The Social Role of Linguistic Alignment with In-Group and Out-Group Members

Exam No. 1896547

MSc Psycholinguistics

The University of Edinburgh

2010

Abstract

This experiment examined whether the act of copying another person's linguistic choices, or *linguistic alignment*, like the act of copying another person's behaviors, or *non-linguistic mimicry*, functions as a tool for establishing rapport between interlocutors. This was achieved by having participants play a picture describing/matching game in which they could either align or not align with the syntactic structure or lexical term produced by their "partner" (who was in fact a computer simulation) under conditions in which rapport was either desirable- i.e., when their partner was ostensibly an in-group member, or less desirable- i.e., when their partner was ostensibly an out-group member. Additionally, it examined whether the degree to which the social group membership manipulation mediated linguistic alignment depended on whether a syntactic structure/lexical term was highly favored or highly disfavored in comparison to an equally acceptable alternative. Finally, it tested whether social group membership mediation altered according to whether the participants had high or low self-esteem. Participants' patterns of lexical alignment revealed that they did copy lexical terms to a greater extent when interacting with an in-group versus an out-group member, although this tendency did not alter according to whether a lexical term was favored or disfavored, or the participants' self-esteem. Conversely, participants engaged in only marginally different levels of syntactic alignment in the in-group versus the out-group condition overall, and this tendency was not modified by the favored/disfavored status of a syntactic structure. However, participants with high self esteem *did* show a much greater increase in syntactic alignment in the in-group versus the out-group condition than participants with low self-esteem. The implications of these findings with respect to the utility of lexical and syntactic alignment as tools for promoting rapport in accordance with social context demands are discussed.

Mimicry is a ubiquitous characteristic of human interaction. Even people who engage in minimal contact tend to adopt each other's carriage, emotional displays, speech cadences, choice of words, and other behaviors, often reflexively and without realizing that they are doing so. The various manifestations of this phenomenon are typically divided according to whether they do or do not involve language. Here, the term *non-linguistic mimicry* denotes the tendency for people to copy each other's posture, facial expressions, body movements and other non-linguistic actions (Chartrand & Bargh, 1999). Similarly, the term *linguistic alignment* denotes the tendency for interlocutors to copy each others linguistic choices, such as their use of specific lexical terms or syntactic structures (Pickering & Garrod, 2004; Garrod & Pickering, 2004). Both forms of reflexive mimicry qualify as manifestations of the *perception-behavior link*, in which the mere perception of another person's behavior automatically increases the likelihood of performing the same behavior (Dijksterhuis & Bargh, 2001; Garrod & Pickering, 2004). Because perception-behavior link processes require less cognitive effort than those in which behaviors are consciously planned, both researchers who study non-linguistic mimicry and those who study linguistic alignment have concluded that one function of these processes is to conserve cognitive resources. However, despite the obvious parallel between these forms of mimicry, researchers in the two fields have assigned them different roles in the domain of higher-order behavior. Specifically, non-linguistic mimicry is cast as a process that can be augmented or attenuated in order to enhance or reduce rapport between interactants in accordance with social context demands (Lakin & Chartrand, 2003; van Baaren, Holland, Kawakami & van Knippenberg, 2004; Likowski, Muhlberger, Sebt, Pauli & Weyers, 2008; van Baaren, Janssen, Chartrand & Dijksterhuis, 2009). Conversely, linguistic alignment is characterized as automatically promoting mutual understanding between interlocutors in conversation, regardless of the context in which it occurs (Pickering & Garrod, 2004; Garrod & Pickering, 2004; Pickering & Garrod, 2006). The purpose of the present research is therefore to examine whether linguistic alignment is also influenced by factors derived from the social context, by testing whether it is mediated by the interlocutors' social group membership. Such an effect would indicate that an additional function of linguistic alignment is to promote or limit affiliation in social situations where rapport is desirable or undesirable, such as when interacting with a member of one's own versus another social group.

Focus on the social function of non-linguistic mimicry has motivated numerous studies that have established a substantial body of evidence that this process is mediated by factors derived from the social environment in which interaction occurs, such as the interactants' prior social experiences,

attitudes towards each other, and whether they belong to the same or different social groups. The comparative dearth of research that explores whether social factors mediate linguistic alignment constitutes a blindspot in this research that should be remedied for three salient reasons. First, the study of factors that mediate any form of mimicry is critical to our understanding of the perception-behavior link and the circumstances under which it is modified. Second, this blindspot creates a gaping disparity between what we know about linguistic versus non-linguistic mimicry, and thus renders a comprehensive comparison between these behaviors impossible. Finally, any conceptualization of linguistic alignment that does not incorporate social factors may be incomplete because, as a dynamic form of interaction between people, conversation is inherently susceptible to the impact of the social context in which it takes place. The present investigation into the degree to which social group membership mediates linguistic alignment therefore addresses multiple issues that merit attention.

Automaticity and Social Mediation of Non-Linguistic Mimicry

The empirical foundation of the present research comes in part from the progression of studies that first introduced and then reinforced the notion that the social environment influences automatic non-linguistic mimicry. Although earlier conceptualizations of the role of mimicry in social interaction characterized interactants as *purposefully* using this behavior as an affiliative tool, research in the past decade has illuminated the variety of ways in which interactants produce this behavior without awareness or intent in response to social context demands.

One of the first researchers to explore mimicry was Scheflen (1964), who observed that people who interact with each other often adopt the same head and limb configurations. He placed this behavior within a social framework, arguing that this type of mimicry serves as an indicator of shared perspective with its target, and therefore promotes affiliation between people who interact in social groups. The dominant view amongst researchers who built upon Scheflen's (1964) observations in subsequent years was that people *overtly* and *intentionally* use mimicry to affiliate. For instance, Kendon (1970) concluded, following his analysis of the degree to which people match the rhythm of each others body movements, that "Coordination of movement in interaction may thus be of great importance since it provides one of the ways in which two people signal that they are 'open' to one another, and not to others." (p. 124). Bavelas, Black, Lemery and Mullett (1986) espoused a similar interpretation of their finding that participants mimicked the pained facial expression of an experimenter who experienced a simulated injury to a greater extent when the experimenter maintained

eye-contact with the participant versus when he looked away. Specifically, these researchers proposed that the participants engaged in mimicry in order to express sympathy with the experimenter, and accordingly increased their performance of mimicry when the experimenter was able to see it. These and other, similar conceptualizations of mimicry within a social context from this period all characterize this behavior as both conscious and motivated, and hence exclude the possibility that social factors impact mimicry that occurs automatically and outwith the sphere of awareness. Prior to the past decade, discussion of this possibility was largely constrained within the topic of infants' tendency to mimic adults, which was cast as an innate predisposition that facilitates the acquisition of mature social behavior (Malatesta, Grigoryev, Lamb, Albin & Culver, 1986; Moran, Krupka, Tutton & Symons, 1987).

The turning point in this field came with Chartrand and Bargh's (1999) set of experiments. These researchers proposed first that non-linguistic mimicry is a spontaneous, passive response to the perception of another person's behavior. Moreover, although such mimicry can grease the wheels of social interaction, it is not consciously used to achieve this goal. Chartrand and Bargh (1999) tested their first proposal in Experiment 1, during which participants sequentially interacted with two confederates, each of whom performed a different body movement (nose rubbing or foot shaking). Unlike prior studies in which participants conversed with each other in a manner that was comparable to a natural social interaction, this experiment placed participants in a setting that attenuated any goals to socially affiliate. Specifically, confederates' and participants' speech was limited to the description of pictures, and confederates never made eye contact with nor expressed emotion toward the participants. The fact that participants both mimicked the confederates' body movements under these conditions, and professed no awareness that they had done so after the experiment, indicated that this form of mimicry is indeed non-conscious and automatic, and thus a manifestation of the perception-behavior link (Dijksterhuis & Bargh, 2001). In order to then test their proposal that mimicry can promote rapport, these researchers trained the confederates in Experiment 2 to either mirror the participants' movements or to act neutrally. As predicted, participants rated interactions with confederates who mimicked them as having progressed more smoothly, and the confederates themselves as more likeable. These and similar findings (van Baaren, Holland, Steenaert, & van Knippenberg, 2003; Hove & Risen, 2009) provide solid evidence that interactants can perform non-linguistic mimicry in a way that effectively promotes rapport, without even realizing that they are doing so. However, this experiment only examined whether mimicry has social consequences, and not the reverse- whether components of the

social environment influence mimicry. Nevertheless, by attempting to combine automatic non-linguistic mimicry and its social context for the first time within an empirical experiment, these researchers established the foundation for the many subsequent studies that *did* examine this interaction.

To date, researchers have determined that a wide variety of social factors mediate automatic non-linguistic mimicry. Demonstrations of this effect include the reduced degree to which participants in Miles, Griffiths, Richardson and Macrae's (2010) study synchronized their body movements with those of a tardy versus a punctual confederate, and the increased performance of body movement mimicry exhibited by Lakin and Chartrand's (2003) participants who had failed to affiliate with another person during a previous social interaction. However, the most extensively explored mediating factor is the interactants' social group membership.

Yabar, Johnston, Miles and Peace (2006) conducted the first direct investigation of this topic. These researchers initially determined that individuals from the population they studied viewed Christian people as members of a social out-group that was held in relatively low regard. They then found that the degree to which participants mimicked the face-touching behavior exhibited by a confederate when she appeared in clothes and accessories that identified her as Christian was significantly less than to the degree to to which they mimicked the same confederate when her appearance was neutral. Mondillon, Niedenthal, Gil and Droit-Volet (2007) further showed that mimicry is not only attenuated when its target is an out-group member, but also increased when its target is an in-group member. Specifically, the Caucasian participants in their study mimicked the facial expressions of anger depicted in photographs of other Caucasian people to a greater extent than those depicted in photographs of Chinese people. These effects are not limited to conditions in which the social groups studied are deeply personal and salient, such as those that are based on religion or ethnicity. For instance, Bourgeois and Hess (2008) found that their participants exclusively mimicked in-group members using an in-group/out-group division based on whether the participants and targets of mimicry did or did not play basketball. Taken together, these findings indicate that the performance of automatic behavioral mimicry is curtailed during interactions between individuals who belong to different social groups, and increased when the interactants share the same social group identity.

