natural speech, function words are also produced none consciously (Niederhoffer & Pennebaker, 2002). Therefore, realistic parameters had to be set regarding the number of categories a confederate could consciously attend to and reduce in their text chat. Second, it was important that the confederate's text chat maintained grammatical integrity, so that utterances made sense. Finally, some function words are produced at a higher frequency than others, thus suggesting that these may be easier to target and thus reduce. To inform which function word categories occurred at high and low frequencies, data from the study in Chapter 4, was reviewed. As can be seen in Table 5.1, some function words occurred at a much higher frequency than others.

Table 5.1 *Means and standard deviations for production of function words per person during the study in Chapter 4*

Function Words	*M*	*SD*
Auxiliary Verbs	11.34	3.28
Personal Pronouns	10.54	3.28
Prepositions	9.78	3.27
Indefinite pronouns	6.83	2.75
Conjunctions	6.34	2.64
Articles	6.24	2.70
Common adverbs	5.84	2.49
Quantifiers	2.67	2.13
Negations	2.51	1.55

Personal pronouns were function words placed as high priority for disruption. First, they were one of the most frequently used words in the previous study. Second, sentences expelling personal pronouns still made sense, (e.g., “I think the evidence is unclear’ becomes ‘think the evidence is unclear’). Third, personal pronoun use is something accessible to conscious awareness such that a confederate may become aware of their use and subsequently reduce their occurrence.

Next to be targeted were auxiliary verbs, indefinite pronouns and Articles. Auxiliary verbs occurred with the highest frequency in the previous Study and often co-occurred with indefinite pronouns (e.g, ‘it is’ and ‘that is’). Articles, while occurring with less frequency, are relatively easy to identify and control within conversation.

Negations, quantifiers, prepositions, common adverbs and conjunctions were not targeted during the online interactions. Removing common adverbs, prepositions

and to a lesser extent, conjunctions, affects the grammatical integrity of sentences to too greater an extent. And negations and quantifiers occur infrequently during interactions.

The aim of the positive emotion disruption was to devise a workable method for the confederate to reduce his production of positive emotion words. As LIWC provides a dictionary of words that fall under the positive emotion word category, this provided material for the basis of the disruption. Given that most words were intuitively of positive affect, such as words like 'good' and 'excellent', it was expected that a simple instruction for the confederate to avoid positive affect language would be sufficient to lower the language behaviour.

The confederate practiced disruption by creating sentences in reaction to excerpts from past study transcripts of groups discussing the murder mystery task. Excerpts contained 4 to 5 lines of text from various group members; on exposure to this, the confederate was tasked with creating a language style disruption sentence, which maintained topic relevance. The confederate practiced disrupting LSM and positive emotion. With practice the confederate was competent at implementing each strategy to disrupt LSM or positive emotion.

Using the above information and rational, a 'word crib sheet' was created of the specific word categories to be avoided. A 'phrase crib sheet' was also created, which listed typical phrases that arose during the relational and task phases in the previous study. Typical phrases were tailored for use by the confederate by either removing function words or positive emotion words from the expression.

A protocol was created to ensure that, while altering style, the confederate maintained consistent content of utterances wherever possible. This was particularly relevant to relational issues, where variance in the confederate's disclosure of

personal biography or personality traits might introduce unwanted variance to perceived trustworthiness. Therefore the confederate was given a consistent profile of generic strengths, weaknesses and previous experiences. These could easily be expressed in either disruption condition. For example, "I'm a *great* problem solver" became "One of my strengths is problem solving" (positive emotion disruption) or "One strength, great problem solver" (LSM disruption). A similar strategy was implemented for the confederate disclosing task information. The confederate was given consistent information regarding the mystery, none of which actually contained any 'critical information', as to not affect the success of the group. The confederate always disclosed all of their information. For other parts of the task, the confederate maintained a passive and agreeable role, and reacted to decisions and followed discussion topics nominated by others.

Study Procedure. A study advert was circulated to potential participants around Lancaster University. The advert was circulated by contacting various university departments and society administration staff. The advert was also posted on an online study system for first year psychology students, participating for course credit. In addition, a research associate staffed an advertising stand in various locations on the university campus; in addition to the available advertising materials, participants could learn about the study and ask questions directly to the research associate before stating an interest in taking part. Those interested in taking part were contacted via email. Participants were then directed to a web portal, which provided the participant information sheet, and consent form, once participants had read the participant information sheet and signed the consent form they were asked to complete a pre-interaction questionnaire.

Participants were sorted into groups of 5. This was done strategically to avoid participants who knew one another signing up together. Specifically, groups comprised participants who signed up at different times, from different colleges / courses, and who stated different responses to the question "where did you hear about this study?" Participants were then invited, via email, to participate at the two meeting times selected for their particular group.

The procedure for participants during trials remained the same as in the study in chapter 4. Researcher instructions and prompts were replicated. The prize money incentive was again £25. Finally, participants were debriefed following the post interaction questionnaire as before. The only difference was that participants attended two instead of three meetings.

5.5. Results

Table 5.2 shows means and standard deviations for all trust measures at both phases of group development. The descriptive statistics indicate that psychometric trust measure scores were consistent across the relational and task phases.

5.5.1. Hypothesis testing.

To test hypothesis 1, two mixed ANOVA's were carried out. The results showed a significant disruption by phase interaction effect on LSM, $F_{1,84}$ =67.40, p < .001, and Positive emotion, $F_{1,84}$ =35.26, p < .001. Table 5.3 shows low LSM in two phases where LSM was disrupted (Strong disruption condition, relational phase & weak disruption condition, task phase) and low positive emotion in the two phases where positive emotion was disrupted (Strong disruption condition, task phase & weak disruption condition, relational phase). Thus, results supported Hypothesis 1.

Table 5.2 *Means and standard deviations for trust measures in each phase.*

	Pre-Interaction		Relational		Task	
	M	*SD*	*M*	*SD*	*M*	*SD*
Trust propensity	16.25	3.23	-	-	-	-
Affective trust	-	-	15.09	5.27	15.08	5.33
Cognitive trust	-	-	14.90	3.63	14.17	4.21
Disclosure intention	-	-	19.47	6.29	19.28	6.04
Reliance intention	-	-	23.28	5.70	22.54	6.23
Trust behaviour	-	-	-	-	0.40	0.18

Note: There were 4 cases of missing responses at the relational activity phase. Decrease in N between the relational activity and task activity phase reflected participant drop out (e.g., groups of 6 decreasing to groups of 4). Trust propensity: $N = 167$. Affective trust, cognitive trust, disclosure intentions and reliance intentions: $N = 163$ (relational), $N = 155$ (task). Trust behaviour: $N = 155$.

Table 5.3 *Means and standard deviations for LSM and positive emotion in each phase and each experimental condition.*

	Relational		Task	
	M	*SD*	*M*	*SD*
Strong disruption LSM	0.71	0.06	0.83	0.05
Weak disruption LSM	0.81	0.05	0.75	0.04
Strong disruption positive emotion	8.76	2.16	2.02	0.81
Weak disruption positive emotion	6.00	1.50	2.88	0.77

Note: LSM and positive emotion: $N = 167$ (relational), $N = 155$ (task).

To test Hypothesis 2, a LME model with disruption condition, LSM, positive emotion and phase as fixed effects (plus their interaction terms) was modelled. Individual trust propensity and group level random effects were entered as in chapters 3 and 4. Parameter estimates indicated significant main and interaction effects of

disruption condition (β = -5.49, p = 0.04, two-tailed); the disruption condition interacting with LSM with positive emotion (β = -1.00, p = 0.02, two-tailed); as well as its lower order disruption condition with LSM (β = 6.98, p = 0.04, two-tailed) and disruption condition with positive emotion interactions (β = 0.78, p = 0.03, two-tailed). The interactions suggest that the disruption condition effected trust behaviour via LSM and positive emotion. Least square means indicated *lower* trust behaivour in the *strong disruption* condition as compared to the weak disruption condition, supporting Hypothesis 2, results are reported in Table 5.4.

Next, the significant interaction between disruption condition, LSM and positive emotion, which predicted trust behaviour, was explored. To do so, two LME models tested relationships between predictor variables and trust behaviour at each level of the disruption condition. LSM, positive emotion and phase were predictor variables and random effects were entered as before. It was expected that in the weak disruption condition, LSM, positive emotion, and phase would interact to predict trust behaviour (as in the study in chapter 4), however this effect will have been absent in the strong disruption condition, thus explaining lower trust behaviour. There was partial support for this, as the LSM, positive emotion and phase interaction was a none significant predictor for the strong disruption condition; whilst the same interaction approached significance for the weak disruption condition (β = 1.45, p = 0.06, one-tailed).

Lower order significant main effects of LSM (β = 6.57, p = 0.01, one-tailed) and positive emotion (β = 0.78, $p < 0.01$, one-tailed) on trust behaviour, subsumed by the higher order interaction, help explain this effect in the weak disruption condition.

Table 5.4 *Least square means estimates of effect of disruption condition on trust behaviour.*

Disruption Condition	Estimate	Standard	*df*	*t*	Lower CI	Upper CI	*P*
Strong	0.25	0.10	243	2.58	0.06	0.45	<0.01
Weak	0.34	0.08	170	4.29	0.18	0.49	<0.001

The effects presumably operated such that LSM positively predicted trust behaviour in the relational phase, and positive emotion positively predicted trust behaviour in the task phase. This can be assumed given that in this weak disruption condition; high LSM was prevented in the task phase, and high positive emotion was prevented in the relational phase.

Hypothesis 3 proposed that language, interacting with disruption condition and Phase, impacted trust behaviour via affective based trust beliefs or disclosure trust intention but not cognitive based trust beliefs or reliance intention. A series of models explored this possibility, each entered random effects as before. The first model tested which trust beliefs and / or intentions predicted trust behaviour. Trust beliefs (affective and cognitive) and intentions (disclosure and reliance) interacting with phase were modelled as predictors of trust behaviour. Affective trust interacting with phase was the only predictor of trust behaviour that approached significance (β = -0.07, p = 0.03, one-tailed).

Next, a model tested if LSM, positive emotion, phase and disruption condition would interact to predict affective trust. A four way significant interaction indicated that LSM and positive emotion were affecting affective trust in different ways at different levels of the variables phase and disruption condition (β = -8.49, p = 0.07, two-tailed).

Finally, a model *including affective trust* interacting with phase, and the original predictors from testing hypothesis 2 (disruption condition, LSM, Postive emotion), was modelled to predict trust behaviour. Random effects were added as before. As in the original model which tested hypothesis 2, LSM, condition and positive emotion interacted to predict trust behaviour (β = -1.05, p = 0.02, two-tailed). In addition the affective trust and phase interaction significantly predicted trust behaviour (β =-0.05, p = 0.04). Thus, the models offered some support for indirect effects of disruption and language variables on trust beahvour, via affective trust beleifs.

5.6. Discussion

The current study aimed to manipulate language to provide further evidence for the group phase dependent effect of LSM and Positive emotion on trust behaviour in line with The Relevant and Reliable Language Theory. The results indicated that group language variables could be manipulated via a strategy of confederate disruption. A novel strategy, which placed a single confederate in each group who strategically moderated their own language style, was successful in lowering LSM and positive emotion. The results also showed support for a causal relationship between language and trust behaviour. The manipulation produced less trust behaviour in the strong disruption condition compared to the weak disruption condition. Finally, evidence was found that LSM in the relational phase may have influenced trust behaviour via an indirect effect of individual's affective based trust beliefs.

The present study demonstrated the value of disruption to manipulate group language variables. Previous work has demonstrated the value of positive language manipulations (e.g., through strategic verbal and none verbal mimicry [Swaab et al.,

2011;Van Swol, 2003]), however, in group contexts such positive manipulations were said to be difficult to induce (Tausczik & Pennebaker, 2013), thus the present strategy offers an alternative language manipulation.

It is noteworthy that a single confederate in a group of up to 5 genuine participants was able to influence group language and group trust. The success of the positive emotion manipulation supported the role of contagion (Kramer, 2012) as a powerful process in which a norm of positive emotion word use is established. Similarly, the LSM manipulation suggested that misalignment could have strong negative effects on LSM. Felps, Mitchell and Byington (2006) described 'bad apple' behavior, whereby one individual in a group produces negative interpersonal behaviours, which were found to consume 'inordinate' time, psychological resources, and emotional energy in groups. Then, it is perhaps then unsurprising that a single individual's language style can hold group wide effects. In conclusion, disruption via a single confederate altering his language style is offered as a useful and effective tool for manipulating language.

It is argued that the reason for lower levels of trust observed in the strong disruption condition was due to the absence of the reliable and relevant processes, which were proposed to underlie trust formation in online groups. That is to say that, an absence of LSM in the relational phase communicated an absence of engagement in the relational needs of the group. Therefore, less willingness to form attachments and less caring was communicated. The strong disruption also created an absence of positive emotion in the task phase. This absence occurred at a time when participants presumably were still searching for trust relevant information, given that their expectations of trust were not met in the relational phase, due to the LSM disruption. Hence, group members experienced a lack of perceived support at the task phase, and

the latent path to trust, via positive emotion word use, was not possible. In essence, the opposite of the positive effects of relational LSM and task positive emotion (shown in chapter 4) are found when each process is disrupted. It follows that if language was merely a reflection of trust, such effects would not be observed. However, this was not the case in the present findings, thus offering support for the argument that trust formation occurs via the causal role of relevant and reliable language processes.