Why should mimicry vary according to its target's group membership? One potential explanation, derived from findings that mimicry is linked with feelings of liking (e.g., Chartrand & Bargh, 1999), is that individuals might mimic in-group members more than out-group members simply because they

view in-group members more positively and, consequently, are more motivated to affiliate with them. Alternately, the relationship between mimicry and rapport described earlier suggests that this behavior pattern might act as a mechanism that serves to safeguard the individual's own affiliative bonds with other in-group members. This possibility is supported by evidence that individuals who are either primed with or personally experience exclusion from a group subsequently exhibit increased levels of mimicry, particularly of in-group and not of out-group targets, presumably in order to repair the social link between themselves and in-group members (Lakin, Chartrand & Arkin, 2008; Over & Carpenter, 2009). Although these alternatives can account for the enhanced levels of mimicry that characterize interactions between in-group members, they do not readily explain circumstances in which an out-group members is mimicked less than group-neutral individual (Yabar et al., 2006) or not at all (Bourgeois & Hess, 2008). The fact that the community Yabar et al. (2006) studied held relatively unfavorable attitudes toward the out-group they used raises the possibility that individuals mimic out-group members to a lesser extent in order to avoid any appearance of association with them that might invite social disapprobation. This idea is harmonious with Neuberg, Smith, Hoffman and Russel's (1994) demonstration that their participants actively distanced themselves from a stigmatized out-group member in order to prevent becoming "tainted" with the same stigma. However, this account is only relevant to conditions in which the out-group is deprecated to some degree, which was not the case in Bourgeois and Hess's (2008) study. A more broadly applicable explanation is that individuals might automatically refrain from mimicking out-group members because, as evidence from several decades of social psychology research has demonstrated, nearly *any* division between groups can directly induce competitive feelings towards out-group members (Tajfel, 1970; Brewer, 1979). Competitiveness in turn decreases mimicry performance, even when non-consciously primed, as shown in Weyers, Muhlberger, Kund, Hess and Pauli's (2009) investigation of facial expression mimicry.

These accounts are not mutually exclusive. Given that a rapidly growing body of findings has revealed that social behavior is underpinned by dynamic and multi-faceted non-conscious processes (Bargh, Chen, & Burrows, 1996; Chen & Bargh, 1997; Bargh, & Chartrand, 1999; Chen & Bargh, 1999), the mechanisms indicated in each of the above accounts may operate singly or combinatorialy in order to moderate mimicry.

Automaticity and Social Mediation of Linguistic Mimicry

Researchers who investigate mimicry during conversation either espouse the view that this phenomenon is the product of an effortful, intentional process, or instead argue that it unfolds automatically as a result of the way in which the systems used for language production and comprehension are organized. Because the term *linguistic alignment* only refers to linguistic mimicry when it is characterized as automatic, this paper uses the terms *linguistic convergence* and *linguistic entrainment* to denote two conceptualizations of linguistic mimicry in its effortful sense. Whereas linguistic convergence and linguistic entrainment theories inherently incorporate social factors, the primary linguistic alignment account (the *Interactive Alignment Account*, or IAA) posits that linguistic mimicry is underpinned by mechanisms that operate independent of such factors. Researchers who study linguistic alignment within the IAA framework have largely focused on examining the nature of its automatic mechanisms, and have only very recently begun to take the first steps toward investigating whether it is subject to the influence of the social environment.

Linguistic convergence is the conceptualization of linguistic mimicry proposed in *Communication Accommodation Theory* (CAT), a sociological account of the causes and effects of communication style adjustments that interactants exhibit in a wide variety of social contexts (Gallois, Ogay & Giles, 2005; Giles & Ogay, 2009). Proponents of CAT argue that linguistic convergence is an *overt* strategy that is used to address either cognitive or social demands. For instance, linguistic convergence addresses cognitive demands for communicative efficiency because speech that contains repeated elements is more simple to understand than speech that is full of novel elements. More pertinent to the focus of this research, linguistic convergence also addresses the social demands of making a positive impression on a fellow interactant by appearing similar and likable to him/her. Furthermore, CAT states that individuals can intentionally avoid mimicry by engaging in *linguistic divergence*, which is used to address different social demands, such as the desire to appear distinctive from and avoid affiliating with out-group members. Linguistic convergence and divergence are also actively interpreted by their recipients, who take the social context in which these behaviors occur into account when determining what they mean and how to feel about them. For instance, when linguistic convergence is exhibited by an in-group member, its recipient should decide that it was intended as a friendly gesture, but when it it is exhibited by an out-group member, its recipient may decide that it was intended as a mockery of the recipient's speech style. Similarly, the recipient of linguistic divergence performed by an in-group member may infer that this mimicry failure is due to situational constraints rather than malevolent

intent, whereas the recipient of linguistic divergence performed by an out-group member may interpret this behavior as intentionally offensive. This account of linguistic mimicry is reminiscent of conceptualizations of non-linguistic mimicry that predominated prior to this past decade, as it casts this process as a behavior that is intentionally performed and consciously interpreted in accordance with attributes of the social context in which it occurs. Consequently, research that uses this account as its theoretical framework does not address social mediation of linguistic mimicry that unfolds automatically and outside the domain of conscious cognition. Moreover, little of this research has examined mimicry of discrete components of language, such as syntax and lexical terms, and instead explored more general constructs, like the use of an interrogative versus a conversational speech style (Linell, 1991). Therefore, the body of evidence produced by this research has not systematically disentangled the impacts of social context on mimicry that occurs on different linguistic levels.

Accounts of linguistic mimicry as linguistic entrainment, conversely, combine the conceptualization of this process as effortful and influenced by social context with an examination of its occurrence on specific linguistic levels. The main proponents of this approach are Brennan, Clark and colleagues (Brennan & Clark, 1996; Metzing & Brennan, 2003; Brennan & Hanna, 2009). At the root of their approach to linguistic mimicry is the concept of *common ground*, which refers to the body of knowledge that interlocutors share (Clark & Murphy, 1982; Wilks-Gibbs & Clark, 1992). These researchers argue that interlocutors consciously create mental models of their common ground, taking into account information from a wide range of sources, *including* social group membership (Clark & Marshall, 1981, Brennan & Hanna, 2009), in order to determine what each person the conversation knows. For instance, an interlocutor might glean that his/her conversation partner is aware of certain political issues on the basis of a badge that the latter is wearing. In order to facilitate successful communication, the interlocutor then produces speech that is intentionally tailored to include material with which both interlocutors are familiar. Linguistic entrainment then occurs via the incorporation of *conceptual pacts* into common ground. A conceptual pact is formed when interlocutors agree to denote a specific concept using a specific referring term. For the most part, interlocutors do not enter into this agreement explicitly; instead, the conceptual pact is implied when interlocutors copy each other's use of specific referring term and concept combinations. For instance, one interlocutor might mimic the other's use of the term "lobby" to refer to the entrance room of a public building, rather than selecting another applicable term such as "foyer" or "entryway" on the basis of personal preference. Although their formation is generally tacit, adherence to conceptual pacts nevertheless represents an intentional

attempt to communicate in a way that all interlocutors will easily understand- hence the effortful nature of linguistic entrainment.

Linguistic entrainment theories therefore posit that both linguistic mimicry and the way in which it is influenced by social group membership are overt, conscious processes that serve to promote mutual understanding in communication. Although, to the best of this researcher's knowledge, the possible interaction between these two processes has not yet been empirically investigated, it is clearly predicted by these theories. For instance, because social groups are often associated with specific knowledge of or attitudes towards specific issues, members of the same social group should be more likely to talk about these issues and refer to them in the same way. As an example, if two casual interlocutors discover that they are both doctors, they should realize that they both possess technical medical knowledge, and thus copy each other's use of terms like "gastroenteritis". Conversely, a doctor and a lay-person might have more difficulty settling on whether to use "gastroenteritis" or "stomach flu". Similarly, two members of a political party might share an opposition to nationalized healthcare, and therefore readily form a conceptual pact in which they refer to a nationalized healthcare bill as "that communist policy", because they are both aware that this is a term that they will mutually understand in the same way. Members of different political parties with divergent views should obviously fail to establish such a conceptual pact.

Unlike linguistic entrainment theories, the IAA does not incorporate any type of social influence or conscious process, but instead identifies its proposed *parity* between language production and comprehension systems as the cause of linguistic mimicry (Pickering & Garrod, 2004). This proposal of parity states that both systems share the same structure, in which various aspects of language such as its syntax, lexical terms, semantics and conceptual meanings are represented in distinct but interconnected levels that are hierarchically organized. The act of comprehending the linguistic items that comprise another interlocutor's speech (e.g., its syntactic structure, its lexical terms and their associated meanings within the conversational context) activates the representations of these items within a listener's language comprehension system. Because language production draws upon a commensurate system, residual activation within these representations then automatically increases the likelihood that the same linguistic items will be used during subsequent speech. This mechanistic, perception-behavior link process manifests as the tendency for interlocutors to copy various aspects of each other's speech that is termed linguistic alignment.

According to the IAA, linguistic alignment also automatically promotes mutual understanding between interlocutors in a way that does not require them to consciously model each other's mental states in order to determine the contents of their common ground. This is achieved via two additional components of the IAA. First, the account proposes that linguistic level representations are linked to a *situation model*, which represents multiple aspects of a discussed subject (such as its temporal, spatial, causal and intentionality dimensions and its main actors) (Zwaan & Radvansky, 1998). Second, alignment on one representational level can *percolate* along links to other levels that, consequently, become aligned as well. Combining these two components yields alignment that percolates to the situation model level, which in turn serves to increase the similarity between each interlocutor's concept of the topic under discussion (Figure 1). The greater degree of shared perspective that this process affords then results in clear and easy communication.
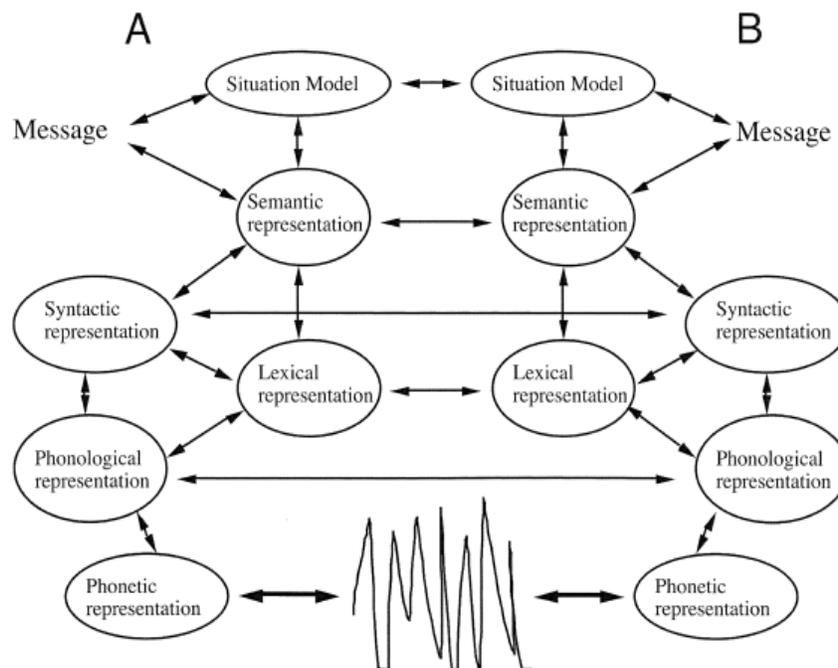

Figure 1. Pickering and Garrod's (2004) schematic diagram of the relationships between the situation models, conceptual message representations, linguistic level representations and utterances (irregular line) of two interlocutors (A and B) engaged in dialogue. Horizontal arrows represent alignment channels; vertical and diagonal arrows represent links between levels through which alignment can percolate.

Because interlocutors do not need to gather any information about each other (such as their social group membership) in order to engage in alignment *and* reap its communicative benefits, the processes described in the IAA can unfold uninfluenced by the social context. Indeed, the majority of studies conducted to test the IAA have employed methodologies that attenuate social context factors, similar to those used in Chartrand and Bargh's (1999) experiments. Specifically, the format of these studies follows the confederate scripting paradigm developed by Branigan, Pickering & Cleland, 2000. In this paradigm, a participant and a confederate (who poses as a participant) play a game in which they take turns to describe pictures and to match their partner's descriptions to other pictures. On critical trials, the pictures for both the confederate and the participant can be described using one of a set of interchangeable linguistic items. For instance, these pictures can depict transitive events that can be described using either an active or a passive syntax structure, or objects for which multiple lexical terms are acceptable. The confederate always produces descriptions before the participant, according to a pre-set script, and alignment is measured as the degree to which the participant copies them in his/her own descriptions.

A large number of studies have demonstrated that alignment assessed in this manner occurs for a variety of linguistic items, across languages spoken by bilingual participants, and in both adults and children (Branigan et al., 2000; Cleland, & Pickering, 2003; Hartsuiker, Pickering & Veltkamp, 2004; Branigan, McLean & Jones, 2005). Moreover, this evidence supports the contention that linguistic mimicry can occur in the form of non-conscious, automatic alignment that is distinct from the processes outlined in linguistic entrainment theories and CAT. For instance, investigations of linguistic entrainment have focused solely on the lexical terms that participants use to describe objects in a way that renders these terms highly salient, and thus subject to conscious processing. Conversely, linguistic alignment studies have also examined syntax structure, the use of which participants are rarely aware (Bock, 1986; Pickering & Branigan, 1999). Moreover, conceptual pacts are presumably formed when interlocutors gradually come to a tacit agreement upon a single set of terms to use for specific referents that they have described repeatedly. However, the linguistic items that the confederate produces in the confederate scripting paradigm change throughout the experimental session, which prevents the interlocutors from settling on any particular items over time. Instead, participants only have the opportunity to mimic a linguistic item that they have comprehended from the confederate's

immediately preceding description. Mimicry that is directly induced by perception in this manner is more felicitously characterized as automatic than as deliberate.

The IAA's conceptualization of linguistic mimicry as resultant from purely automatic, non-conscious mechanisms within the linguistic system itself therefore has ample empirical support. Given that this theory can account for clearly demonstrated behavior on its own, it is perhaps unsurprising that few researchers have attempted to examine whether linguistic alignment is mediated by social factors. However, the fact that non-linguistic mimicry can occur in a similarly automatic and non-conscious manner, but is nevertheless influenced by the social context in which it takes place, suggests that the potential social mediation of linguistic alignment merits investigation. Some recent studies have begun to shed light on this issue, and have yielded valuable findings that have informed the design of the present research. However, these studies are few in number, and most have characteristics that render it difficult to draw concrete conclusions from their findings that can directly address this question.

One potentially relevant line of research (Branigan, Pickering, Pearson, McLean & Nass, 2003; Branigan, Pickering, Pearson, McLean & Nass, 2010; Branigan, Pickering, Pearson, McLean & Brown, 2010) assessed the degree to which participants differentially engage in linguistic alignment depending on whether they believe their interlocutor is a person or a computer. For this purpose, these researchers created a version of the confederate scripting paradigm in which participants played the picture describing/matching game on a computer, and were told that they were interacting with either another person or a computer that was able to parse their descriptions. However, participants in fact interacted with a pre-scripted computer program. If the social context has an impact on linguistic alignment, participants might mimic their "partners" to a greater extent when identified as people versus as computers because, as the non-linguistic studies showed, mimicry serves to promote affiliation, and participants might possess the motivation to affiliate only with other people, as they alone are viewed as social agents. Instead, participants in these studies either exhibited the same degree of mimicry regardless of whether they interacted with a "computer" versus a "person", or mimicked the "computer" more. However, these findings do not in fact counter the proposal that linguistic alignment is mediated by its social context, because a number of studies have yielded evidence that computers are implicitly regarded as social agents, and accordingly treated as though they were people (e.g., Nass, Steuer & Tauber, 1994; Friedman, 1995; Nass, Fogg & Moon, 1996). Because the social context may not therefore differ according to whether the participant believes their interlocutor is a person or a

computer, the evidence yielded from these studies cannot be used to judge whether this context mediates linguistic alignment.

Another study that has bearing on this topic is Branigan, Pickering, McLean and Cleland's (2007) investigation of the impact on syntactic alignment of a participant's role in conversation as either a confederate's direct addressee, or a side-participant who heard the confederate speak to another individual. This study may have measured the impact of a social context factor because these roles might have different social characteristics. For instance, being directly addressed might activate a non-conscious goal to affiliate with the speaker, whereas passively listening to the speaker might not. Given this postulate, the finding that participants exhibited higher levels of syntactic alignment when directly addressed versus when acting as a side-participant indeed indicates that social roles mediate alignment. However, the researchers who conducted this study instead espoused an alternate, purely mechanistic interpretation in which social factors are not incorporated. Specifically, they argued that an individual processes speech that he/she hears when directly addressed more deeply than speech that he/she hears as a side-participant. The individual's linguistic system representations of the items contained within this speech consequently receive more activation during comprehension, and thus influence his/her own subsequent speech to a greater extent. These two accounts can be synthesized by positing that individuals process speech that is addressed to them more deeply due to the aforementioned social affiliation goal that they might possess. Although this perspective allows the outcomes of this study to apparently provide evidence for social mediation of linguistic alignment, no study known to this researcher has assessed whether participant roles in conversation actually *do* possess different social connotations. If they do not, both direct addressees and side-participants operate might operate within the same social context, and the source of the enhanced linguistic alignment exhibited by direct addressees may lie elsewhere. The results of this study therefore provide only equivocal support for the proposal that linguistic alignment is influenced by the social context in which it occurs.

Finally, Balcetis and Dale (2005) conducted a set of two syntactic alignment experiments that constitute the only clear-cut examination of this topic thus far. In the first, participants played the picture describing/matching game with confederates who exhibited either arrogant or affable social behavior. The finding that participants aligned with a confederate to a greater extent when he/she acted affably indicates that the degree to which interlocutors engage in alignment is dependent upon social context factors, such as whether their conversation partner's social behavior invites an affiliative response. However, the design of this experiment did not exclude the possibility that participants

exhibited this pattern of alignment for more general reasons. For instance, the positive mood that the affable confederate probably inspired might have promoted alignment, whereas the negative mood inspired by the arrogant confederate might have depressed it. Experiment 2 removed this confound by employing confederates who acted as though the experience of participating in the experiment was either irritating or pleasant. A confederate's irritated behavior should have induced a more negative mood, but also provoked enhanced alignment because it acted as a signal to the participants that their social interaction was in danger of failure (which elicits a non-conscious goal to pour more resources into establishing rapport via augmented levels of mimicry, as Lakin and Chartrand (2003) demonstrated). Indeed, the results of Experiment 2 confirmed these predictions. The outcomes of this study therefore harmonize with evidence from non-linguistic mimicry research. In so doing, they represent the first and only decisive indication that linguistic alignment is mediated by social factors derived from the conversation context influence in which it occurs, and therefore may act as an affiliation-promoting mechanism.

Current Experiment

The purpose of this experiment was to extend the findings described in the previous section along a number of avenues. First, by examining the impact of social group membership on linguistic alignment, it assessed both the generalizability of Balcetis and Dale's (2005) results to other social factors, and the degree to which linguistic alignment is mediated by social factors that demonstrably influence non-linguistic mimicry. Accordingly, this experiment was designed to test the hypothesis that participants should exhibit higher levels of alignment when they interact with in-group versus out-group members.