Evidence was found for affective trust-acting as a mediating variable between language and trust behaviour. This supported the theoretical position that affective trust may underlie trust formation specifically built on *language mechanisms*. LSM effects are proposed to rest on communicating engagement in the relational needs of the group, whilst positive emotion in the task phase communicates group support. Intuitively, it follows that such effects would impact affective trust, which McAllister (1995) stated emerge through attachments and caring actions. In line with Ajzen's (1988) principle of comparability, affective trust may be at the same level of specificity to our language effects. That is, the language mechanisms that affect trust are most closely conceptualized by the individual as reflecting 'affective trust', as self reported by participants. Suggesting that other measures such as cognitive based trust, disclosure intention, or reliance intention are not at the same level of specificity to the language effects. In online contexts, such as in virtual groups, with relational and task phases, affective trust is offered as a possible mechanism through which language communicates trust.

The role of affective trust provides evidence for the 'engagement' interpretation of LSM effects, addressing the counter 'temporal order' interpretation proposed by Swaab et al. (2011). The temporal order interpretation proposed that

early mimicry effects on trust behaviour are owing to its early temporal position which colours the rest of the interaction with trust; and did not discriminate between this trust being cognitive or affective based. Conversely, the engagement interpretation proposed that mimicry (LSM) effects on trust behaviour are owing to demonstrating engagement in the relational needs of the group; and so would influence *only* affective based trust. Hence, the indirect effect of affective trust, and lack of indirect effect of cognitive based trust, provided evidence for the latter interpretation.

5.6.1. Limitations and future research

One limitation of the present study exists in the difficulty of interpreting a four-way interaction. Whilst the interaction, and lower order interactions of the four way interaction, supported hypotheses and were interpreted as such, a study by Halford, Baker, McCredden & Bain (2005) found that human interpretation of a four way interaction, relative to a three way interaction, significantly increases in error. The same study suggested that a four-way interaction is at the limit of even an experienced researcher's processing ability, and therefore a note of caution is necessary with regard to the interpretation in the present study.

While it was shown that language affected trust, it is unclear to what extent this effect was reciprocal; i.e. to what extent trust, in turn, affected language. The study in chapter 3, by utilizing a trust prime, demonstrated that the relationship between language and trust could operate this way. Although it was not the aim of the present study, to test for reciprocal effects between language and trust, future research might extend the present findings to investigate this.

The generalizability of the results to different group compositions is not certain. Firstly, the current study showed how language functions in a relatively

stable group that meets over a short period of time. However, it is unclear how trust functions for groups whose internal structure changes (e.g. group members joining and leaving the group). Felps et al. (2006) found that shared group experiences, as well as group members leaving and entering groups affected trust. Replication of the present findings in groups of a less stable composition would be useful.

Finally, the present research considered groups where task and relational orientation made up equal parts of the group's life cycle. However, it is possible some online groups persist as either task dominated or relational dominated. In line with the present Relevant and Reliable Language Theory, language mechanisms that predict trust would be expected to replicate. That is to say that, positive emotion or LSM would become more heavily weighted in determining the level of trust in a group depending on whether the group was more task or relational orientated, respectively.

5.6.2. Conclusion

The present study offered a novel means to extend the findings that LSM and positive emotion have phase dependent effects on trust via disruption of those language processes themselves. A causal relationship to trust emanating from LSM in a relational phase, and positive emotion in a task phase was found. In addition, the results implicated that it is through affective trust through which these particular language mechanisms influence trust behaviours. Further evidence is provided for The Relevant and Reliable Language Theory underlying trust formation for online groups; shedding further light on *how* trust formation occurs in online domains.

6. Chapter 6. Using Language to Measure Trust in a Criminal Virtual Community

Research thus far has considered the relationship between language and trust for online groups in laboratory-based experiments. Significant relationships have been established, namely that reliable and relevant language, in the form of either LSM or positive emotion word use, facilitate and reflect trust formation in online groups. Such relationships have not yet been explored in naturally occurring online groups. Similarly, nor have these relationships been explored in 'criminal' online groups (a research area where the language trust link is thought to be particularly applicable). The present study sought to establish the extent to which previous findings can be generalized to online group interactions, outside of the laboratory setting.

6.1. Overview of Virtual Communities

One type of online group interaction is participation in online communities; also known as virtual communities, or VC's. VC's are large groups of internet uses who share common interests or resources (Preece & Maloney-Krichmar, 2003). VC's communicate largely through message boards, sometimes called forums or online discussion boards, where subtopics are created, and then commented upon and discussed by group members; subtopics and comments are visible to all group members (Holtz, Kronberger, & Wagner, 2012). VC's are different to virtual teams in that they consist of a larger volume of group members, in addition they emerge naturally as people are attracted to the community by a common interest or hobby, whereas virtual teams are usually centered around a task orientated, organizational, goal (Ridings, Gefen, & Arinze, 2002). Given the differences of virtual teams to virtual communities, there is further need to consider how the present theory of how

trust and language are related in online groups transfers to this type of online group communication.

6.2. Trust Matters in Virtual Communities

There are good reasons to believe that trust is important to the functioning of virtual communities. Indirect evidence for this comes for the fact that there are numerous similarities between virtual teams and virtual communities, and the importance of trust in virtual teams has been extensively documented (for review, see Jarvenpaa, Shaw, & Staples, 2004). Virtual community members do not previously know each other, lack face-to-face contact, and are dispersed by space and time (Riding et al., 2002). As stated by Wilson, Straus, and McEvily (2006), it is these qualities in virtual teams which make trust both difficult to achieve *and important*. However, VC's also differ to virtual teams. Interaction in VC's is between a larger volume of group members, and there are less explicit rules compared to virtual teams, which usually have a prescribed structure in line with wider organizational culture (Riding et al., 2002). These qualities of VC's might make the possibility of opportunistic behavior and deception *more* likely, as has been exemplified in a number of high profile breaches of trust in virtual communities (see Birchmeier, Joinson, & Dietz-Uhler, 2005; Joinson & Dietz-Uhler, 2002). Hence, there is evidence to suggest that the importance of trust in the functioning of VC's is, at the very least, equal to that in virtual teams.

There is also direct empirical evidence to support the importance of trust in VC's. Riding et al. (2002) found that individual's trust propensity and perceived ability, benevolence and integrity, predicted engagement, i.e. the desire to exchange and get information from the VC. The authors noted that in VC's, a 'special kind of trust' between an individual and a large community sometimes emerges, which

eventually leads to positive outcomes to the community as a whole. Hence, there is evidence to suggest that the functioning of VC's is – at least in part – dependent upon group member's trust in the community.

6.3. Trust Matters in Criminal Groups

In organized crime literature it has become a truism to say that what holds organized criminals together is trust (Von Lampe & Johansen, 2004). Trust becomes critical in criminal interaction because many of the institutional safe guards designed to compensate for the consequences of deceit and betrayal, are unavailable for group members operating illegally. Also, with the threat of law enforcement intervention and criminal sanctions, the consequences of disloyal behavior are likely to be more severe than those to be expected in the legal sphere of society, hence there is greater risk and greater trust required for criminals to operate (McCarthy, Hagan, & Cohen, 1998). Researches have argued that this is especially true of criminal groups that exist online due to the additional risks of opportunistic behaviour that comes with online interactions in general (Benjamin, & Chen, 2012; Wilson et al. 2006). Hence, it is proposed that in the criminal online discussions analysed in the present study, the role of trust is at least no less important than in non-criminal groups previously studied, and indeed could be a *more* salient construct.

6.4. Language Matters in Virtual Communities

Language analysis appears as a useful tool to reveal social dynamics in VC's. For example, language analysis has been used to determine which individuals in VC's could be considered 'non-leaders', as revealed by their tendency to mimic others (Jones, Cotterill, Dewdney, Muir & Joinson, 2014). It has also been found that virtual community size and density predicts language similarity (Huffaker, 2011). Finally,

research has shown that harassment in virtual communities might be characterized by elevated use of pronouns in messages (Yin, Xue, Hong, Davison, Kontostathis, & Edwards, 2009). The various findings relating to language in VC's is perhaps unsurprising; given that, in the absence of non-verbal communication, language is the main currency of interaction. It is reasonable to expect, and has thus far been supported, that language plays a critical role in the social dynamics of these online communities. Therefore it is also reasonable to expect, given that trust is an important construct in VC's, that language will also play a critical role in determining the level of *trust* in such groups.

6.5. The Present Study

The present study sought a criminal VC, with varying levels of trust occurring over the group's life cycle, as subject matter for a natural experiment to examine how the language behaviors within the group might change as the level of trust fluctuates. The present study acquired such data from the UK police. The VC was a group of credit card fraudsters, which had been attacked by UK police at a specific time. The attack, which made group members aware that the UK police had access to the group's discussions and confidential information, was thought to undermine group trust. Given the role of language and trust in VC's, which hypothetically operate in a similar way to trust in virtual teams, a number of predictions with regard to how the group's language would change, in reaction to the trust disruption, were made. Therefore the present study examined the ebb and flow of trust, and the language that facilitates and reflects such trust, in a VC that was subjected to a significant disruption to trust.

6.6. Hypotheses

Authors have considered salient possible trust disruptions specific to VC's. For example, Riding et al. (2002) lists two salient risks to trust in VC's. Firstly, that one's personal details, such as email and IP address, could be revealed to third parties without consent. Secondly, that 'opportunistic individuals' within the group, could be operating under a covert identity. In the case of the VC used for the analysis in the present study, it was known that the disruption ot trust both a) revealed the insecurity of personal details and b) highlighted the possibility of UK police operating as covert group members. Thus, exemplifying both the common trust breaches detailed by Riding et al. (2002). Therefore, it is reasonable to expect that the efforts of UK police in the present group studied constituted a 'classic' VC trust disruption and successfully reduced trust.

The first research question was; would the language behavior of group members significantly change, in the short term, following a trust disruption? It was hypothesized that trust will be lower in the phase following the attack to the present VC. Therefore, it is expected that language indicators of trust, such as LSM and positive emotion, will be lower as compared to phases prior to the disruption. Hence:

> *H1:* Language behaviors, which facilitate and reflect trust (i.e. LSM and positive emotion), will be lower in the short term following the *disruption* to trust.

The second research question was, would there be a long-term effect of the disruption to trust, and would this be reflected in the language of the group? Groups are able to continue to exist for long durations following a trust disruption via utilizing mechanisms of 'trust repair' (Gillespie & Dietz, 2009). However, it is unclear what this 'repaired' level of trust looks like conceptually. For example, Dirks,

Lewicki and Zaheer, (2009) (and later, in a similar review; Kramer & Lewicki, 2010) proposed three possible interpretations of 'repaired trust'; one possibility is that trust might be repaired to an acceptable level; however, negative visible signs of the previous disruption persist. Alternatively, trust might be 'restored' rather than repaired, where the group bears no visible signs of damage. Finally, repaired trust might be qualitatively different to 'pristine' trust. That is to say that, trust that has been repaired in some way might be more durable, vigilant, wise and less susceptible to further disruption.

None of the studies in either Dirks et al. (2009) or Kramer and Lewicki's (2010) recent reviews included a measure of pre-violation, post-violation, and post-repair trust levels. However, by operationalising a long-term pre-repair phase, distinct from the violation phase and long term post-violation phase; the present research was novel in being able to examine the precise and relative state of 'repaired trust'. The level of trust in this phase would be compared to the long-term pre-violation phase, via language measures, to determine if repaired trust is less than, equal to, or greater than pre-violation trust levels. Thus, a non-directional hypothesis was proposed; that trust levels in the long-term post violation phase would be different to those in the long-term pre-violation phase.

H2: Trust levels in the long-term post-violation phase would differ to those in the long-term pre-violation phase.

The third research question asked was, does language behavior function to recover trust following the effect of a disruption? Following a trust disruption trust must be restored to an acceptable level for individuals to continue to interact; otherwise the relationship is likely terminated (Kim, Dirks, & Cooper, 2009). Therefore, the result of violated trust, if the relationship is not terminated, is the need

to repair trust (Kim et al., 2009). There is evidence to suggest that this repair process occurs through the language behaviors of the parties involved. For instance, numerous authors have considered explicit language mechanisms of trust repair, such as transgressors apologizing for trust violations, denying them, or making promises to influence future expectations (Kim, Dirks, Cooper, & Ferrin, 2006; Kim, Ferrin, Cooper, & Dirks, 2004; Schweitzer, Hershey, & Bradlow, 2006). However, the consideration of language as a mechanism to repair trust has not yet been extended to language *style*.

There is evidence to suggest that language style, that is to say *how* information is communicated in addition to *what* is communicated, could be important in trust repair. For example, the affective valence of language has been proposed to affect trust repair. Dirks et al. (2009) argued that restoring positive exchanges is the primary goal of trust repair, proposing that one important facet in repairing trust is the targeting of affective damage itself. Similarly, Tomlinson and Mayer (2009) proposed that managing emotions is as important as managing cognitions in repairing trust. Based on Weiner's (1986) causal attribution theory, the authors argue that reducing emotions such as anger and fear may enable higher perceived levels of trustworthiness and trust following a violation. It follows that inciting a positive language style could be one way to achieve the emotional foundations necessary to repair trust, however such a claim has yet to be empirically tested.

Next, there is evidence to suggest that demonstrating renewed commitment to the group might repair trust. For example Heider (1958) stated that following an organizational level failure; trust repairing procedures per se are not sufficient to repair trust. Instead, these mechanisms must be implemented *voluntarily* by the organization, and must imply that the company is intrinsically committed to acting in

a new way. Similarly, Gillespie and Dietz (2009) suggested that companies *themselves* must make new, positive, commitments; in order to repair trust above and beyond simple good-willed statements. In accordance with this, given that LSM reflects engagement (Ireland, 2011), increased LSM could communicate the renewed commitment that seems to be important to repairing trust.

In conclusion, the research suggests that in repairing trust, it is not only the content of what is communicated which affects the success of repair efforts, but also how it is communicated. Given that positive emotion and LSM are two ways in which the 'how' of communication varies, it would be expected that an increase in each of these variables would facilitate trust repair in the group analysed in the present study.

> *H3:* Following the effect of disruption in the short term (the lowest trust phase as indicated by language), LSM and Positive emotion will increase in order to facilitate trust repair.

The final research question asked, which language behaviors best measure changes to trust in the VC? As previously discussed, one way that VC's vary from virtual teams, is the content of their focus. That is to say that, while virtual teams tend to be organizational, and focused on completion of a task, VC's tend to be emergent, and focused on discussion of shared hobbies and interests (Riding et al., 2002). In this respect, VC's could be considered as being more relational focused, rather than task focused.

As has been previously argued, the relationship between LSM and trust, and positive emotion and trust, is dependent on their relevance and reliability in a given context. That is to say that, in contexts where relational aspects of group dynamics are salient; LSM, is a more reliable cue to trust by demonstrating engagement in

relational group needs. Whilst in task phases, LSM is not a reliable cue to trust, reflecting engagement in the task rather than group members, and so positive emotion word use emerges as a reliable cue to trust, providing it is relevant. That is to say that, providing the group has not established high trust in a previous relational phase. In line with this theoretical framework, LSM, rather than positive emotion, should be the reliable cue to trust in the present VC data due to the relational nature of the interaction.

H4: LSM will reflect changes in group trust more so than positive emotion word use.

Figure 6.1 shows the conceptual model tested in the present study. The model builds on the model from the study in the previous chapter as the relationship between trust and language, in a relational phase, is thought to rest entirely on the language variable LSM. Whilst the previous model demonstrated the causal path from language to trust, the final model is supplementary in also representing the causal path from trust to LSM. The model also depicts the absence of a relationship between trust and positive emotion given the relational context of the interaction.

6.7. Method

6.7.1. Participants.

Participants were users of an online message board discussing the topic of credit card fraud. Users participated under fictitious alias names; therefore there was no socio-demographic information available about users. While there was no information on the individual users, it was possible to characterize the social group organizing and using the forum by taking into account background information such as introductory pages and press articles reporting on the message board.

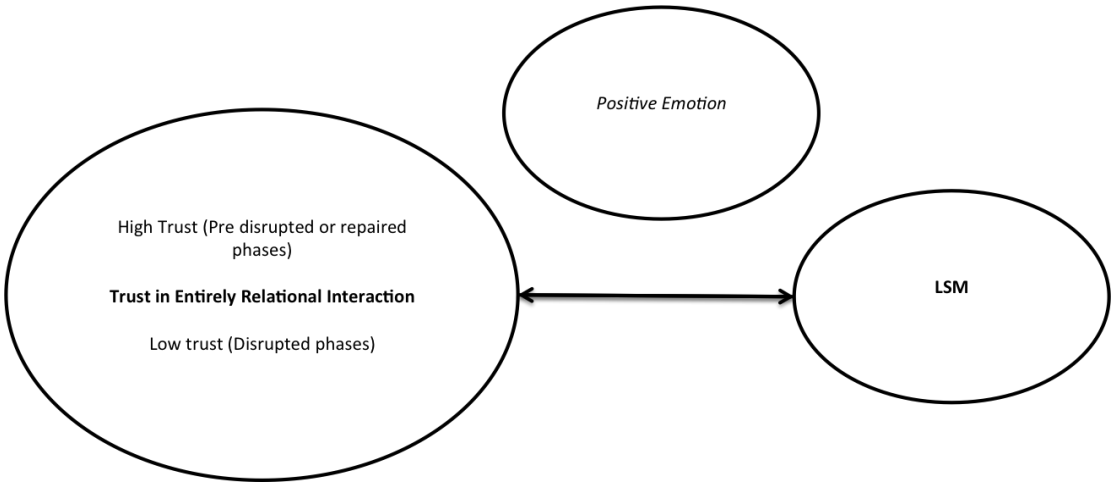

Figure 6.1 *Schematic representation of a conceptual model linking the varying levels of high and low trust and the language of the group in an entirely relational interaction.*

Introductory pages revealed that the topic of the message board was 'carding', and users self identified as 'carders'. 'Carding' is slang for credit card fraud, and 'carders' are active or aspiring credit card fraudsters (Peretti, 2008). In a press interview with the serious organised crime agency (SOCA), SOCA described the site as facilitating the commission of fraud and related criminal offences. SOCA went on to state that under UK law an offence of fraud might be punished with imprisonment of 10 years (Brewster, 2013). Hence, participants in the present study were, by UK law, serious criminals; 540 users made up the group.

6.7.2. Materials.

Website content. Cpro.su is a website designed to facilitate credit card fraud. UK police initiated a period of disruption designed to undermine trust in the website's organizers and users. The specific dates and times, accurate to one hour, of this disruption period was made available for the purposes of the present research. The message board was suitable material for the present study as language behaviors before, during, and following disruption could be analyzed.

Message board. Contained within the website was a public discussion forum, or message board (Holtz et al., 2012). The message board 'rules' as defined by website organizers, were detailed on the first page. The forum prohibited the disclosure of sensitive information, such as credit card details. The forum also prohibited advertising any services, or initiating any transactions (other areas of the website could facilitate this behaviour). Hence, the message board was related to the running of the website, the state of the carding black market, success stories and other issues in carding outside of carding commerce itself.

Internet message boards are typically organised into specific thematic sections with subsections (Holtz et al., 2012). In the present study the thematic section analysed was called 'English speaking carders' and the subsection was called 'general discussion'. The message board had been active since December 2009, and to the authors knowledge is still active today. The present analysis took a subsection of the message board's content lasting 13 months and 21 days.

The message board followed the typical tree-like structure described by Holtz et al. (2012). Users could start a discussion by creating a new 'thread', with a 'starter posting'. Other users could reply to the starter posting or to other users' comments. These messages are called posts. There were 176 threads in the present sample.

Text extraction. Extract.pl was a perl script designed to convert html files into individual text files. The program converted html threads into a text file containing date, user, post, and thread topic. One issue with text extraction in general, is the decision regarding how to deal with quotes from earlier posts (Holtz et al., 2012). Keeping quotes can bias the word count. This was a particularly salient issue in the present study where word count is entered as part of the formulation of the language

variables. Therefore, extract.pl was designed to exclude quotes when converting html data to text files.

6.7.3. Procedure

Data extraction. A cpro.su user account was created, which permitted access to the websites message boards. The first step was to export the content of the website to text processing software, this is particularly relevant given that forums may suddenly go offline for various reasons (Holtz et al., 2012). Given the criminal nature of the data in the present study, this was a particularly salient risk. Indeed, having gained ethical clearance to begin the study, the forum transitioned between active and inactive on numerous occasions, being inactive for several months. However, it was possible to export the entire message board, during a 3-day window when the site was active. HTML files were saved by hand direct from the online website. Extract.pl then converted HTML files to text files.

Data restructure. The data was restructured into the relevant phases for analysis. Text files were divided into folders containing posts exclusive to the particular phase parameters. Phase parameters were based on the time stamp of each *individual post*. A single topic thread sometimes contained posts within 2 phases. In such circumstances, the posts were divided into their respective phases, and the topic thread was coded as part A and part B, with part A existing in the earlier group phase and part B in the later group phase. At this stage an inclusion criteria was also defined. Inclusion criteria were thread topics that contained three or more posts, by two or more individual users. Any discussion that consisted of less than this was removed from the data pool.

6.7.4. Design

Independent variable. Phase of group development was the independent variable with 7 levels. Phases were defined to reflect varying levels of trust, so that planned comparisons of language could be made between phases. A disruption phase was defined using information from UK police. This was the phase which, accurate to one hour, the research team was aware that the website had been disrupted by UK police. The disruption phase lasted 9 days and 4 hours. Phases surrounding the critical disruption were defined as follows; *immediate* before and after phases, these were the 10 days before and immediately after the disruption phase; *short term* before and after phases, these were the 10 days before and after the immediate phases; and *long term* before and after phases, these contained posts from 6 months before and after the short term phases. 10 day periods were used to mirror the duration of the disruption period, thus keeping all phases (outside of the long term phases) basically consistent in duration.

This 'ripple effect' design structure allowed the sequential effects following the disruption, to be assessed in the immediate, short and long term. With regard to phases defined *before* the disruption, the design structure allowed for the post disruption phases to be compared to what was 'typical' of the group's language in the immediate, short, and long term history of the groups life cycle. Phases are detailed in Table 6.1.

Dependent variables. Dependent variables were LSM and positive emotion word use. Each language variables was taken at the individual user level, as opposed to the group level. Thus, LSM measured an individual's language similarity to their group in a single thread topic. Positive emotion word use measured the individual's use of positive emotion words as a proportion of their total word count, in a single

Table 6.1 *Phases of group's life cycle.*

Phase Code	Phase Name	Thread *N*	Group Member *N*	Duration
1.1	Long-term Pre-disruption	73	299	6 Months
1.2	Short-term Pre-disruption	7	29	10 Days
1.3	Immediate Pre-disruption	4	19	10 Days
2	*Disruption*	7	35	9 Days, 4 Hours
3.1	Immediate Post-disruption	4	24	10 Days
3.2	Short-term Post-disruption	5	26	10 Days
3.3	Long-term Post-disruption	76	300	6 Months

thread topic. The same formula to calculate an individual's LSM in chapter 3 was used in the present study. As in previous chapters, this formulation provided greater statistical power, as opposed to unnecessarily aggregating scores across groups.

Statistical models. Linear mixed effects models (LME) tested the effect of group phase (1.1 through to 3.3, see table 6.1) on group language (LSM and Positive emotion). Two distinct models predicted LSM and positive emotion. Phase constituted a single fixed factor. Language behaviour was expected to vary randomly between threads and between individual users; hence thread and user ID were entered as random factors. Within the models, planned comparisons tested hypotheses 1

through to 3, comparing: pre-disruption phases with the single highest impacted post disruption phase (hypothesis 1); the long term pre-disruption phase with long term post disruption phase (hypothesis 2); and the single highest impacted post disruption phase with subsequent phase or phases (hypothesis 3).

6.7.5. Ethics

It has been argued in fields of sociology, psychology, and medicine that communication in internet forums is private and should not be used for scientific analysis without the informed consent of the users (Holtz et al., 2012). However, one of the main functions of such public forums is to inform non-members about the organizations' agenda and goals and to attract new members. Usually, anyone can read the postings in these forums. In cpro.su, any member of the public could sign up for a free user account and access the entire content of message boards. Arguably, this justifies the consideration of communication within such forums as 'public behavior' (Herring, 1996). Therefore analysing such content might be considered a 'low risk' ethical concern.

Nevertheless, it should not be forgotten that users of such public forums might at least be annoyed by the possibility of their postings being analyzed in scientific research (King, 1996). For this reason, alias names were not published in the present research. Furthermore, literal quotes from the message board were avoided because the respective postings could be found easily with search engines. Finally, dates and times of each phase were not detailed; this was as much to protect the privacy of users, as it was to keep the times of the UK police disruption secret. Overall, the present research contained as little potentially identifying information about individual users as necessary.

Finally, the research was reviewed and granted clearance by two separate ethics committees; Lancaster University research ethics committee, and Ministry of Defense research ethics committee. In conclusion, the research could be considered ethically sound.

6.8. Results

The ANOVA summary indicated that the overall LME model approached significance for phase predicting LSM, F (6, 219.15) = 1.81, p = .10, two-tailed test). However, the LME model for phase predicting positive emotion was none significant. Significant effects of phase predicting LSM were found specifically on the immediate pre-disruption phase (1.3) and long term post disruption phase (3.3) (see Table 6.2 for summary). LSM in each phase is illustrated in Figure 6.2 and illustrates the highest LSM scores in the immediate pre-disruption phase (1.3), and LSM gradually decreasing following this phase into the disruption phase (2), immediate post-disruption phase (3.1) and short-term post-disruption phase (3.2).

Hypothesis 1 was tested by comparing the short-term post disruption phase, which was the single highest impacted post disruption phase as reflected by the lowest mean LSM score, with *all* pre-disruption phases (i.e. phase 3.2 with 1.1, 1.2 and 1.3).

Hypothesis 2 was assessed by comparing the two long-term phases (i.e. phase 1.1 with 3.3). Hypothesis 3 was assessed by comparing the short-term post disruption phase, which as stated was the single highest impacted post disruption phase, with the subsequent phase, which was the long-term disruption phase (i.e. phase 3.2 with. 3.3). Multiple t-tests with a corrected alpha (5 comparisons; p-value cut off =0.01) tested each effect. The comparison results are reported in table 6.3.