Second, Balcetis and Dale (2005) focused on syntactic alignment alone. This experiment examined alignment on both interchangeable syntactic structures *and* lexical terms, and therefore tested whether the impact of social context on alignment is generalizable to other linguistic levels. I predicted that the impact of social group membership should manifest in both syntactic and lexical alignment. Measuring both these forms of alignment also facilitates a qualitative examination of whether syntactic and lexical alignment are differentially susceptible to the influence of the ambient social context. This pattern may emerge if one of these forms of alignment has more potential for establishing rapport, because it would then merit recruitment of the additional cognitive resources necessary to mediate a

perception-behavior link process. Lexical alignment may fit this role, because mimicry of lexical terms is more conspicuous than mimicry of syntactic structures and may therefore promote a greater sense of affiliation.

The third avenue addressed Balcetis and Dale's (2005) combination of two sets of interchangeable syntactic structures in their experiments. Specifically, they derived a single measurement of alignment from the degree to which participants mimicked both active versus passive structures when describing transitive events, *and* prepositional object versus double object structures when describing ditransitive actions[1]. However, lumping these sets of structures together precluded any examination of how social factors mediate alignment when use of one of the items in an interchangeable set is favored over use of the other. For instance, although active and passive descriptions are equally applicable to the majority of transitive events, active descriptions are produced more often. Conversely, the use of neither prepositional object nor double object structures is strongly preferred. Whereas a social factor should mediate alignment on two equally favored linguistic items to the same extent, it might produce distinct effects on alignment on favored versus disfavored items. Specifically, because favored items are produced by automatic default, social group membership might exert little influence on their use. Conversely, interacting with an in-group versus with an out-group member might enhance the likelihood that a participant will align with a confederate's use of a disfavored item. In order to test this prediction, each set of interchangeable syntactic structures and lexical terms used in this experiment consisted of one highly favored item and one highly disfavored item.

Finally, although both non-linguistic mimicry and linguistic alignment appear universal, the degree to which individuals engage in these behaviors is highly variable (Sonnby-Borgstrom, Jonsson & Svensson, 2003; Gill, Harrison & Oberlander, 2004; Estow, Jamieson & Yates, 2007). The impact of social context on performance of these behaviors should, correspondingly, also be distinct for each individual. Accordingly, this study tested whether the degree to which social group membership mediates linguistic alignment varies according to individual differences between participants. The individual difference variable examined here was self-esteem, because Sidanius, Pratto and Mitchell (1994) demonstrated that participants' susceptibility to an in-group/out-group division depended on their self-reported levels of this characteristic. Specifically, higher self-esteem was associated with an increase in both the tendency to evaluate in-group members more positively than out-group members,

---

1   In a ditransitive action, an agent (the one who performs the action) conveys a patient (the item on which the action is performed) to a beneficiary (the recipient of the action).

and the willingness to cooperate with in-group members more than with out-group members. I therefore expected that individuals with higher self esteem should exhibit a more pronounced attenuation of alignment when they interacted with out-group versus in-group members.

In order to test these predictions, each participant in this experiment met a confederate who posed as another participant. The two individuals were then either both categorized as belonging to the same group, or each categorized into different groups, in accordance with the minimal groups paradigm developed by Tajfel and colleagues (e.g., Tajfel, Billig, Bundy & Flament, 1971). This paradigm involves categorizing participants according to arbitrary criteria in order to divide them into two groups that bear no relationship to any other social factors. Despite the meaningless nature of the group labels, participants consistently exhibit preferential treatment toward in-group members and discriminatory behavior toward out-group members (Brewer, 1979). Because this paradigm neither induces any experience of social exclusion, nor causes participants to interact with members of any group that carries stigma, the only potential means through which the group division utilized in this experiment might have impacted linguistic alignment were those related to any automatic tendencies to like in-group members and feel competitive toward out-group members. Introducing a social group membership factor using this paradigm was therefore appropriate for the preliminary nature of this research, because it should render the interpretation of any effects maximally straightforward.

The variation of this paradigm used in this experiment involved instructing first the confederate and then the participant to complete a short estimation task, at the end of which they were classified as "overestimators" or "underestimators". This feedback was manipulated to ensure that half the participants received the same classification as the confederate (in-group condition), and half received the opposite (out-group condition). Afterward, the confederate was ostensibly taken to another room where she would play two sessions of a picture describing/matching game with the participant over a network connection (though she actually left at this point). The participant then completed a short survey designed to measure self-esteem, and subsequently began to play the two game sessions, during which he/she in fact interacted with a pre-scripted computer program adapted from the confederate-scripting paradigm. In one session, the participant described pictures of events, a subset of which depicted transitive actions that could be described using either an active (favored) or passive (disfavored) syntax structure. The picture set that the participant described in the other session depicted objects, some of which were associated with one highly favored and one highly disfavored lexical term. The computer program was designed to produce equal numbers of active/passive and

favored/disfavored terms. The degree to which the participant copied their "partner's" use of these structures and terms served as the measure of alignment. This data was used to test first whether alignment is greater in the in-group condition than in the out-group condition for either syntactic or lexical alignment, and then whether this effect is greater for favored versus disfavored items and for participants with high versus low levels of self-esteem.

Method

Participants

Forty-one participants were initially recruited from the University of Edinburgh community through a university-run online advertisement service, two of whom were later removed from the subsequent analysis due to reasons stated below. Participation was compensated at a rate of £6/hour. The final sample consisted of 20 males and 19 females, with an age range of 19-24 years (Mean = 20.46), who were all native speakers of English and free of any language impairment.

Materials

A standard desktop computer compatible with Windows operating systems was used to run programs created in E-Prime. Participants received information/consent forms, copies of the Rosenberg Self-Esteem Scale (RSES) questionnaire, task instruction sheets, and debriefing sheets (copies of RSES questionnaire and task instruction sheets in Appendixes A and B).

Estimation task. The E-Prime program for this task consisted of five displays of 25-35 dots that were presented for 2000ms, each of which was followed by a blank screen presented for 750ms and an instruction screen that read, "Please type your two-digit estimate and press <ENTER>" that was presented until the user had made three keystrokes. The ultimate screen displayed a message that indicated that the user was either an "OVERESTIMATOR" or an "UNDERESTIMATOR".

Four versions of this program were created: two to be used by the confederate and two to be used by participants, and of these, one that indicated that the user was an overestimator and the other that he/she was an underestimator. The dot displays were presented in a different order in the confederate and participant versions.

RSES questionnaire. The format of this questionnaire was taken from its most commonly used version (Blascovich & Tomaka, 1991, Okada, 2008), and consisted of 10 statements, half of which expressed high self-esteem such as "I feel that I have a number of good qualities", and half of which

expressed low self-esteem such as "All in all, I am inclined to think I am a failure". The respondent indicated the degree to which he/she agreed with each statement on a 4-point Likert scale that ranged from "Strongly Agree" to "Strongly Disagree".

Picture-matching game: Events session. Items in this experiment consisted of a Prime- a picture and its typed description, and a Target- a to-be-described picture. In this session, there were 24 critical items and 72 filler items. The pictures for critical Primes and Targets depicted transitive actions, in which an animate agent acted upon an animate patient. To create these pictures, 6 transitive verbs (e.g., chase; complete list in Appendix C) were used 4 times each with different combinations of agents and patients. In half of these pictures, the agent appeared on the right and the patient on the left, and in the other half, this order was reversed. This arrangement eliminated the potential influence on the use of active/passive structures of the automatic tendency to describe agents that appear on the right as subjects of a sentence and those that appear on the left as objects. The pictures for filler Primes and Targets depicted intransitive actions performed by animate agents, for which 18 verbs (e.g., bow) were used 4 times each. The appropriate verb was printed beneath each picture.

Two sets of critical descriptions were created for the transitive action pictures. In each set, half of the descriptions followed an active syntax structure (e.g., "The nun is chasing the cowboy") and half a passive syntax structure (e.g., "The cowboy is being chased by the nun"); the assignment of active and passive syntax structure to each picture was reversed between sets. Additionally, half of each of the passive and active descriptions exactly matched the action depicted in the relevant picture, and half did *not* match on the basis of referring to an animate agent that did not appear in the picture. For instance, a mismatched item might contain a picture of a nun chasing a cowboy and a description such as "The nun is chasing the boxer". These two sets of picture and description pairs constituted critical Primes, and were each matched with a different picture (a Target) to create two sets of critical items.

One set of filler Prime descriptions was created for the intransitive action pictures in which half matched and half mismatched the relevant picture, and 1/6th contained typographical errors. These errors were included to make the descriptions appear as though they were typed by a person, rather than produced by the computer. To create filler items, each of these pictures and their associated descriptions were combined with another picture. Each set of critical items was then matched with the set of filler items and then placed in a random order to create two versions of the events description session in E-prime. The use of these versions was counterbalanced.

Picture matching game: Objects session. This session contained 18 critical items and 116 filler items. The pictures used for critical items were taken from Branigan, Pickering, Pearson, McLean and Brown (2010), who pre-tested pictures of common objects for which two terms were applicable (henceforth called *dual-name pictures*) to identify a set for which each name was comparably acceptable, but differed on the basis of preference status. Specifically, these researchers first presented one set of twelve participants with 106 dual-name pictures (sourced primarily from Snodgrass & Vanderwart, 1980), and asked them to rate each name on a scale from $1 - 7$ to indicate how acceptable each was for its respective picture (1 = completely unacceptable, 7 = completely acceptable). Afterward, the researchers presented another set of twelve participants with the 77 pictures from the original set for which the two applicable names had received an average acceptability rating above 5 (mean = 6.24), and asked them to complete a forced-choice task in which they indicated which of the two names they preferred to use. The 18 dual-name pictures used in both their study and this experiment were those for which one term was preferred over the other by more than 80% of these participants (e.g., gun/pistol; complete list in Appendix C). 154 pictures of common objects for which only one term was applicable (*single-name pictures*) were used for both filler items and as distractor pictures in critical items.