The long-term effect of disruption was an increase in LSM, as demonstrated

Table 6.2 *Summary of LME model; phase of group interaction predicting LSM.*

	Estimate	Std. Error	*df*	*t*	*P*
Phase1.2	0.02	0.05	281.62	0.40	0.69
Phase1.3	0.21	0.08	203.16	2.67	0.01
Phase2	0.04	0.05	218.51	0.82	0.41
Phase3.1	-0.01	0.07	202.90	-0.14	0.89
Phase3.2	-0.05	0.06	218.19	-0.88	0.38
Phase3.3	0.04	0.02	200.46	1.67	0.10

Note. Phase 1.1 was used as the intercept in the LME.

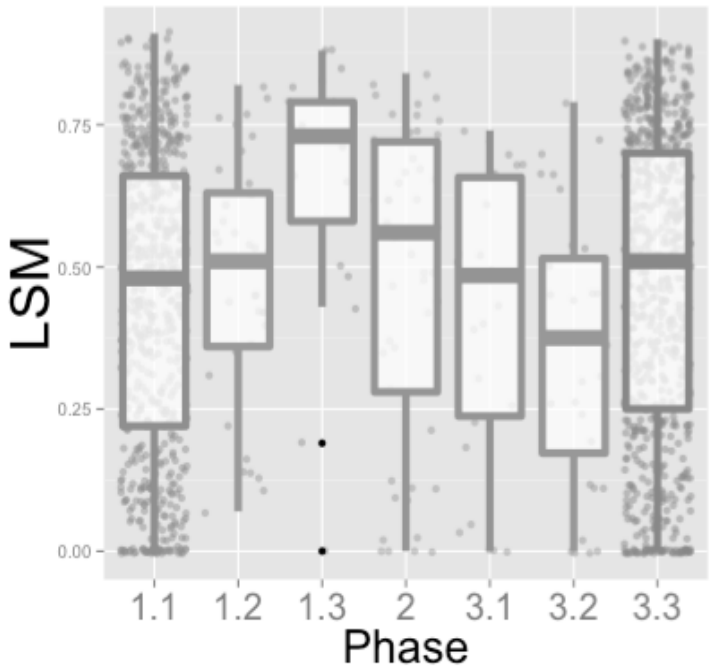

Figure 6.2 *Effect of phase of group interaction on LSM.*

by comparison A, however this difference only approached significance. The short-term effect of disruption was a decrease in LSM, as demonstrated by comparisons B through to D, however only comparison D reached significance. There was evidence

Table 6.3 *Hypothesis 1 through to 3; planned comparison results.*

Comparison	Phases	*df*	*t*	*P*	Variable 1 mean	Variable 2 Mean
A	1.1 vs. 3.3	34.99	2.00	0.05	0.44	0.47
B	1.1 vs. 3.2	1333.26	-1.52	0.13	0.44	0.36
C	1.2 vs. 3.2	63.08	2.24	0.03	0.48	0.36
D	1.3 vs. 3.2	43.92	4.59	<0.01	0.66	0.36
E	3.2 vs. 3.3	34.64	-2.52	0.02	0.36	0.47

for a trust repair effect as demonstrated by comparison E, however this also only approached significance.

6.9. Discussion

Trust was proposed to be a critical component in the functioning of criminal online virtual communities. It was hypothesized that certain levels of trust would exist at various stages of the group's life cycle, and that these levels of trust would be reflected in the language use of the VC's group members. Hypotheses were only partially supported as most effects only approached significance. Nethertheless, LSM was lower following disruption, increased following the lowest trust phase (indicating trust repair), and was greater in the long term following the disruption as compared to the long term level prior to disruption. The lack of effects with regard to the positive emotion language was in line with the prediction that in relational focused interactions, LSM is a reliable and relevant signal to trust, whilst positive emotion, in this context, is less reliable and relevant.

The crucial contextual factor proposed to facilitate the effect of LSM on trust, was the *relational* phase in which LSM occurs. However, alternative interpretations

have been proposed. It has been suggested that 'early temporal phase', in the interaction, is the crucial contextual variable in explaining the effect of LSM on trust (Swaab, Maddux, & Sinaceur, 2011). Studies in chapters 2 through to 5 have grappled with disentangling these two interpretations. The present findings provide support for the 'relational context interpretation' by demonstrating that LSM reflected changes in trust throughout the group's *entire* life cycle, regardless of temporal position. Hence, it is argued that LSM, crucially in relational focused interactions, is a reliable and relevant trust signal irrespective of temporal position in the group's life cycles.

There was evidence to suggest that the trust disruption had the negative effect on trust predicted, as revealed by a decrease in LSM in the immediate and short term post disruption phases. It is interesting that trust was *lowest* in the short-term post disruption phase, rather than the *immediate* post disruption phase. However, graphing the results indicated that LSM progressively decline from disruption phase; to immediate post disruption phase; to short-term post disruption phase, as opposed to an abrupt shift in trust. Relevant to this finding is McKnight, Cummings and Chervany's (1998) distinction between fragile and robust trust. The authors stated that interactional history accumulates over time, along with information about individuals, which is transmitted to other people, and which builds individual's reputations. Until this point, trust might be described as fragile, however if the process is allowed to occur, the authors claim it is harder for a negative event to significantly reduce a high level of trust. Group members in the present study had a long interactional history (more than 12 months), which might have created a level of robustness, which prevented an abrupt decline in trust. The lifespan of an online group prior to a trust disruption is likely an important characteristic when considering how trust declines

following disruption. Future research could utilize language analysis to study this further.

The present results suggested that the level of trust in the long-term repaired state was equal to or greater than 'pristine' trust, i.e. greater than the level of trust prior to any disruption. Dirks et al. (2009) and Kramer and Lewicki's (2010) had proposed the possibility of such an effect previously. This suggested that for online groups, following a trust disruption, only a greater level of trust 'will do' if the group is to survive a disruption. This might be especially true of criminal groups, where trust has been said to be more critical to the survival of online groups than none criminal online groups (Von Lampe & Johansen, 2004).

There was support for the role of language style repairing trust; specifically, that an increase in LSM may have facilitated trust repair. Whilst Tomlinson and Mayer (2009) proposed that language styles, such as anger and fear, could have a negative effect on trust repair, the present findings were novel in demonstrating, positively, that a language style such as high LSM can facilitate trust repair.

The exact mechanism by which LSM acts to repair trust can be speculated upon. In line with the role of LSM in the relevant and reliable language theory; LSM, in a relational phase, communicates engagement in the relational needs of the group. Following a disruption to trust, Heider (1958) and Gillespie and Dietz (2009) stated that 'renewed commitment' to the group was the crucial group need for trust to be repaired. Hence, LSM might repair trust via communicating engagement in the activity of renewing group member's commitment to the group.

It has been difficult to disentangle the direction of effects between trust and language in previous studies. This was less of a limitation in the present study because the research aimed to demonstrate how language can be a useful measure for changes

in trust; regardless of whether varying levels of trust *caused changes in language*, or varying language *caused changes in trust*. Nevertheless, the various findings from the present study arguably supported each possible direction of effects. Specifically, the drop in trust following a disruption suggested that the disruption to trust caused changes in language (LSM). On the other hand, increased LSM over the long term following the disruption suggested that language might have *caused* a workable level of trust for the group to continue to exist. Thus, the findings add further evidence to the role of language as a cause and consequence of online group trust.

6.9.1. Applications and implications

The findings suggest applications for how to measure trust and how to disrupt trust in online groups. Automated text analysis is proposed as a remote way to measure trust in online groups. This is useful for scenarios where a measure of trust is important but must remain covert, as direct measures of trust (i.e. psychometric and behavioural trust measures) become unavailable. The only previous language measure of trust, proposed as a possible remote measure, utilized time consuming qualitative methods using human observers to rate 'positive emotion' (Crisp & Jarvenpaa, 2013). Hence, the present measure builds on past attempts by increasing efficiency, as well as accuracy; given that the automated measure doesn't rely on human judgments, which are liable to produce errors.

The present findings also inform the issue of how law enforcements should effectively disrupt criminal online groups. The present strategy, by UK police, was to undermine trust via implicating the existence of covert, malicious agents; as well as implicating the insecurity of personal information. According to the present findings, the success of this strategy, as measured by disruption to group trust, was mixed. The results would suggest that such a method is useful to undermine trust in the short

term, but in the long term might in fact make the group's level of trust greater, and therefore more resilient to further disruptions. The present research would suggest that determining the aims of disruption, i.e. to disrupt trust in the short or long term, is therefore crucial, before initiating disruptive efforts.

6.9.2. Limitations and future research

An alternative interpretation to the present findings with regard to language style facilitating trust repair exists. It is possible that the increase in LSM may have been conflated with the longer-term effect of trust repair following trust disruption. That is to say that, given that the phase defined as the 'trust repair phase' fell on the same phase as the 'long term post disruption phase', it is difficult to disentangle whether what was observed was the long term effects of repaired trust, or the short term process of trust repair itself.

A second limitation of the present study is that the state of trust inferred at each phase was somewhat speculative. The findings infer states of trust given the knowledge regarding the timings of trust disruptions, and 'typical' effects following disruptions. That is to say that, trust is typically lowered, repaired, and stabilized following a disruption (Dirks et al., 2009). This meant that lower trust following the disruption, increased trust via a mechanism of trust repair, and the group establishing a new level of trust in the long term; was never directly measured. The nature of the study, using retrospective data from a criminal VC, meant that a more objective measure of trust, i.e. psychometric or behavioural measures, at each phase was impossible. Implementing such measures in future quasi-field experiments could increase the robustness of the findings.

6.9.3. Conclusion

The present study extended the findings form previous studies in this thesis to measure trust in a real world online group. This is a novel approach to measuring trust and one that appears useful, especially in settings where conventional measures of trust are unsuitable, such as criminal VCs. In line with the theory that language variables that reflect trust are dependent on being relevant and reliable within the context of the interaction, LSM was the critical language variable that appeared to reflect changes in trust. Whilst positive emotion was useless; an important future research question concerns the role of LSM and positive emotion as measures of trust in real world online groups that contain *task* as well as relational orientated interactions. As a measure of trust, with close attention to context, automated text analysis offers a promising tool to assess the impact of law enforcement disruptions.

7. Chapter 7. General Discussion

7.1. Experiment and Theory Summary

This thesis aimed to establish a language measure of trust. The various language behaviours that were thought to relate to trust, with sparse prior research in this area, was vast. Hence, hypotheses were created paying attention to communication and trust research. This process resulted in ideas of how language behaviour might relate to trust with regard to language at the individual word level (positive emotion, negative emotion, personal pronouns, cognitive processes words and perceptual processes words) and interactive level (LSM). In Chapters 2 and 3, these variables were the central language behaviours investigated and related to trust. It was concluded that of the language behaviours studied, positive emotion words only were reliably related to trust. That is to say that, an increase in positive emotion word use related to an increase in trust for both dyads and group online interactions.

In addition to these findings, at this stage, questions regarding the direction of effects between language and trust were beginning to be addressed. This would inform theory of *how* language and trust interact with one another. On the one hand, the dominant theory of interpersonal trust (Mayer et al., 1995) suggested that language causally relates to trust, as discussed in Chapter 1. The theory states that trust is based on trustworthiness perceptions, *first,* which inform beliefs, intentions, and behaviour. Hence, in online contexts, where language is the salient communication channel and there is no prior interactional history, language is the primary means by which trust perceptions are arrived at, and thus causally relate to trust. On the other hand, Pennebaker's (2012) recent research tradition in communication has demonstrated how analyzing language at the individual word level reveals internal states. This perspective spoke to the present research, given that

trust, once gleaned from trustworthiness perceptions, exists as an intention, i.e. an internal state. Hence, it is possible that such an intention might reveal itself in identifiable language styles. Evidence for this view was found in the study in chapter 3, with greater positive emotion word use in those primed to believe their group was high in trustworthiness, as compared to those primed to believe their group was low in trustworthiness. Hence, the first two studies demonstrated how language affects trust, and how trust, at the same time, affects language.

From the studies in Chapters 2 and 3, it was clear that positive emotion would form a part of the trust measure. In addition, LSM was nominated as a variable to continue to investigate, given that the variable had been grounded in a multitude of empirical findings demonstrating its links to behaviours where trust has been shown to be a prerequisite (e.g. peaceful hostage negotiation outcome [Taylor & Thomas, 2008] and online dating success [Ireland et al., 2011]). It was speculated that the limited, task focused, context of interactions in the studies in Chapters 2 and 3 could have moderated the potential positive effects of LSM on trust.

Ireland's (Ireland, 2011; Ireland & Henderson, 2014) social engagement theory, which stated that LSM reflects engagement in the most salient feature of the interaction, offered an explanation as to how context might moderate the relationship between LSM and trust. That is to say that, engagement in an entirely task orientated interaction (Chapters 2 and 3) would not necessarily communicate anything about the relationship itself, and so did not relate to trust in the first two studies. Hence, in Chapter 4, a study tested what the effect of LSM on trust would be if participants were first encouraged to establish a relationship (something which trust is critical to [Mayer et al., 1995]) prior to a task focused interaction. This was an intuitive design given that task *and* relational phases are typical of group phase development anyway

(Poole & Roth, 1989). The design would also facilitate testing the effect of positive emotion on trust in a wider context than just task focused interactions; hence testing the robustness of the previous findings on positive emotion from Chapters 2 and 3.