To create critical Primes, two lists of dual-name picture descriptions were produced in which half of the pictures were paired with their favored name, and half with their disfavored name. The assignment of favored/disfavored names was reversed between the two lists. To create critical items, first Primes were combined with different dual-name pictures (Targets), and then each Prime and Target dual-name picture was matched with a single-name picture that would appear alongside it and act as a distractor picture. Each set of critical items was then combined with the same set of 116 filler items (consisting of a single-name picture, its description, and another single-name picture) and placed in a randomized order. These full sets of items were used in two E-prime versions of this session. The use of these versions was counterbalanced.

Procedure

Prior to the experiment session, the experimenter randomly assigned each upcoming participant to the in-group or the out-group condition.

The experimenter met with both the confederate and the participant at a participant waiting area. Throughout the subsequent period during which the experimenter and confederate appeared together,

they acted as neutrally towards each other and the participant as possible in order to attenuate the influence of any non-target social factors. The experimenter then led the confederate and participant to a lab room that contained a single computer and asked them to read and sign information/consent forms, which presented an outline of the experiment as an investigation of computer-mediated communication that would consist of an estimation task and a picture describing/matching game played over computers in separate rooms. Once these forms were completed, the experimenter provided a description of the estimation task, and invited the confederate to perform it first. The feedback that the confederate received at the end of this task indicating that she was either an overestimator or an underestimator remained on the computer screen while the participant was seated, in order to ensure that the participant viewed the confederate's group assignment. The participant's in-group/out-group condition assignment determined which version of the estimation task the participant then performed; participants in the in-group used a version that gave them the same feedback as the confederate, and those in the out-group used a version that gave them the opposite feedback. After the participant completed the estimation task and received a group assignment from the feedback screen, he/she was given a copy of the RSES questionnaire and asked to fill it out while the experimenter took the confederate to "another room and set [her] up". Both the experimenter and confederate left at this point, and the experimenter returned a minute later.

The experimenter then told the participant that he/she was "Player B", and provided a "Player B Game Instructions" sheet for either the events or the objects session, which indicated that the participant would start with a matching task turn followed by a description task turn, and described how to perform both. For the events session, the matching task instructions stated that the participant would first see the other player's description appear on the computer screen, followed by a picture that might either match or mismatch the description. The participant was to hit <Y> to indicate a match and <N> to indicate a mismatch, and this response would be sent to the other player to appear on their screen. The instructions for the description task were simply to type a description of another picture that would appear on the screen and hit <ENTER> to send it to the other player, after which the participant would see the other player's matching turn response. For the objects session matching task, the instructions indicated that the participant would see the other player's description and two pictures, one of which matched the description. The participant was to hit <1> if the description matched the picture on the left, and <2> if it matched the picture on the right; the picture that they selected would be outlined in red on the other player's screen. The instructions then stated that when completing the

description task, the participants would see another two pictures; a yellow outline would appear around one picture, which the participant should then describe and hit <ENTER>. Subsequently, they would see a red outline appear around the picture selected by the other player during their matching turn.

After the participants had read one of these instruction sheets, the experimenter said that she could be found in an adjacent room once the first session had ended, started the appropriate E-Prime program, and then occupied another room throughout the session. The session progressed in E-Prime as the instructions described, with the exception that the other player's responses were all provided by the program following short variable delays that simulated the time taken for the other player to type them. For matching turn responses, these delays ranged from 1500 - 2000ms in the objects session and 1000 - 2500ms in the events session, and for description turn responses, they ranged from 4000 - 5500ms in the objects session and 3500 - 5500ms in the events session.
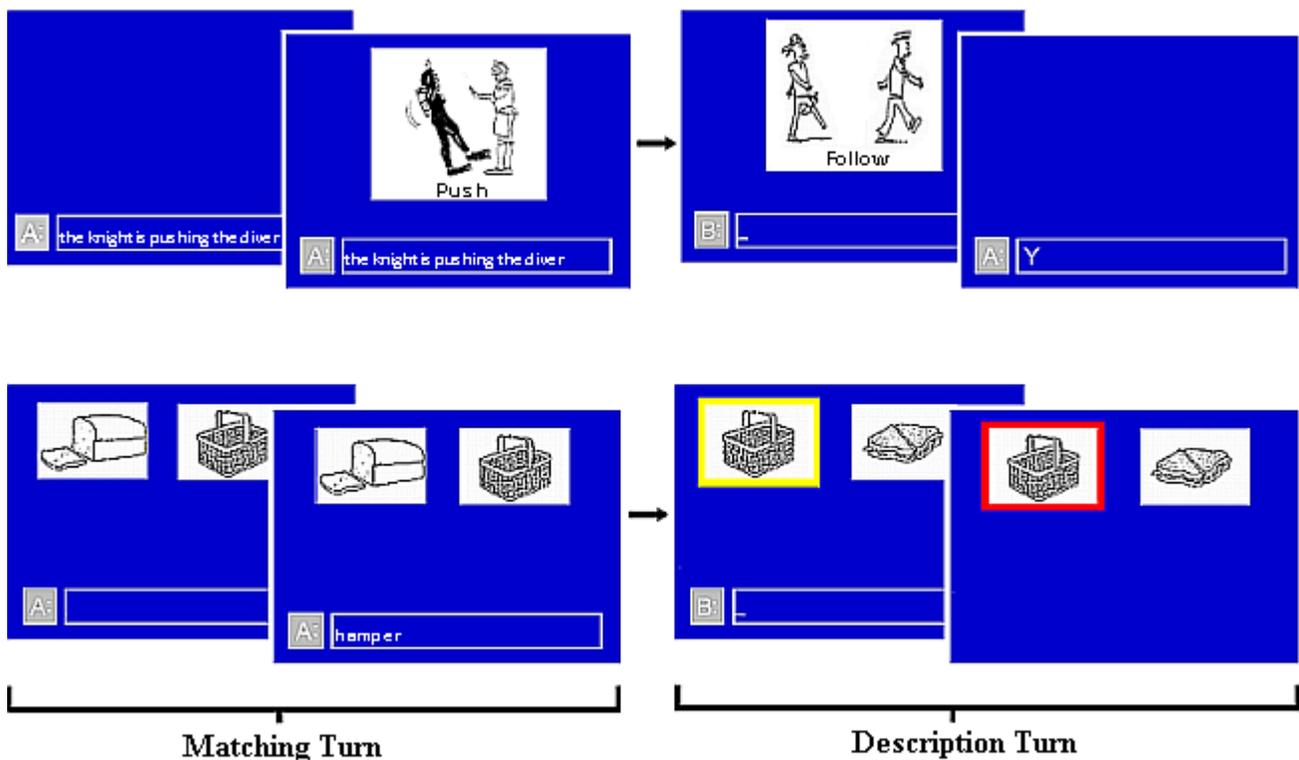

Figure 2. Example of the screen images that participants saw during matching and description turns when completing critical trials of the events session (above) and the objects session (below).

Within each session, critical items only first appeared following a number of filler items (6 in the events session, 14 in the objects session), and thereafter were separated by 2 - 6 filler items. In the events session, a critical item started with the participant taking a matching turn in which he/she read a description of a transitive action that used a passive or active structure (a Prime description), and decided whether it matched a picture of a transitive action. Immediately afterwards, the participant took a description turn in which he/she described another picture of a different transitive action (a Target picture). A critical item in the objects session also started with a participant's matching turn, during which he/she read a term for an dual-name object and decided whether it matched the picture on the right or the picture on the left (one of which was a distractor that depicted a single-name object). The participant subsequently took a description and then a matching turn with filler items. Finally, the participant took another description turn in which he/she saw a picture of the same dual-name object that the "other player" had described at the start of the critical item, which appeared outlined in yellow next to a distractor picture of a single-name object, and entered a term for the dual-name object (Figure 2). E-Prime recorded both the computer's Prime and the participant's Target descriptions, which were used to derive a measurement of alignment in the subsequent analysis.

When the participant came to indicate that he/she had finished the first session, the experimenter gave him/her the instruction sheet for the other session, then left the lab for a minute "to set up the other participant". The second session then progressed as the first. All participants thus completed both sessions, and the order in which they did so was counterbalanced in each condition.

At the end of the second session, the experimenter asked whether the participant had any questions, comments, or had noticed anything "strange" during the experiment in order to assess whether he/she had been aware of either the favored/disfavored item manipulations or the fact that the other player was actually a computer program. The data from two participants were not included in the subsequent analysis because they suspected that they had been interacting with a computer program. Finally, the participants were debriefed with a description of the true purpose of the study and paid for their contribution.

Results

Self-Esteem and Alignment Coding Procedures

The responses made by the participants to the RSES questionnaire and during their description turns in the picture describing/matching game were coded prior to conducting the following analyses.

In accordance with the scoring procedure commonly used for the RSES (Blascovich & Tomaka, 1991; Okada, 2008), responses to the positive self-esteem items of the questionnaire were given scores from 0 – 3, where 0 corresponded to a Strongly Disagree response (indicating low self-esteem) and 3 corresponded to a Strongly Agree response (indicating high self-esteem). Responses to the negative self-esteem items were reverse-scored on this scale. Each participant's scores for all of the 10 items were then summed, to yield a total score out of 30. Scores for this sample ranged from 12 – 30, with a median of 21, upper quartile of 24, and lower quartile of 17. Accordingly, participants with total scores of 24 or higher were coded as having "high" self-esteem, those with total scores from 18 – 23 as having "moderate" self-esteem, and those with total scores of 17 or lower as having "low" self-esteem.

On critical trials of the picture matching/describing game, participants either produced Target descriptions that used the same syntax structure/lexical term as appeared in the Prime description, in which case their response was categorized as "aligned", or ones that used the opposite syntax structure/lexical term, in which case their response was categorized as "not aligned". This binomial categorical response served as the measurement of alignment and constituted the primary outcome variable.

Overview of Analyses

The following analyses used logit mixed effects models to test the predicted effects on alignment of three factors: 1) condition- whether the participant interacted with an in-group member or an out-group member (2 levels, between participants); 2) preference- the status of the syntax structure/lexical term in an item as favored or disfavored (2 levels, within participants); and 3) self-esteem- whether the participant had high, moderate or low self-esteem (3 levels, between participants). This type of model can simultaneously test for both for variation in the outcome variable that is due to differences between participants *and* variation that is due to differences between items, and thus renders separate by-participants and by-items analyses unnecessary (Jaeger, 2008).

The first analysis tested the hypothesis that participants exhibited higher levels of alignment in the in-group versus the out-group condition (a main effect of condition); the second that this difference between conditions was greater when the syntax structure/lexical term was disfavored than when it was favored (an interaction between condition and preference); and the third that this difference would be greater for participants with high versus low self-esteem (an interaction between condition and self-esteem).

The analysis of each hypothesis was performed by first building a model that included the relevant effect or interaction. Then, the significance of each component within a model was measured by performing a Wald test that used the component's coefficient (in the form of log odds) and standard error to calculate whether the impact of the component on linguistic alignment differed from zero (Agestri, 2001). These tests yielded a Wald statistic (Z) and corresponding significance level for each model component, and thus indicated whether the effect or interaction of interest in that model had a significant effect on linguistic alignment. If this test failed to reveal any model in which the effect or interaction achieved significance, the analysis was terminated at this point. Alternately, if the test revealed one or more model in which the effect or interaction achieved significance, the log likelihood of the model was then taken as the measurement of the degree to which it fit the relevant alignment data. If the analysis for a given hypothesis revealed more than one such model, then the log likelihood value was used to determine which had the best fit, which was then designated the "best-fit critical model". If the analysis revealed only one such model, it was used as the best-fit critical model by default. The analysis then tested whether the fit of the best-fit critical model significantly exceeded the fit of the best-fit null model that did not include the effect or interaction. This comparison was performed using a χ^2 test in which in which the degrees of freedom value was the difference between the number of predictor factors in the critical versus the null models. The outcome of this test was represented by the value of the χ^2 statistic which, when significant, indicated that the effect or interaction contributed meaningfully to the degree to which the model accounted for the data.

Impact of Group Membership on Alignment

Hypothesis 1 tested whether group membership had a mediating effect on alignment by first building models to which each of the three factors were added as predictors of alignment in a stepwise manner.

Syntactic alignment. Reported in Table 1 is the outcome of the analysis of the critical best-fit model for the syntactic alignment data, which included preference and condition as predictors of syntactic alignment. These results show that condition had a marginal effect above and beyond the impact of preference, in which the probability that a participant would exhibit alignment increased from 46% in the out-group condition to 56% in the in-group condition (p = .08). The analysis also revealed a significant main effect of preference: participants were more likely to copy their "partner's" use of favored syntactic structures and lexical terms than they were to copy disfavored items. This

effect was found in all subsequent analyses, and because of its irrelevance to the focus of this study, it is not noted further in this section.

A χ^2 test was used to compare the critical best-fit model to the null model that did not include condition as a predictor with the best fit, which included preference alone. As Table 1 shows, the improvement to the degree to which the model that included both preference and condition over the model that included preference alone was marginally significant (p = .08). This outcome indicates that the effect of condition approached the magnitude at which it would qualify as contributing meaningfully to the best-fit model.

Lexical alignment. The details of the critical best-fit model for the lexical alignment data are reported in Table 2. This model included preference, condition and self-esteem as predictors of alignment. Within this model, condition had a significant effect on alignment: participants in the in-group condition engaged in lexical alignment to a greater degree than participants in the out-group condition. Specifically, the probability that a participant would exhibit alignment increased from 65% in the out-group condition to 72% in the in-group condition (p < .05).

The critical best-fit model was compared using a χ^2 test to the null model that did not include condition as a predictor with the best fit, which included both preference and self-esteem. The critical best-fit model did indeed account for the lexical alignment data to a significantly better extent than did the null model (p < .05) (Table 2). Therefore, the inclusion of the effect of condition in the critical best-fit model meaningfully contributed to its account of lexical alignment performance.

Impact of Group Membership on Alignment for Favored vs. Disfavored Items

To build the models for the test of Hypothesis 2, the best-fit models from the analysis so far, which were the critical best-fit models from the test of Hypothesis 1, were taken as a starting point, after which the interaction between preference and condition was added. This interaction was not a significant component of the model for either the syntactic or lexical alignment data (Tables 1 and 2). Therefore, the participants' in-group/out-group condition assignment did not influence the difference between the degree to which they aligned with their partner's use of favored versus disfavored syntactic structures/lexical terms.

Impact of Group Membership on Alignment in Participants with High vs. Low Self esteem

The test of Hypothesis 3 started with the critical best-fit models from the test of Hypothesis 1. To build the models for this analysis, the self-esteem factor was first added if it was not present in the critical best-fit model from the test of Hypothesis 1, followed by the interaction between condition and self-esteem.

Syntactic alignment. The critical best-fit model, reported in Table 1, included all three factors and the interaction between condition and self-esteem. Within this model, the interaction had a significant effect on syntactic alignment. Specifically, participants with high self esteem tended to exhibit a greater difference than participants with low self esteem in the degree to which they syntactically aligned with an in-group member versus with an out-group member. For participants with high self-esteem, alignment levels showed a large increase from 42% in the out-group condition to 62% in the in-group condition, whereas for participants with low self-esteem, alignment levels showed a much smaller change in the opposite direction from 62% in the out-group condition to 54% in the in-group condition.

The fit of the critical best-fit model to the syntactic alignment data was then compared to that of a null model with the best fit out of all possible models that did not include the interaction between condition and alignment, which predicted syntactic alignment on the basis of all three factors as independent effects. The results of the χ^2 test comparing these two models, reported in Table 1, revealed that there was no significant difference between the degree to which each accounted for the syntactic alignment data. Therefore, the interaction between condition and self esteem within the critical best-fit model did not substantially contribute to its prediction of syntactic alignment performance.

Lexical alignment. The interaction between condition and self-esteem did not reach significance in any model (Table 2) of the lexical alignment data. Therefore, the degree to which participants engaged in higher levels of alignment in the in-group condition than in the out-group condition was not influenced by their self-esteem.

Table 1

Summary of logit mixed effects models for syntactic alignment data.

Critical Model	Predictor	Estimate	SE	Z
1	$\chi^2(1) = 3.11$, p = 0.08, log likelihood = -213.11, N = 920			
	Intercept	-3.36	0.45	-7.56**
	Preference: Favored	6.85	0.43	16.01**
	Condition: In-group	0.98	0.57	1.73+
2	χ^2 = NA, log likelihood = -213.05			
	Intercept	-3.44	0.49	-7.00**
	Preference: Favored	7.02	0.60	11.69**
	Condition: In-group	1.09	0.63	1.71
	Preference: Favored/Condition: In-group	-0.29	0.86	-0.33
3	$\chi^2(2) = 4.27$, p = 0.19, log likelihood = -209.90, N = 920			
	Intercept	-1.43	0.86	-1.67+
	Preference: Favored	6.87	0.44	15.55**
	Condition: In-group	-0.88	1.05	-0.84
	Self-Esteem: Moderate	-2.23	1.02	-2.19*
	Self-Esteem: High	-2.56	1.14	-2.23*
	Condition: In-group/Self-Esteem: Moderate	1.91	1.28	1.49
	Condition: In-group/Self-Esteem: High	3.22	1.57	2.05*

+ p < .1
* p < .5
** p < .001

Table 2

Summary of logit mixed effects models for lexical alignment data.

Critical Model	Predictor	Estimate	SE	Z
1	$\chi^2(1) = 5.46$, p<0.01, log likelihood = -259.82, N = 702			
	Intercept	-1.88	0.53	-3.56**
	Preference: Favored	4.68	0.38	12.24**
	Condition: In-group	0.88	2.42	2.42*
	Self-Esteem: Moderate	1.04	0.45	2.31
	Self-Esteem: High	1.15	0.52	2.21*
2	χ^2 = NA, log likelihood = -259.66			
	Intercept	-1.91	0.53	-3.60**
	Preference: Favored	4.86	0.53	9.21**
	Condition: In-group	0.93	0.37	2.50*
	Self-Esteem: Moderate	1.04	0.45	2.30
	Self-Esteem: High	1.14	0.52	2.19*
	Preference: Favored/Condition: In-group	-0.38	0.72	-0.53
3	$\chi^2(2)$ = NA, log likelihood = -258.87			
	Intercept	-1.75	0.83	-2.11*
	Preference: Favored	4.68	0.38	12.25**
	Condition: In-group	0.72	0.89	0.81
	Self-Esteem: Moderate	1.08	0.86	1.26
	Self-Esteem: High	0.71	0.90	0.79
	Condition: In-group/Self-Esteem: Moderate	-0.18	0.80	-0.18
	Condition: In-group/Self-Esteem: High	0.98	1.12	0.87

+ p < .1
* p < .5
** p< .001

Discussion

The aim of the present experiment was to examine whether the current primary conceptualization of linguistic alignment as a purely mechanistic, non-mediated process should be broadened by building upon the only unambiguous evidence, presented by Balcetis and Dale (2005), that the same social context factors that demonstrably mediate non-linguistic mimicry also impact linguistic alignment. The social context factor selected for this experiment was social group membership, because whereas this factor has been extensively investigated in the course of non-linguistic mimicry research, it was previously unexplored in the context of linguistic alignment. In order to introduce this factor, this experiment used the minimal groups paradigm to assign participants to either a condition in which they believed they were interacting with an in-group member, or one in which they believed they were interacting with an out-group member. Alignment was then assessed using a computer-adapted version of the confederate scripting paradigm's picture describing/matching game, which ensured that participants in both conditions experienced exactly the same stimuli. In order to assess the degree to which social group membership mediates both syntactic and lexical alignment, this game consisted of both an events and an objects session. Moreover, each session contained an equal number of favored and disfavored primes with which the participants could align or not align, in order to assess whether the influence of social group membership differed according to a linguistic item's preference status. Finally, to test whether the influence of social group membership differed on the basis of the participants' self-esteem, levels of this trait were measured using the RSES questionnaire.