The results of the study in Chapter 4 found that LSM was significantly related to trust when it occurred in the relational focused phase of the group's life cycle. The initial analysis revealed that positive emotion, counter to previous findings, was not significantly related to trust across *any* phase of the interaction. This led to a post hoc analysis, which tested the effects of positive emotion on trust in task focused phases, for groups who had not experienced high levels of LSM in the relational focused phase. It was found that for such groups, positive emotion was significantly related to trust in the later task phase. Together, the results indicated that groups might form trust based on LSM in a relational phase; however, failing to achieve this, positive emotion might be used to facilitate trust in later, task focused, phases.

The findings led to a theory of language and trust which became the cornerstone of the thesis; this was The Relevant and Reliable Language Theory. The theoretical framework is a collection of three quasi-independent mini-theories, joined by an overarching logic. Firstly, in line with Sperber and Wilson (1986), who state that relevance is central to the processing of *any* communication, the theory proposed that only *relevant* language is used to inform trust decisions. It therefore implies that once a group have already established trust, further language behaviours will not be processed to inform trust decisions. This formed the explanation for why positive emotion in task phases was not related to trust in groups that had already established trust (via LSM) in the relational phase, but did for those groups who had *not* established trust in this phase (Chapter 4), or had not had the opportunity to in the absence of a relational phase (Chapters 2 and 3).

Secondly, Bacharach and Gambetta's (2001) theory of 'reliable' trust signals, which states that trust signals that are most difficult to 'mimic' by 'opportunists' are the ones that people use to make trust judgements, explained why LSM might be chosen *instead of* positive emotion to inform trustworthiness perceptions. This was because the unconscious nature of LSM, might be more difficult to manipulate by opportunists than consciously produced positive emotion words. Thus explaining why, when two signals communicating trust are present (i.e. LSM *and* positive emotion in a relational phase), individuals might use LSM, over positive emotion, to inform trust decisions.

Lastly, Ireland's (Ireland, 2011; Ireland & Henderson, 2014) social engagement theory suggested that LSM would not *always* be considered a trust signal. That is to say that, in instances where LSM reflected engagement in the task, this would not necessarily inform trust judgements, as it communicates little about the individuals relationship to the group, only ones engagement in the task. That is to say that, in such instances LSM might become irrelevant to trust. Thus explaining why LSM was not related to trust in task orientated interactions (Chapters 2,3, 4, and later 5). The Relevant and Reliable Language theory assimilated findings from studies in Chapters 2, 3 and 4; and was tested and supported in Chapters 5 and 6.

In Chapter 5 a single confederate in groups of 4 to 6 people was able to manipulate language such that LSM or positive emotion could be reduced in a specific phase of the group interaction. It was hypothesised that the most disruptive manipulation to trust possible was to disrupt LSM in a relational phase, followed by positive emotion in a task phase, this formed the 'strong disruption' condition. Half the groups in the study were subject to this condition. The other half were subject to a control condition whereby the manipulations were implemented in the reverse order,

i.e. positive emotion was disrupted in the relational phase and LSM was disrupted in the subsequent task phase, this formed the 'weak disruption' condition. The results illustrated that groups in the strong disruption typically displayed less trust behaviour than those in the weak disruption condition. Further analysis supported the role of LSM and positive emotion functioning as the Relevant and Reliable Language Theory would predict to facilitate trust formation in the weak disruption condition. That is to say that, there was evidence to suggest that allowing groups to produce high LSM *in the relational phase*, and high positive emotion *in the task phase* facilitated trust.

The final study in Chapter 6 aimed to examine the link between language and trust in real world online groups. The study analysed transcripts from interactions between group members engaged in a credit card fraud virtual community. Knowledge of a disruption to trust, which was implemented via a police intervention, created a natural experiment. Language behaviours across phases of the group's development in relation to the disruption, when various states of high and low trust could be inferred, were analysed. Task orientated discussions (e.g. concerning credit card fraud tactics) were explicitly prohibited by the forum organisers; hence the group interactions were more relational than task focused. Therefore, in line with our theoretical framework it was predicted that LSM, more so than positive emotion word use, would reflect trust throughout the group's life cycle. The results supported this, finding that LSM, but not positive emotion, ebbed and flowed in line with inferred levels of group trust.

The study in chapter 6 demonstrated the utility of the newly developed language measure of trust. Lower levels of LSM were found in the short term, following disruption. This suggested that the impact of a trust disruption was, as expected, lower trust and that this was reflected in language. It was also found that

LSM, in the long term prior to disruption, was less than the long term following disruptions, suggesting that the long term effects of disruption was *greater trust*. This was interpreted in line with previous authors' ideas (Dirks et al., 2009; Kramer & Lewicki, 2010) who had suggested that a state of repaired trust might be more robust than that required prior to trust disruption. The study demonstrated how the new measure could be used to assess trust in real world online groups. In this case, providing evidence for the success of a police disruption in the short term, as well as its lack of success in the long term, with regard to disrupting trust.

7.2. Implications

It is argued that the most significant implication of the present thesis is the theoretical framework presented to explain the relationship between language and trust online. For this to be a significant implication, the theory must explain trust and language findings better than previous theories. Prior to The Relevant and Reliable Language Theory, no theory adequately explained the array of findings from the present thesis or previous work regarding the interplay between language and trust in online interactions. For example, although not explicitly stated as a theory, Swaab et al.'s (2011) interpretation of the role of language mimicry in trust online was that mimicry *early* in the interaction was the underlying mechanism by which mimicry influenced trust. That is to say that, mimicry early in an interaction has positive effects on trust because it forms a positive early impression in the interaction. However, this was counter to findings in Chapters 2 and 3, which did not find that greater mimicry, LSM in this case, in an interaction prior to a trust decision related to trust. A second interpretation of the relationship between language and trust was proposed by Crisp and Jarvenpaa (2013). Their findings suggested that positive emotion was a universal characteristic of online groups with high trust. However,

such findings did not replicate in groups who existed in various phases of group development (Chapter 4 & 5), or in an entirely relational interaction (Chapter 6). In conclusion, The Relevant and Reliable Language Theory explains the intermittent emergence of positive emotion and mimicry (including LSM) relating to trust in a new framework that is able to encompass a wider array of findings than previous theories.

The direction of effects debate between language and trust has reemerged throughout discussions of findings in this thesis. The language that was transformative in shaping trust (i.e. that which appeared to lead to trust), and that which reflected trust, was investigated throughout the studies in the thesis. It was found that the language that led to trust and the language that reflected trust was on the *same* language behaviours. Studies in Chapters 3 and 6 considered the language that reflects trust. This was done so by considering language in interactions where a high or low level of trust could be estimated, i.e. following a trust prime or disruption to trust respectively. Results showed that in an entirely task interaction, positive emotion was the language behaviour that reflected trust (Chapter 3); and that in an entirely relational interaction, LSM was the language behaviour that reflected trust (Chapter 6). Interestingly, this mapped directly onto the context dependent findings for language that *led to* trust (in Chapters 2,3,4 and 5). That is to say that positive emotion in a task phase (following an absence of trust built on LSM in an earlier relational phase) both led to and reflected trust, whilst LSM in a relational phase also both led to and reflected trust. This implied a common, reciprocal, mechanism to the relationship between language and trust, i.e. a relationship whereby the same language behaviors that facilitate trust, in certain contexts, also reflected trust.

7.3. Applications

Collectively, the studies indicate the best ways in which an investigator might both *measure* trust in an online group and, following from this, *disrupt* trust in an online group. Knowledge of the context dependent roles of LSM and positive emotion in trust formation should allow the investigator to estimate the level of trust amongst an online group. This can be determined by comparing language behaviour relative to another group, i.e. measurements of language behaviour can be used to estimate which groups have established the greater or lesser level of trust. Similarly, levels of trust can be estimated within the same group at different phases of group development, this was most clearly demonstrated in Chapter 6, where trust was measured across phases relative to a disruption.

Specific decision paths can be taken to form such estimates of trust. First, the investigator must determine if the group completed a relational phase prior to a task phase. If so, LSM in this phase should be measured to determine the level of trust. Greater levels of LSM in this phase should be a reliable indicator of greater trust, regardless of language behaviour in subsequent task phases. However, if LSM is relatively low in the relational phase, further measurement of language behaviour in the task phase becomes critical. Here, positive emotion in the task phase should be measured to determine the level of trust.

In the case that the group did not enter a relational phase, prior to task phase (i.e. the group exists exclusively in a relational or task phase) a different decision path will be taken. For those groups in exclusively a relational phase, LSM should be measured to determine the level of trust. For those groups in exclusively a task focused phase, positive emotion should be measured to determine the level of trust. In

all cases, language behaviours are positively related to trust, i.e. the greater the level of language behaviour (LSM or positive emotion) the greater the level of trust.

Parallel decision paths can be taken in order to *disrupt* trust. However, the investigator will be limited by the phase in which he comes into contact with the group. Disruption as early as possible should be implemented, i.e. if access were possible while the group is in an early relational phase, disrupting LSM would be the most effective trust disruption. For groups that persist in a relational phase, LSM should continue to be disrupted. For groups who exist in a task phase, either with prior relational phase or not, positive emotion should be disrupted. However, this might have limited success if the group has already established a high level of trust based on LSM in the relational phase.

7.4. Limitations and future research

The relationship between language and trust has been studied in this thesis largely with regard to how language helps facilitate trust, and which language behaviours reflect trust. However, the relationship between language and trust could also be studied with regard to trust disruption, decline and repair. In Chapter 6, first steps were taken in understanding these relationships by highlighting the role of language in trust decline and repair. However, such phenomena might become the *focus* of future research.

With regard to trust repair, the relationship to language behaviours (specifically, language style as measured by computer text analysis) has largely been ignored. Those studies that have considered language behaviour in trust repair have done so at the level of content, e.g. the effects of apology or denial (see Kim et al. 2013). Future research might consider how language style interacts with language content to affect the success of trust repair. For example, asking questions such as;

does an apology with positive emotion better repair trust than an apology with low positive emotion? This research would be useful to inform best practice in trust repair.

A number of The Relevant and Reliable Language Theory predictions are yet to be tested. For instance, for groups who are entirely task focused over a long period of time, the theory would predict that positive emotion word use, rather than LSM, would relate to trust for the entire interaction. The present research found this in a single interaction, but did not test this over repeat interactions. Also, for groups who enter a task phase prior to a relational phase, the theory would predict the reverse of the effects found in Chapter 4. That is to say that, positive emotion in the task phase would be the predictor of trust, and LSM would become an irrelevant predictor of trust in the latter relational phase, unless trust was not established in the initial task phase. The Relevant and Reliable Language Theory at least offers a framework, with predictions, to explore the relationship between language and trust in various make ups of groups beyond those studied in the present thesis.

The role of context, i.e. phase of group development, is critical to the present measure of trust. However, at present the measure has no way to objectively determine which phase of development a group exists in at a given time. Instead, human judgements are relied upon to determine whether the context would be defined as relational or task. To increase the utility of the measure, computer text analysis could be used to determine when a group is in a relational or task phase. Such a measure could be established by correlating phase of interactions with language behaviours. This addition to the measure could be combined with the present language measure of trust. For instance, LSM could be multiplied by the extent to which a group discussion is relational focused. Similarly, positive emotion scores could be multiplied by the extent to which the group is task focused. This would

mitigate error in the measure owing to *human error* in judging the extent to which a phase of a group's development is task or relational focused.

Finally, a general limitation with regard to experimental design must also be noted. In the studies in Chapters 3 and 5 there was an absence of control conditions. For example, in the study in Chapter 3 a high trust prime condition and a low trust prime condition was induced but no 'no prime' trust condition. The effect of a low trust prime is only explored relative to it's opposite, a high trust prime, and vice versa. Therefore the effect of the prime may have been exaggerated. The additional condition was not included due to limitations on the number of participants available.

Similarly, in the study in Chapter 5, whilst two conditions were induced (strong disruption and weak disruption) there was no 'no disruption' condition. Again, this may have exaggerated the effects, as manipulations were compared to their opposite, rather than a control. As in the study in Chapter 3, the additional condition was not included due to limitations on the number of participants.

7.5. Concluding remarks

A theory of the relationship between language and trust in online interactions has been put forward based on empirical findings from four studies using student participant data, and one study using real world online interactions. The theory is called The Relevant and Reliable Language Theory. The theory rests on the language processes LSM and positive emotion word use, which by paying attention to the phase of group development in which they occur, can be used to measure trust (one of the main aims of the thesis). The theory also informs best practice for *disrupting* trust. The implications for trust theory were discussed. Firstly, it was concluded that relevance, the phase of the interaction that language behaviour occurs, and reliability, the likelihood that language behaviour is genuine and not being faked, are the critical

factors that influence *when* and *how* language behaviour is transformative or reflective in relation to trust. Secondly, the transformative *and* reflective nature of language behaviour to trust was implied via a two-directional relationship, whereby LSM in the relational phase and positive emotion in the task phase *both* reflect and transform trust for group members. Future directions were proposed. Firstly, it was suggested that the measure can be improved by assimilating a language measure of *group phase development* with the measure of trust, as to mitigate the risk of errors due to human judgements. Secondly, the reliability of the measure and theory should be tested on more variations of group dynamics, paying attention to variation in the nature and order of group phase development. Thirdly, application of the measure and theory to trust research beyond trust *formation* could be explored by considering trust repair. The theoretical framework and language measure offered are novel contributions to trust research and provide a foundation to further understand interpersonal trust in online groups.

References

Abrams, L. C., Cross, R., Lesser, E., & Levin, D. Z. (2003). Nurturing interpersonal trust in knowledge- sharing networks. *Academy of Management Executive, 17*(4), 64–77.

Ajzen, I. (1988). *Attitudes, personality, and behavior*. Homewood, IL: Dorsey Press.

Alge, B. J., Wiethoff, C., & Klein, H. J. (2003). When does the medium matter? Knowledge-building experiences and opportunities in decision-making teams. *Organizational Behavior and Human Decision Processes, 91*(1), 26-37.

Anderson, C., & Thompson, L. L. (2004). Affect from the top down: How powerful individuals' positive affect shapes negotiations. *Organizational Behavior and Human Decision Processes*, *95*(2), 125-139.

Argyris, C. (1962). *Interpersonal competence and organizational effectiveness.* Homewood, IL: Dorsey Press.

Arrow, H., Poole, M. S., Henry, K. B., Wheelan, S., & Moreland, R. (2004). Time, change, and development the temporal perspective on groups. *Small group research*, *35*(1), 73-105.

Aubert, B. A., & Kelsey, B. L. (2003). Further understanding of trust and performance in virtual teams. *Small group research*, *34*(5), 575–618.

Axelrod, R. (1984). *The evolution of cooperation*. New York: Basic Books.

Bacharach, M., & Gambetta, D. (2001). Trust in signs. *Trust in society*, *2*, 148-184.

Bales, R. F., & Strodtbeck, F. L. (1951). Phases in group problem solving. *Journal of Abnormal and Social Psychology*, *46*, 485-495.

Barber, B. (1983). *The logic and limits of trust.* New Brunswick, NJ: Rutgers University Press.

Baron, R. A. (1990). Environmentally induced positive affect: Its impact on self-efficacy, task performance, negotiation, and conflict. *Journal of Applied Social Psychology, 20*, 368–384.

Becker, L. C. (1996). Trust as noncognitive security about motives. *Ethics, 107*, 43–61.

Benjamin, V., & Chen, H. (2012). Securing cyberspace: Identifying key actors in hacker communities. In *Intelligence and Security Informatics,* 24-29

Benton, A. A., Gelber, E. R., Kelley, H. H., & Liebling, B. A. (1969). Reactions to various degrees of deceit in a mixed-motive relationship. *Journal of Personality and Social Psychology, 12*(2), 170-179.

Berg, J., Dickhaut, J., & McCabe, K. (1995). Trust, reciprocity, and social history. *Games and economic behavior*, *10*(1), 122-142.

Berry, D. S., Pennebaker, J. W., Mueller, J. S., & Hiller, W. S. (1997). Linguistic bases of social perception. *Personality and Social Psychology Bulletin*, *23*, 526-537.

Bigley, G. A., & Pearce, J. L. (1998). Straining for shared meaning in organization science: Problems of trust and distrust. *Academy of Management Review, 23*(3), 405-421.

Birchmeier, Z., Joinson, A. N., & Dietz-Uhler, B. (2005). Storming and forming a normative response to a deception revealed online. *Social Science Computer Review*, *23*(1), 108-121.

Bond, G. D., & Lee, A. Y. (2005). Language of lies in prison: Linguistic classification of prisoners' truthful and deceptive natural language. *Applied Cognitive Psychology*, *19*(3), 313-329.

Bos, N., Olson, J., Gergle, D., Olson, G., & Wright, Z. (2002). *Effects of four computer-mediated communications channels on trust development.* In Proceedings of the SIGCHI conference on human factors in computing systems,135-140. ACM.

Branigan, H. P., Pickering, M. J., Stewart, A. J., & McLean, J. F. (2000). Syntactic priming in spoken production: Linguistic and temporal interference. *Memory & Cognition, 28,* 1297–1302.

Brennan S.E., Hanna J.E. (2009). Partner-specific adaptation in dialogue. *Topics in Cognitive Science*, *1*, 274–291.

Brett, J. M., & Thomson, L. (2008). *Negotiation, Teamwork and Decision Making Exercises.* Northwestern University, Illinois.

Brewster, T. (2013). *How UK Sleuths Are Threatening Would-Be Cyber Crooks* [web article]. Retrieved from http://www.techweekeurope.co.uk/workspace/uk-police-threatening-cyber-crooks-carders-108180

Brown, P., & Levinson, S. C. (1987). *Politeness: Some universals in language usage* (Vol. 4). Cambridge University Press.

Brülhart, M., & Usunier, J. C. (2012). Does the trust game measure trust? *Economics Letters, 115*(1), 20-23.

Bryant, C. M., & Conger, R. D. (2002). An intergenerational model of romantic relationship development. *Stability and change in relationships*, 57-82.

Butler, J. K. (1991). Toward understanding and measuring conditions of trust: Evolution of a conditions of trust inventory. *Journal of management, 17*(3), 643-663.

Butler, J. R., & Cantrell, R. S. (1984). A behavioral decision theory approach to modeling dyadic trust in superiors and subordinates. *Psychological Reports, 55*(1), 19-28.

Campbell, R. S., & Pennebaker, J. W. (2003). The secret life of pronouns flexibility in writing style and physical health. *Psychological science*, *14*(1), 60-65.

Carnevale, P. J., & Isen, A. M. (1986). The influence of positive affect and visual access on the discovery of integrative solutions in bilateral negotiation. *Organizational Behavior and Human Decision Processes, 37*, 1–13.

Chartrand, T.L & Lakin, J.L (2012). The Antecedents and Consequences of Human Behaviour, *Annual Review of Psychology*, 64, 258- 308.

Chartrand, T. L., & Van Baaren, R. (2009). Human mimicry. *Advances In Experimental Social Psychology*, *41*, 219-274.

Chen, M. G. (2009). Communication, coordination, and camaraderie in World of Warcraft. *Games and Culture, 4*(1), 47-73.

Chung, C. K., & Pennebaker, J. W. (2007). The psychological function of function words. In K. Fiedler (Ed.), *Social communication: Frontiers of social psychology*, 343-359.

Cohn, M. A., Mehl, M. R., & Pennebaker, J. W. (2004). Linguistic markers of psychological change surrounding September 11, 2001. *Psychological Science, 15,* 687-693.

Colquitt, J. A., Scott, B. A., & LePine, J. A. (2007). Trust, trustworthiness, and trust propensity: a meta-analytic test of their unique relationships with risk taking and job performance. *Journal of Applied Psychology*, *92*(4), 909-927.

Conchie, S. M., Taylor, P. J., & Donald, I. J. (2012). Promoting safety voice with safety-specific transformational leadership: the mediating role of two

dimensions of trust. *Journal of Occupational Health Psychology, 17*(1), 105-115.

Cook, J., & Wall, T. (1980). New work attitude measures of trust, organizational commitment and personal need non‐fulfilment. *Journal of Occupational Psychology, 53*(1), 39-52.

Cook, K. S., Levi, M., & Hardin, R. (2009). *Whom can we Trust.* New York: Russell Sage Foundation.

Costa, A. C. (2003). Work team trust and effectiveness. *Personnel Review 32*(5), 605-672.

Costa, P.T., & McCrae, R.R. (1992). *Revised NEO personality inventory and five-factor inventory professional manual*. Odessa, FL: Psychological Assessment Resources.

Coupland, N., & Giles, N. (1998). Introduction: The communicative contexts of accommodation. *Language and Communication, 8*, 175- 182.

Cramton, C. D. (2001). The mutual knowledge problem and its consequences for dispersed collaboration. *Organization Science, 12,* 346–371.

Crisp, C. B., & Jarvenpaa, S. L. (2013). Swift trust in global virtual teams. *Journal of Personnel Psychology*, *12*(1), 45-56.

Cummings, L. L., & Bromiley, P. (1996). The Organizational Trust Inventory (OTI): Development and validation. In R. M. Kramer & T. R. Tyler (Eds.), *Trust in organisations: Frontiers of theory and research*. Thousand Oaks, CA: Sage.

Currall, S. C., & Judge, T. A. (1995). Measuring trust between organizational boundary role persons. *Organizational behavior and Human Decision Processes, 64*(2), 151-170.

Delgado, M. R., Frank, R. H., & Phelps, E. A. (2005). Perceptions of moral character modulate the neural systems of reward during the trust game. *Nature neuroscience, 8*(11), 1611-1618.

Deutsch, M. (1958). Trust and suspicion. Journal of conflict resolution, 265-279.

Dirks, K. T. (1999). The effects of interpersonal trust on work group performance. *Journal of applied psychology*, *84*(3), 445–455.

Dirks, K. T. (2000). Trust in leadership and team performance: Evidence from NCAA basketball. *Journal of Applied Psychology. 85*, 1004-1012

Dirks, K. T., & Ferrin, D. L. (2001). The role of trust in organizational settings. *Organization Science*, *12*(4), 450–467.

Dirks, K. T., & Ferrin, D. L. (2002). Trust in leadership: meta-analytic findings and implications for research and practice. *Journal of Applied Psychology*, *87*(4), 611-628.

Dirks, K. T., Lewicki, R. J., & Zaheer, A. (2009). Reparing relationships within and between organizations: building a conceptual foundation. *Academy of Management Review*, *34*(1), 68-84.

Donohue, W. A., & Druckman, D. (2009). Message framing surrounding the Oslo I Accords. *Journal of Conflict Resolution, 53*(1), 119-145.

Donohue, W. A., Liang, Y., & Druckman, D. (2013). Validating LIWC dictionaries: the Oslo I accords. *Journal of Language and Social Psychology*, *33,* 282 – 301.

Dubrovsky, V. J., Kiesler, S., & Sethna, B. N. (1991). The equalization phenomenon: Status effects in computer-mediated and face-to-face decision-making groups. *Human-Computer Interaction, 6*(2), 119-146.

Erdem, F. (2003). Optimal trust and teamwork: From groupthink to teamthink. *Work Study, 52*(5), 229-233.

Fast, L. A., & Funder, D. C. (2008). Personality as manifest in word use: correlations with self-report, acquaintance report, and behavior. *Journal of personality and social psychology*, *94*(2), 334.

Felps, W., Mitchell, T. R., & Byington, E. (2006). How, when, and why bad apples spoil the barrel: Negative group members and dysfunctional groups. *Research in organizational behavior*, *27*, 175-222.

Fischer, U., McDonnell, L., & Orasanu, J. (2007). Linguistic correlates of team performance: Toward a tool for monitoring team functioning during space missions. *Aviation, space, and environmental medicine*, *78*(Supplement 1), B86-B95.

Fishbein, M., & Ajzen, I. (1977). Attitude-behavior relations: A theoretical analysis and review of empirical research. *Psychological bulletin, 84*(5), 888-918.

Frost, T., Stimpson, D. V., & Maughan, C. (1978). Some correlates of trust. *Journal of Psychology, 99*, 103-08.

Furumo, K., & Pearson, J. M. (2006, January). An empirical investigation of how trust, cohesion, and performance vary in virtual and face-to-face teams. In *System Sciences, 2006. HICSS'06. Proceedings of the 39th Annual Hawaii International Conference* (Vol. 1, pp. 26c-26c). IEEE.

Gabarro, J. (1978). The development of trust, influence, and expectations. In Athos, A. J., & Gabarro, J. *Interpersonal behavior: Communication and understanding in relationships*, 290-303. Englewood Cliffs, NJ: Prentice Hall.

Garrod, S., & Pickering, M. J. (2009). Joint Action, Interactive Alignment and Dialog. *Topics in Cognitive Science, 1*, 292- 304.

Gibson, C. B., & Manuel, J. A. (2003). Building trust: Effective multicultural communication processes in virtual teams. In Gibson, C.B. & Cohen, C.G. (Eds.), *Virtual Teams that Work: Creating Conditions for Virtual Team Effectiveness* (pp. 59–86). San Francisco: Jossey-Bass

Giles, H., & Coupland, N. (1991). *Language: Contexts and consequences*. Keynes, UK: Open University Press.

Giles, H., & Ogay, T. (2006), Communication accommodation theory. In Whalen, B., & Samter, W. (Eds.), *Explaining communication: Contemporary theories and exemplars* (pp. 293-310). Mahwah, NJ: Lawrence Erlbaum.

Gillespie, N. (2003). *Measuring trust in work relationships: The Behavioral Trust Inventory.* Paper presented at the annual meeting of the Academy of Management, Seattle, WA.

Gillespie, N., & Dietz, G. (2009). Trust repair after an organization-level failure. *Academy of Management Review*, *34*(1), 127-145.

Goldberg, L. R. (1999). A broad-bandwidth, public domain, personality inventory measuring the lower-level facets of several five-factor models. *Personality Psychology in Europe*, *7*, 7-28.

Gonzales, A. L., Hancock, J. T., & Pennebaker, J. W. (2010). Language style matching as a predictor of social dynamics in small groups. *Communication Research, 31*, 3-19.

Granovetter, M. (1985). Economic action and social structure: the problem of embeddedness. *American journal of sociology, 91,* 481-510.

Halford, G. S., Baker, R., McCredden, J. E., & Bain, J. D. (2005). How many variables can humans process? *Psychological Science*, *16*, 70-76.