The outcome of this experiment revealed that the nature of the impact of social group membership differed between syntactic and lexical alignment. First, whereas participants overall exhibited only a marginal change in the degree to which they engaged in *syntactic* alignment depending upon whether they were in the in-group or the out-group condition, they exhibited significantly higher levels of *lexical* alignment in the in-group condition than in the out-group condition. Specifically, the likelihood that participants would align with their "partner's" syntactic term varied around chance levels from 56% in the in-group condition to 46% in the out-group condition, whereas the likelihood that they would align with a lexical term varied from 72% in the in-group condition to 65% in the out-group condition. Accordingly, lexical alignment appears more susceptible to the influence of social group membership than syntactic alignment.

This finding indicates a correspondence between lexical alignment and non-linguistic mimicry, which is similarly affected by social group membership (Yabar et al., 2006; Mondillon et al., 2007; Bourgeois & Hess, 2008). The paradigm used to create social groups in this experiment excluded the

possibility that some factors that may contribute to the impact of social group membership on non-linguistic mimicry, such as the desire to avoid being tainted with stigma associated with an out-group or to attenuate the danger of ostracism by strengthening bonds with an in-group, played a role in the effect on lexical alignment in this experiment. Therefore, the roots of this effect most likely lay in the remaining factors that contribute to the social group membership mediation of non-linguistic mimicry, including the non-conscious goal to affiliate with in-group members and the non-conscious feeling of competitiveness towards out-group members. These possibilities could be explored by testing whether priming participants with affiliation or competition, following paradigms modeled on those used by Lakin and Chartrand (2003) and Weyers et al. (2009), respectively, has an impact on lexical alignment.

This finding also suggests the possibility that social group membership does not directly mediate syntactic alignment to the same extent that it mediates lexical alignment and non-linguistic mimicry. This discrepancy may have arisen because syntactic alignment is less socially salient than these other perception-behavior link processes. For instance, non-linguistic mimicry has a clear impact on the social tenor of an interaction, as demonstrated by findings that people judge interactions with others who mimic them as having progressed more smoothly and successfully (e.g., Chartrand & Bargh, 1999). Accordingly, the non-conscious goal to affiliate that many researchers propose is primed when a person interacts with an in-group versus with an out-group member (e.g., Cheng & Chartrand, 2003; Yabar et al., 2006; Lakin et al., 2008) is pursued by engaging in higher levels of non-linguistic mimicry when interacting with an in-group member. Lexical alignment may have a similar impact on the quality of a social interaction, because using a different lexical term from the one just used by a conversation partner might appear actively impolite and non-affiliative, as it represents a tacit disagreement with the conversation partner's proposed construal of the referent. Conversely, whether or not an interlocutor uses the same or a different syntactic structure as one just employed by his/her conversation partner may generally pass under the social radar. The utility of lexical alignment and non-linguistic mimicry as a mechanisms for pursuing a non-conscious affiliation goal may therefore be greater than the utility of syntactic alignment. Accordingly, a non-conscious goal to affiliate that is more strongly induced when interacting with an in-group member than with an out-group member may increase an interlocutor's tendency to copy their partner's lexical terms or non-linguistic behavior to a greater extent than their tendency to copy syntactic structure.

The limited degree to which social group membership mediated syntactic alignment is also discrepant with Balcetis and Dale's (2005) finding that the social factors they studied *did* significantly

impact syntactic alignment. Social salience may account for this discrepancy as well. In this case, although the social salience of the forms of alignment studied was probably commensurate, the salience of the social factors may have differed. Specifically, Balcetis and Dale (2005) manipulated the social behavior of the confederate in order to give the impression that he/she was either friendly or aloof in their first experiment, and either pleased or irritated with the experience of being a participant in their second experiment. This behavior was probably much more attention-grabbing than the social group membership assignment procedure used in this experiment, which, in accordance with the minimal groups paradigm, was designed to be as inconspicuous as possible while still creating an in-group/out-group division. As a consequence, the mediation of syntactic alignment induced by the social factors studied by Balcetis and Dale (2005) may have been highly pronounced, whereas the social factor in this experiment may have been too subtle to produce a more than a marginal impact on syntactic alignment. The possibility that only highly salient social cues significantly affect syntactic alignment is in accordance with the aforementioned proposal that it is less sensitive to the social environment than non-linguistic mimicry and lexical alignment because it is of lesser importance as an affiliation mechanism than these processes. In contrast, lexical alignment was more sensitive to the arbitrary in-group/out-group division, and non-linguistic mimicry is sensitive to even extremely trivial components of the social environment, as demonstrated by the fact that an incidental correspondence between two interactants' first names is enough to increase levels of this behavior (Gueguen & Martin, 2009).

The second way in which the results of this experiment indicate that social group membership has different relationships with syntactic and lexical mimicry concerns the impact of self esteem on these relationships. Specifically, participants engaged in higher levels of lexical alignment with an in-group versus an out-group member regardless of their self-esteem level. Conversely, participants with high self esteem showed a significantly greater increase in the degree to which they engaged in syntactic alignment with an in-group versus an out-group member than did participants with low self-esteem. This pattern suggests that in order to override the perception-behavior link by engaging in an altered level of alignment, the degree to which a person is motivated to affiliate more with an in-group than an out-group member must be greater when the form of alignment is subtle and of low utility as an affiliative mechanism, as I propose is the case for syntactic alignment, than when it is more socially salient and affiliative, as I propose is the case for lexical alignment. Both individuals with high and low self esteem may be sufficiently motivated to affiliate more with an in-group interlocutor than with an out-group interlocutor by overriding the perception-behavior link in order to *lexically* align more with

the former interlocutor than with the latter. However, only individuals with high self esteem may possess enough motivation of this nature to *syntactically* align to a significantly greater extent with an in-group versus an out-group interlocutor. In contrast, this motivation in individuals with lower self-esteem may be insufficiently potent to merit the recruitment of the additional cognitive resources necessary to mediate syntactic alignment. As Sidanius et al.'s (1994) research suggests, this difference in motivation levels may be driven by both the more positive evaluations of in-group members that individuals with high self-esteem form, which should induce a stronger goal to affiliate, and the lesser willingness to cooperate with out-group members that they possess, which should induce greater feelings of competitiveness.

The results of this experiment did not however indicate a divergence between the impact of social group membership on lexical and syntactic alignment in all respects: in both cases, the impact did not differ according to the preference status of linguistic items. Instead, favored items were always copied to a greater extent than disfavored items. This finding runs counter to the prediction that whereas favored items should be copied by default, alignment with disfavored items should be more susceptible to the influence of social group membership. It is possible that preference, which is established over the course of long-term language use, is too deeply ingrained to alter according to the social context. The tendency to align with the use of favored items more readily than with disfavored items may instead only change if it directly threatens communicative success. For instance, an individual may engage in enhanced levels of alignment with disfavored items if they are produced by an interlocutor who might not understand the alternate, favored items. This scenario is supported by Branigan et al.'s (2010) series of recent experiments investigating lexical alignment in human-computer interaction. These experiments showed first that participants engaged in higher levels lexical alignment, particularly with disfavored lexical terms, when they believed their interlocutor to be a computer than when they believed it to be another person. Moreover, participants also aligned to a lesser extent with a computer interlocutor's disfavored versus favored lexical terms when they believed it was a state-of-the-art, high performance model than when they believed it was a poorer quality bargain model. Both these findings indicate that participants expended greater effort to copy disfavored lexical terms when they believed their interlocutor possessed poorer linguistic competence, presumably because they thought that such an interlocutor might not have the ability to parse lexical terms that it had not produced. Accordingly, contextual factors may mediate the automatic tendency to align with favored items to a much greater extent than with disfavored items, but only when these factors pertain to communicative success rather

than social interaction.

Overall, these findings suggest that the nature of the impact of social context on alignment varies according to the social salience both of the linguistic level on which the form alignment occurs, and of the social context factor. Specifically, they indicate that any social context factor can directly mediate a form of alignment that is characterized by a potential to readily and conspicuously affect the tenor of the social interaction, and that this characterization is more applicable to lexical than to syntactic alignment. Moreover, a social context factor that is a minimal feature of an interaction, such as the social group membership factor used here, may only significantly mediate a salient form of alignment like that which occurs on the lexical level, whereas one that is a prominent feature of the interaction, such as the attention-grabbing behavior of an interlocutor, can significantly mediate even the more subtle form of alignment that occurs on the level of syntax. Finally, individual differences factors like self-esteem may provide the extra motivation necessary for significant mediation of syntactic alignment to occur as a result of an inconspicuous social context factor. However, this experiment yielded no evidence that the social context can affect the tendency to align to a greater extent with an interlocutor's use of disfavored versus favored linguistic items. This tendency may be too strong to be vulnerable to the influences of affiliation goals or feelings of competitiveness that the social group membership factor used in this experiment was designed to induce. Instead, it may instead only alter when lexical alignment of favored and disfavored linguistic items can potentially affect communicative success.

It is critical to note, however, that due to the preliminary nature of this research, these interpretations are somewhat speculative. Future studies could expand upon this research in a number of directions in order to build a greater understanding of the relationship between linguistic alignment and its ambient social context, some of which are outlined in the following sections.

Social Salience of Alignment

The previous section highlighted the possibility that lexical alignment was more directly influenced by social group membership than syntactic alignment because it plays a more prominent role in rapport, and therefore is preferentially mediated by a social factor that affects affiliation goals. This possibility could be explored by evaluating the degree to which participants who are or are not mimicked on different linguistic levels, each of which would be tested separately, judge their interlocutor positively and their interaction as having progressed smoothly. A study of this nature could be modeled on Chartrand and Bargh's (1999) Experiment 2, in which participants interacted with a

confederate who either did or did not mimic their posture and body movements, and then appraised both the confederate and the quality of their interaction. One study, conducted by van Baaren et al., (2003) has already broached the subject of the social consequences of linguistic mimicry by determining that a waitress received larger tips when she repeated her customers' orders verbatim, versus when she merely indicated that she'd understood them. Thus, people do appear to react more favorably to others who linguistically mimic them than to those who do not. However, this study did not control for the overall degree to which the waitress interacted with her customers: the mere fact that she spoke more to them in the mimicry condition than in the non-mimicry condition may account for the difference in tipping generosity. Moreover, the researchers who conducted this study made no attempt to disentangle the impacts of different types of linguistic mimicry such as syntactic and lexical alignment on the people who were mimicked. The question of whether different forms of linguistic alignment vary according to their utility as affiliative mechanisms therefore remains open for study.