Hancock, J. T., & Dunham, P. J. (2001). Impression Formation in Computer-Mediated Communication Revisited An Analysis of the Breadth and Intensity of Impressions. *Communication research, 28*(3), 325-347.

Hancock, J. T., Curry, L. E., Goorha, S., & Woodworth, M. (2007). On lying and being lied to: A linguistic analysis of deception in computer-mediated communication. *Discourse Processes*, *45*(1), 1-23.

Hancock, J. T., Gee, K., Ciaccio, K., & Lin, J. M. H. (2008, November). *I'm sad you're sad: emotional contagion in CMC.* In Proceedings of the 2008 ACM conference on Computer supported cooperative work, 295-298.

Heider, F. (1958). *The psychology of interpersonal relations.* New York: Wiley.

Henderson, S., & Gilding, M. (2004). 'I've Never Clicked this Much with Anyone in My Life': Trust and Hyperpersonal Communication in Online Friendships. *New Media & Society, 6*(4), 487-506.

Herring, S. (1996). Linguistic and critical analysis of computer-mediated communication: Some ethical and scholarly considerations. *Information Society, 12,* 153-168.

Hirokawa, R. Y. (1990). The role of communication in group decision-making efficacy: A task-contingency perspective. *Small Group Research*, *21*, 190-204.

Holmes, J. G. (1991). Trust and the appraisal process in close relationships. In Jones, W. H., & Perlman, D. (1991). *Advances in personal relationships: A research annual, Vol. 2. Advances in personal relationships.* 57-104. Oxford, England: Jessica Kingsley Publishers

Holtz, P., Kronberger, N., & Wagner, W. (2012). Analyzing internet forums: A practical guide. *Journal of Media Psychology, 24*(2), 55-66

Hosmer, L. T. (1995). Trust: The connecting link between organizational theory and philosophical ethics. *Academy of management Review, 20*(2), 379-403.

Huffaker, D. A. (2011). The impact of group attributes on communication activity and shared language in online communities. *First Monday*, *16*, 4-4.

Hung, Y. T. C., Dennis, A. R., & Robert, L. (2004). Trust in virtual teams: Towards an integrative model of trust formation. In *System Sciences, 2004. Proceedings of the 37th Annual Hawaii International Conference on* (pp. 11-pp). IEEE.

Iacono, C. S., & Weisband, S. (1997). *Developing trust in virtual teams.* In System Sciences, Proceedings of the Thirtieth Hawaii International Conference, 412-420. IEEE.

Ireland, M. E. (2011). *Three explanations for the link between language style matching and liking* (Doctoral dissertation).

Ireland, M. E., & Henderson, M. D. (2014). Language style matching, engagement, and impasse in negotiations. *Negotiation and conflict management research*, *7*(1), 1-16.

Ireland, M. E., & Pennebaker, J. W. (2010). Language style matching in writing: Synchrony in essays, correspondence, and poetry. *Journal of Personality and Social Psychology, 99*, 549–571.

Ireland, M. E., Slatcher, R. B., Eastwick, P. W., Scissors, L. E., Finkel, E. J., & Pennebaker, J. W. (2011). Language style matching predicts relationship initiation and stability. *Psychological Science, 22,* 39–44.

Jarvenpaa, S. L., Knoll, K., & Leidner, D. (1998). Is anybody out there? The implications of trust in global virtual teams. *Journal of Management Information Systems, 14*, 29–64.

Jarvenpaa, S. L., Shaw, T. R., & Staples, D. S. (2004). Toward contextualized theories of trust: The role of trust in global virtual teams. *Information systems research*, *15*(3), 250-267.

Jarvenpaa, S.L., & Leidner, D.E., (1999). Communication and trust in global virtual teams. *Organization Science 10*, 791–815.

Joinson, A. N., & Dietz-Uhler, B. (2002). Explanations for the perpetration of and reactions to deception in a virtual community. *Social Science Computer Review*, *20*(3), 275-289.

Jones, A. P., James, L. R., & Bruni, J. R. (1975). Perceived leadership behavior and employee confidence in the leader as moderated by job involvement. *Journal of Applied Psychology, 60*(1), 146-149.

Jones, S., Cotterill, R., Dewdney, N., Muir, K., & Joinson, A. (2014). Finding Zelig in text: a measure for normalizing linguistic accommodation. In: *Proceedings of the 25th. International Conference on Computational Linguistics*. 455–465.

Junghaenel, D. U., Smyth, J. M., & Santner, L. (2008). Linguistic dimensions of psychopathology: A quantitative analysis. *Journal of Social and Clinical Psychology*, *27*(1), 36-55.

Kanfer, R. (1990). Motivation theory and industrial/organizational psychology. In Dunnette, M. D., & Hough, L. M. (1991). *Handbook of industrial and organizational psychology, Vol. 2*. Consulting Psychologists Press.

Kee, H. W., & Knox, R. E. (1970). Conceptual and methodological considerations in the study of trust and suspicion. *Journal of Conflict Resolution*, *14,* 357-366.

Kichuk, S. L., & Wiesner, H. H. (1997). The big five personality factors and team performance: implications for selecting successful product design teams. *Journal of Engineering and Technology Management, 14* (3), 195-221

Kiesler, S., Siegel, J., & McGuire, T. W. (1984). Social psychological aspects of computer-mediated communication. *American psychologist*, *39*(10), 1123–1134.

Kiesler, S., Zubrow, D., Moses, A. M., & Geller, V. (1985). Affect in computer-mediated communication: An experiment in synchronous terminal-to-terminal discussion. *Human-Computer Interaction, 1*(1), 77-104.

Kiffin-Petersen, S. (2004). Trust: A neglected variable in team effectiveness research. *Journal of Management & Organization*, *10*(1), 38–53.

Kim, P. H., Cooper, C. D., Dirks, K. T., & Ferrin, D. L. (2013). Repairing trust with individuals vs. groups. *Organizational Behavior and Human Decision Processes*, *12*(1), 1-14.

Kim, P. H., Dirks, K. T., & Cooper, C. D. (2009). The repair of trust: A dynamic bilateral perspective and multilevel conceptualization. *Academy of Management Review*, *34*(3), 401-422.

Kim, P. H., Dirks, K. T., Cooper, C. D., & Ferrin, D. L. (2006). When more blame is better than less: The implications of internal vs. external attributions for the repair of trust after a competence- vs. integrity-based trust violation. *Organizational Behavior and Human Decision Processes, 99*, 49–65.

Kim, P. H., Ferrin, D. L., Cooper, C. D., & Dirks, K. T. (2004). Removing the shadow of suspicion: The effects of apology vs. denial for repairing ability- vs. integrity- based trust violations. *Journal of Applied Psychology, 89*, 104–118.

King-Casas, B., Tomlin, D., Anen, C., Camerer, C. F., Quartz, S. R., & Montague, P. R. (2005). Getting to know you: reputation and trust in a two-person economic exchange. *Science*, *308*, 78–83.

King, S.A. (1996). Researching Internet communities: Proposed ethical guidelines for the reporting of results. *The Information Society, 12,* 119-128.

Klimoski, R. J., & Karol, B. L. (1976). The impact of trust on creative problem solving groups. *Journal of Applied Psychology, 61*(5), 630-633.

Knoll, D. L., & Gill, H. (2011). Antecedents of trust in supervisors, subordinates, and peers. *Journal of Managerial Psychology, 26*(4), 313-330.

Kramer, A. D. (2012, May). *The spread of emotion via facebook*. In Proceedings of the SIGCHI Conference on Human Factors in Computing Systems, 767-770.

Kramer, R. M. (1999). Trust and distrust in organizations: Emerging perspectives, enduring questions. *Annual review of psychology, 50*(1), 569-598.

Kramer, R. M., & Lewicki, R. J. (2010). Repairing and enhancing trust: Approaches to reducing organizational trust deficits. *The Academy of Management Annals*, *4*(1), 245-277.

Kramer, R. M., Newton, E., & Pommerenke, P. L. (1993). Self- enhancement biases and negotiator judgment: Effects of self-esteem and mood. *Organizational Behavior and Human Decision Processes, 56*, 110–133.

Lakin J.L., Chartrand T.L., & Arkin R.M. (2008). I am too just like you: Nonconscious mimicry as an automatic behavioral response to social exclusion. *Psychological Science*, *19*, 816–822.

Lakin J. L., Chartrand T. L. (2013). *The Oxford Handbook of Social Exclusion*. New York, NY: Oxford University Press.

Lakin, J. L., Jefferis, V. E., Cheng, C. M., & Chartrand, T. L. (2003). The chameleon effect as social glue: Evidence for the evolutionary significance of nonconscious mimicry. *Journal of nonverbal behavior*, 27(3), 145-162.

Langer, E., Blank, A., & Chanowitz, B. (1978). The mindlessness of ostensibly thoughtful action: The role of "placebic" information in interpersonal interaction. *Journal of personality and social psychology*, 36(6), 635-642.

Lawler, E. (1992). *The ultimate advantage: Creating the high involvement organization*. San Francisco: Jossey-Bass.

Lee, M. K., & Turban, E. (2001). A trust model for consumer internet shopping. *International Journal of electronic commerce, 6*, 75-92.

Lewick, R. J., & Bunker, B. B. (1996). Developing and maintaining trust in work relationships. In *Trust in Organizations: Frontiers of Theory and Reach*, 114-39. Thousand Oaks, CA: Sage.

Lewicki, R. J., McAllister, D. J., & Bies, R. J. (1998). Trust and distrust: New relationships and realities. *Academy of management Review, 23*(3), 438-458.

Lewicki, R. J., Tomlinson, E. C., & Gillespie, N. (2006). Models of interpersonal trust development: Theoretical approaches, empirical evidence, and future directions. *Journal of management*, *32*(6), 991-1022.

Lewis, J. D., & Weigert, A. (1985). Trust as a social reality. *Social forces, 63*(4), 967-985.

Lewis, J. D., & Weigert, A. J. (2012). The Social Dynamics of Trust: Theoretical and Empirical Research, 1985-2012. *Social forces, 91*(1), 25-31.

Lieberman, J. K. (1981). *The Litigious Society*. New York: Basic Books.

Likert, R. (1967). *The human organization: Its management and value*. New York: McGraw-Hill.

Lind, E. A. (2001). Fairness heuristic theory: Justice judgments as pivotal cognitions in organizational relations. In J. Greenberg & R. Cropanzano (Eds.), *Advances in organizational justice* (pp. 56–88). Stanford, CA: Stanford University Press.

McIntosh, D. N. (2006). Spontaneous facial mimicry, liking and emotional contagion. *Polish Psychological Bulletin*, 37(1), 31.

Maddux, W.W., Mullen, E., & Galinsky, A.D. (2008). Chameleons bake bigger pies and take bigger pieces: Strategic behavioural mimicry facilitates negotiation outcomes. *Journal of Experimental Social Psychology, 44*, 461- 468.

Magezi, D. A. (2015). Linear mixed-effects models for within-participant psychology experiments: an introductory tutorial and free, graphical user interface (LMMgui). *Frontiers in psychology*, *6*, 2.

Mann, R., Gibbard, G., & Hartman, J. (1967). *Interpersonal style and group development*. New York: John Wiley & Sons.

Manz, C. C., Neck, C. P., Mancuso, J., & Manz, K. P. (1997). *For team members only: Making your workplace team productive and hassle-free*. American Management Association.

Masip, J., Sporer, S., Garrido, E., & Herrero, C. (2005). The detection of deception with the reality monitoring approach: A review of the empirical evidence. *Psychology, Crime & Law, 11,* 99–122. doi:10.1080/10683160410001726356

Mayer, J., & Mussweiler, T. (2011). Suspicious spirits, flexible minds: when distrust enhances creativity. *Journal of personality and social psychology*, *101*(6), 1262–1277.

Mayer, R. C., & Davis, J. H. (1999). The effect of the performance appraisal system on trust for management: A field quasi-experiment. *Journal of Applied Psychology*, *84*, 123-136.

Mayer, R. C., Davis, J. H., & Schoorman, F. D. (1995). An integrative model of organizational trust. *Academy of management review*, *20*(3), 709-734.

Maxwell, S. E., & Delaney, H. D. (2004). *Designing experiments and analyzing data: A model comparison perspective* (Vol. 1). Psychology Press.

McAllister, D. J. (1995). Affect-and cognition-based trust as foundations for interpersonal cooperation in organizations. *Academy of management journal*, *38*(1), 24-59.

McCarter, M.W., & Sheremeta R,M. (2013). You Can't Put Old Wine in New Bottles: The Effect of Newcomers on Coordination in Groups. *PLoS ONE 8*(1): e55058. doi:10.1371/journal.pone.0055058

McCarthy, B., Hagan, J., & Cohen, L. E. (1998). Uncertainty, cooperation, and crime: Understanding the decision to co-offend. *Social Forces*, *77*(1), 155-184.

McEvily, B., & Tortoriello, M. (2011). Measuring trust in organisational research: Review and recommendations. *Journal of Trust Research*, *1*(1), 23-63.

McFall, L. (1987). Integrity. *Ethics, 98*, 5-20.

McGregor, D. (1967). *The professional manager*. New York: McGraw-Hill.

McKnight, D. H., Cummings, L. L., & Chervany, N. L. (1998). Initial trust formation in new organizational relationships. *Academy of Management review*, *23,* 473-490.

McKnight, D. H., & Chervany, N. L. (2001). Trust and distrust definitions: One bite at a time. In *Trust in Cyber-societies* (pp. 27-54). Springer Berlin Heidelberg.

McLain, D. L., & Hackman, K. (1999). Trust, risk, and decision-making in organizational change. *Public Administration Quarterly*, 152-176.

Meyerson, D., Weick, K.E., and Kramer, R.M. (1996). "Swift Trust and Temporary Groups". In R. M. Kramer & T. R. Tyler (Eds.), *Trust in organizations: Frontiers of theory and research*, 90–113. Thousand Oaks, CA: Sage.

Mitchell, A., & Zigurs, I. (2009). Trust in virtual teams: solved or still a mystery? *ACM SIGMIS Database*, *40*(3), 61-83.

Moore, D. A., Kurtzberg, T. R., Thompson, L. L., & Morris, M. W. (1999). Long and short routes to success in electronically mediated negotiations: Group affiliations and good vibrations. *Organizational Behavior & Human Decision Processess, 77*, 22–43.

Moorman, R. H., & Grover, S. (2009). Why does leader integrity matter to followers? An uncertainty management-based explanation. *International Journal of Leadership Studies*, *5*(2), 102-114.

Mullen, B., & Copper, C. (1994). The relation between group cohesiveness and performance: An integration. *Psychological bulletin*, *115*(2), 210–227.

Murray, S. L., & Holmes, J. G. (1994). Storytelling in close relationships: The construction of confidence. *Personality and Social Psychology Bulletin, 20*(6), 650-663.

Nelson, K. M., & Cooprider, J. G. (1996). The contribution of shared knowledge to IS group performance. *Management Information Systems Quarterly, 20*, 409-432.

Niederhoffer, K.G., & Pennebaker, J.W. (2002). Linguistic style matching in social interaction. *Journal of Language and Social Psychology*, *21*, 337–360.

Nimon, K. F. (2012). Statistical assumptions of substantive analyses across the general linear model: a mini-review. *Frontiers in psychology*, *3*, 322.

Orlitzky, M., & Hirokawa, R. Y. (2001). To err is human, to correct for it divine: A meta-analysis of research testing the functional theory of group decision-making effectiveness. *Small Group Research*, *32*, 313-341.

Parks, C. D., Henager, R. F., & Scamahorn, S. D. (1996). Trust and reactions to messages of intent in social dilemmas. *Journal of Conflict Resolution, 40*, 134–151

Pennebaker, J. W. (2012). *The Secret Life of Pronouns: What Our Words Say About Us*. New York, NY: Bloomsbury Press.

Pennebaker, J. W., & King, L. A. (1999). Linguistic styles: Language use as an individual difference. *Journal of Personality and Social Psychology*, *77*(6), 1296-1312.

Pennebaker, J. W., Booth, R. J., & Francis, M. E. (2007). Linguistic inquiry and word count (LIWC2007): A computer-based text analysis program [computer software]. Austin, TX: LIWC, Inc.

Pennebaker, J. W., Mehl, M. R., & Niederhoffer, K. G. (2003). Psychological aspects of natural language use: Our words, our selves. *Annual Review of Psychology*, *54*(1), 547-577.

Peretti, K. K. (2008). Data breaches: what the underground world of carding reveals. *Santa Clara Computer & High Tech. LJ*, *25*, 375.

Perrow, C., Wilensky, H. L., & Reiss, A. J. (1986). *Complex organizations: A critical essay (Vol. 3)*. New York: McGraw-Hill.

Peters, R. G., Covello, V. T., & McCallum, D. B. (1997). The determinants of trust and credibility in environmental risk communication: An empirical study. *Risk analysis, 17*(1), 43-54.

Pickering M.J., Garrod S. (2004). Toward a mechanistic psychology of dialogue. *Behavioral and Brain Sciences*, *27*, 169–225.

Poole, M. S. (1981). Decision development in small groups I: A comparison of two models. *Communications Monographs*, *48*(1), 1-24.

Poole, M. S., & Roth, J. (1989). Decision development in small groups IV: A typology of decision paths. *Human Communication Research*, *15*, 323-356.

Poon, J. M. (2013). Effects of benevolence, integrity, and ability on trust-in-supervisor. *Employee Relations*, *35*(4), 396-407.

Preece, J., & Maloney-Krichmar, D. (2003). Online communities. In J. Jacko & A. Sears (Eds.), *Handbook of human-computer interaction* (596–620). Mahweh, NJ: Lawrence Erlbaum.

Rempel, J. K., Holmes, J. G., & Zanna, M. P. (1985). Trust in close relationships. *Journal of personality and social psychology*, *49*(1), 95.

Richardson, B. E. (2013). *The cooperation link: Power and context moderate language matching* (Doctoral dissertation).

Richardson, B. H., Taylor, P. J., Snook, B., Conchie, S. M., & Bennell, C. (2014). Language style matching and police interrogation outcomes. *Law and human behavior*, *38*(4), 357-366.

Ridings, C. M., Gefen, D., & Arinze, B. (2002). Some antecedents and effects of trust in virtual communities. *The Journal of Strategic Information Systems*, *11*(3), 271-295.

Riegelsberger, J., Sasse, M. A., & McCarthy, J. D. (2003). The researcher's dilemma: evaluating trust in computer-mediated communication. *International Journal of Human-Computer Studies, 58*(6), 759-781.

Riegelsberger, J., Sasse, M. A., & McCarthy, J. D. (2005). The mechanics of trust: a framework for research and design. *International Journal of Human-Computer Studies, 62*(3), 381-422.

Robert, L. P., Denis, A. R., & Hung, Y. T. C. (2009). Individual swift trust and knowledge-based trust in face-to-face and virtual team members. *Journal of Management Information Systems, 26*(2), 241-279.

Roberts, K. H., & O'Reilly, C. A. (1974). Failures in upward communication in organizations: Three possible culprits. *Academy of Management Journal, 17*(2), 205-215.

Rochon, E., Saffran, E. M., Berndt, R. S., & Schwartz, M. F. (2000). Quantitative analysis of aphasic sentence production: Further development and new data. *Brain and Language*, *72*(3), 193-218.

Rotter, J. B. (1971). Generalized expectancies for interpersonal trust. *American psychologist, 26*(5), 443-452.

Rotter, J. B. (1980). Interpersonal trust, trustworthiness, and gullibility. *American Psychologist*, *35*(1), 1-7.

Rousseau, D. M., Sitkin, S. B., Burt, R. S., & Camerer, C. (1998). Not so different after all: A cross-discipline view of trust. *Academy of management review, 23*(3), 393-404.

Rude, S., Gortner, E. M., & Pennebaker, J. (2004). Language use of depressed and depression-vulnerable college students. *Cognition & Emotion*, *18*(8), 1121-1133.

Rusman, E., Van Bruggen, J., Sloep, P., Valcke, M., & Koper, R. (2010). The Mind's Eye on Personal Profiles: How to Inform Initial Trustworthiness Assessments in Virtual Project Teams. *Collaboration and Technology, 16,* 297-304.

Schweitzer, M. E., Hershey, J. C., & Bradlow, E. T. (2006). Promises and lies: Restoring violated trust. *Organizational Behavior and Human Decision Processes, 101*(1), 1–19.

Scissors, L. E., Gill, A. J., Geraghty, K., & Gergle, D. (2009, April). *In CMC we trust: the role of similarity*. In Proceedings of the SIGCHI Conference on Human Factors in Computing Systems, 527-536. ACM.

Sheppard, B. H., & Sherman, D. M. (1998). The grammars of trust: A model and general implications. *Academy of Management Review, 23*, 422–437.

Siegel, J., Dubrovsky, V., Kiesler, S., & McGuire, T. W. (1986). Group processes in computer-mediated communication. *Organizational behavior and human decision processes, 37*(2), 157-187.

Sitkin, S. B., & Roth, N. L. (1993). Explaining the limited effectiveness of legalistic "remedies" for trust/distrust. *Organization science, 4*(3), 367-392.

Skovolt, K. (2009, January). *Leadership communication in a virtual team.* In System Sciences, 2009. HICSS'09. 42nd Hawaii International Conference (pp. 1-12). IEEE.

Smith, J. B., & Barclay, D. W. (1997). The effects of organizational differences and trust on the effectiveness of selling partner relationships. *The Journal of Marketing, 1,* 3-21.

Sperber, D., & Wilson, D. (1986). *Relevance: Communication and Cognition.* Cambridge, Mass.: Harvard University Press.

Stasser, G., & Stewart, D. (1992). Discovery of hidden profiles by decision-making groups: Solving a problem versus making a judgment. *Journal of Personality and Social Psychology*, *63*(3), 426-434

Straus, S. G. (1997). Technology, group process, and group outcomes: Testing the connections in computer-mediated and face-to-face groups. *Human-computer interaction, 12*(3), 227-266.

Swaab, R. I., Kern, M. C., Diermeier, D., & Medvec, V. (2009). Who says what to whom? The impact of communication setting and channel on exclusion from multiparty negotiation agreements. *Social Cognition*, *27*(3), 385-401.

Swaab, R. I., Maddux, W. W., & Sinaceur, M. (2011). Early words that work: When and how virtual linguistic mimicry facilitates negotiation outcomes. *Journal of Experimental Social Psychology*, *47*(3), 616-621.

Tausczik, Y. R., & Pennebaker, J. W. (2010). The psychological meaning of words: LIWC and computerized text analysis methods. *Journal of Language and Social Psychology*, 29(1), 24-54.

Tausczik, Y. R., & Pennebaker, J. W. (2013, April). *Improving teamwork using real-time language feedback.* In Proceedings of the SIGCHI Conference on Human Factors in Computing Systems. 459-468

Taylor, P. J., & Thomas, S. (2008). Linguistic style matching and negotiation outcome. *Negotiation and Conflict Management Research*, *1*(3), 263-281.

Taylor, P. J., Dando, C. J., Ormerod, T. C., Ball, L. J., Jenkins, M. C., Sandham, A., & Menacere, T. (2013). Detecting insider threats through language change. *Law and human behavior*, *37*(4), 267.

ten Brinke, L., & Porter, S. (2012). Cry me a river: Identifying behavioural consequences of extremely high-stakes interpersonal deception. *Law and Human Behavior, 36,* 469–477. doi:10.1037/h0093929

Tomlinson, E. C., & Mryer, R. C. (2009). The role of causal attribution dimensions in trust repair. *Academy of Management Review*, *34*(1), 85-104.

Tuckman, B. W. (1965). Developmental sequence in small groups. *Psychological Bulletin*, *63*, 384-399.

Van Baaren, R. B., Holland, R. W., Steenaert, B., & van Knippenberg, A. (2003). Mimicry for money: Behavioral consequences of imitation. *Journal of Experimental Social Psychology, 39*, 393-398.

Van Swol, L. M. (2003). The effects of nonverbal mirroring on perceived persuasiveness, agreement with an imitator, and reciprocity in a group discussion. *Communication Research, 30*, 461-480.

Van Swol, L. M., Braun, M. T., & Kolb, M. R. (2013). Deception, Detection, Demeanor, and Truth Bias in Face-to-Face and Computer-Mediated Communication. *Communication Research*, *39***,** 267–275.

Von Lampe, K., & Ole Johansen, P. (2004). Organized Crime and Trust: On the conceptualization and empirical relevance of trust in the context of criminal networks. *Global Crime*, *6*(2), 159-184.

Walther, J. B. (1992). Interpersonal eVects in computer-mediated inter- action: A relational perspective. *Communication Research, 19*, 52– 90.

Walther, J. B. (1996). Computer-mediated communication impersonal, interpersonal, and hyperpersonal interaction. *Communication research, 23*(1), 3-43.

Walther, J. B., & Bunz, U. (2005). The rules of virtual groups: Trust, liking, and performance in computer-mediated communication. *Journal of Communication*, *55*(4), 828–846.

Walther, J. B., Bunz, U., & Bazarova, N. N. (2005). The rules of virtual groups. In *System Sciences, 2005. HICSS'05. Proceedings of the 38th Annual Hawaii International Conference on*, *51*. IEEE.

Watzlawick, P., Bavelas, J. B., Jackson, D. D., & O'Hanlon, B. (2011). *Pragmatics of human communication: A study of interactional patterns, pathologies and paradoxes*. WW Norton & Company.

Weiner, B. (1986). *An attributional model of motivation and emotion.* New York: Springer-Verlag.

Wilson, J. M., Straus, S. G., & McEvily, B. (2006). All in due time: The development of trust in computer-mediated and face-to-face teams. *Organizational behavior and human decision processes*, *99*(1), 16-33.

Yakovleva, M., Reilly, R. R., & Werko, R. (2010). Why do we trust? Moving beyond individual to dyadic perceptions. *Journal of Applied Psychology*, *95*(1), 79.

Yee, N., Harris, H., Jabon, M., & Bailenson, J. N. (2011). The expression of personality in virtual worlds. *Social Psychological and Personality Science,2*(1), 5-12.

Yin, D., Xue, Z., Hong, L., Davison, B. D., Kontostathis, A., & Edwards, L. (2009). Detection of harassment on web 2.0. *Proceedings of the Content Analysis in the WEB*, *2*, 1-7.

Zand, D. E. (1972). Trust and managerial problem solving. *Administrative Science Quarterly*, *17,* 229-239.