Salience of Mediating Social Context Factor

The present experiment used the minimal groups paradigm to introduce a social context factor that could mediate alignment through only a circumscribed group of influences, consisting of affiliation goals and feelings of competitiveness, in order to facilitate parsimony in the interpretation of any effects. However, use of this paradigm also rendered the social context factor particularly inconspicuous. The fact that this factor only marginally mediated syntactic alignment, whereas the more conspicuous factors used in Balcetis and Dale's (2005) two experiments significantly mediated this process, indicates that another issue that merits research is the contribution of social group membership salience to its mediation of different forms of linguistic alignment.

The most obvious direction this research could take is to examine whether mediation differs depending on the degree to which the social groups are intrinsically salient to the participants. Assessment of salience could take the form of a post-experiment questionnaire that asks participants to recall details about their conversation partner, with items that refer to his/her group membership and others that refer to non-target details (e.g., hair color); the degree to which group membership details are accurately recalled would reflect their salience. Such an approach could be used with social groups created and presented in the same way they were here. Additionally, for purposes of comparison with this experiment, others could additionally investigate social groups that are likely to be more salient. For instance, social group membership information was only briefly visible in this experiment when

participants viewed their own and the confederate's group assignment in the form of feedback on a computer screen. Another experiment that keeps this information visible throughout the period during which participants converse with an interlocutor might increase the groups' salience. Alternately, using pre-existing social groups that are clearly apparent, like those based on gender or ethnicity, should also render the social group membership factor more obvious. However, care should be taken when investigating this type of group to assess other contributing influences, such as whether the out-group carries stigma. This assessment would allow the researcher both to increase methodological rigor, and to take the opportunity to explore whether the role influences like out-group stigma play in the social group membership mediation of linguistic alignment is similar to the role they play in the mediation of non-linguistic mimicry.

This approach is however characterized by the drawback that it does not allow the researchers to directly manipulate the salience of the social group membership factor. An alternate approach that would make this manipulation possible would involve introducing the factor in a context that either increases or decreases its salience. For instance, Harmon-Jones, Greenberg, Solomon and Simon (1996) conducted a study in which participants first performed a task that either made them think about their own mortality or a neutral topic, and then were assigned to groups in accordance with a variation of the minimal groups paradigm. Participants in the mortality awareness condition versus those in the neutral condition showed a greater tendency to evaluate an in-group member more positively and as more similar to themselves than an out-group member, indicating that mortality awareness increased the salience of in-group/out-group divisions. This methodology therefore constitutes a potentially useful tool for testing the contribution of salience to social group membership's mediation of linguistic alignment.

A related approach could incorporate the threat of ostracism in order to alter the salience of social group membership. For instance, Lakin et al. (2008) examined the influence of ostracism threat on the social group membership mediation of non-linguistic mimicry by first exposing participants to an experience in which they were excluded by members of either an in-group or an out-group during an ostensibly online game of catch. Participants in the in-group exclusion condition who indicated on a subsequent questionnaire that they felt that they did not "belong" to the group of game players later showed the highest levels of preferential mimicry of an in-group versus an out-group member's body movements. This outcome indicates that for some participants, an experience of exclusion from an in-group highlighted the salience of the in-group/out-group division, because they felt that their own in-

group membership was threatened. Consequently, these participants attempted to re-establish their bonds with the in-group and attenuate the threat of ostracism by expending additional cognitive resources toward mimicking in-group members to a particularly pronounced extent. This inclusion/exclusion manipulation therefore appears to influence the degree to which participants preferentially mimic in-group versus out-group members. Any utilization of this manipulation in future linguistic alignment research could be accompanied by a measurement of its impact on both participants' perception of ostracism threat, and on the salience of social group membership. This approach would facilitate an assessment of the role each of these influences play in the impact of social group membership on linguistic alignment.

Alternate Forms of Social Mediation

Social group membership was selected as the social factor of study for this experiment both because any effects it produces on alignment can be readily compared to its extensively researched effects on non-linguistic mimicry, and because the minimal groups paradigm used to introduce this factor is well established. However, the question of whether linguistic alignment is mediated by attributes of the social context in which it occurs can be addressed more extensively by testing the impact of other social factors.

One type of factor that may be productively investigated is highlighted by the incidental direct effect of self-esteem on linguistic alignment that manifested in many of the analyses. Specifically, because self-esteem is implicated in multiple aspects of social behavior (Leary & MacDonald, 2003), this finding might indicate that an individual's personality traits that affect how he/she interacts socially with others may mediate the degree to which he/she engages in linguistic alignment. This possibility would be relatively straightforward to investigate by measuring levels of a personality trait of interest and testing the degree to which variation in this trait predicts performance of linguistic alignment.

One study, conducted by Gill et al. (2004), has already used this approach to test the impact of Extraversion and Neuroticism personality trait constructs on syntactic alignment, under the assumptions that people who score highly on a measurement of Extraversion are more socially oriented and should therefore align to a greater extent, whereas people who are high in Neuroticism are more inwardly oriented and should therefore align to a lesser extent. However, the results of this study were ambiguous, revealing no impact of Extraversion, and an impact of Neuroticism in which people who obtained moderate scores aligned more than those who obtained high or low scores. The equivocal

nature of these results may stem from flaws in the assumptions that these trait constructs have a linear relationship with social affiliation behavior. For instance, although Extraversion does incorporate dimensions such as *warmth* and *gregariousness* that imply a motivation to socially affiliate, it also incorporates dimensions like *assertiveness*, which is related to "forcefulness of expression" and implies a resistance to conforming to the behavior of others, including their speech (Costa & McCrae, 2004). Consequently, any study that investigates the relationship between a socially-pertinent personality trait and linguistic alignment should ensure that the relationship between the personality trait and social behavior is clearly understood.

One such candidate personality trait is *self-monitoring*, which refers to a person's sensitivity to social stimuli and the amount of effort they devote towards making favorable impressions on others (Cheng & Chartrand, 2003; Estow et al., 2006). Accordingly, high self-monitors should be more attuned to another person's behavior, and more likely to copy it in order to establish rapport. Indeed, two studies have demonstrated that measurements of self-monitoring predict both the degree to which participants' performance of non-linguistic mimicry varied in accordance with the desirability of rapport in different social contexts (Cheng & Chartrand, 2003), and the frequency with which participants mimicked positive non-linguistic behaviors like laughing. Thus, a study that investigates the influence of self-monitoring on linguistic alignment would reveal the extent to which this behavior is recruited as an affiliative mechanism by people who are invested in promoting rapport.

Alternately, a researcher interested in the impact on linguistic alignment of the degree to which a person is oriented towards social stimuli, such as the behavior of others, may explore this area in a more empirically controlled and illuminating manner by directly manipulating this orientation. Specifically, this orientation may be temporarily reduced in an experimental setting by inducing *self-focus*, in which a person's attention is turned towards him/herself and away from other people. Spengler, Brass, Kuhn and Schutz-Bosbach (2010) demonstrated that self-focus, as induced by placing participants in front of a mirror or by having them draw upon their own feelings in order to judge a set of evaluative statements, reduced levels of motor mimicry. Accordingly, future research might explore whether reducing natural levels of social orientation towards other people by inducing self-focus attenuates linguistic alignment. Any confirmation of this prediction may entail the critical implication that the process through which linguistic alignment is mediated involves enhanced activation or inhibition of the relevant linguistic item representation itself. This implication would stem from evidence that self-focus may limit motor mimicry by reducing activation in the neural region that

represents perceived motor behavior which automatically induces performance of the same behavior (Cheng et al., 2007; Spengler, von Cramon & Brass, 2009; Spengler et al., 2010). Accordingly, any impact of self-focus on linguistic alignment may occur by modifying activity in representations within the language comprehension/production system that the IAA identifies as responsible for this form of mimicry.

Conclusion

The outcome of this experiment revealed that social group membership exerts a direct impact on lexical alignment, indicating that this behavior is used as a tool for establishing greater rapport with socially desirable conversation partners, such as in-group members, than with socially less desirable conversation partners, such as out-group members. Moreover, lexical alignment is used in this manner regardless of the individual's self esteem. Conversely, the impact of social group membership on syntactic alignment instead manifested as a tendency for participants with high self esteem to show a greater increase in alignment with in-group versus out-group members than participants with low self-esteem. This finding indicates that the subtlety of syntactic alignment limits its utility as a tool for promoting rapport, and it is therefore recruited for this purpose primarily in individuals with high self-esteem, because they are more motivated than individuals with low self-esteem to devote effort towards affiliating to a greater extent with in-group versus out-group members. However, social group membership mediation did not alter according to the preference status of a syntactic structure/lexical term. The greater tendency to align with favored versus disfavored lexical items therefore appears too strongly established to be influenced by the social group membership of the interlocutor who produces them.

Acknowledgements

References

Agresti, A. (2002). *Categorical data analysis.* Hoboken, NJ: Wiley.

Balcetis, E. E., & Dale, R. (2005). An exploration of social modulation of syntactic priming. In B. G. Bara, L. Barsalou & M. Buchiarelli (Eds.), *Proceedings of the 27th annual meeting of the cognitive science society*, (pp. 184-189). Mahwah, NJ: Lawrence Erlbaum Associates.

Bargh, J. A., Chen, M., & Burrows, L. (1996). Automaticity of social behavior: Direct effects of trait construct and stereotype activation on action. *Journal of Personality and Social Psychology, 71*, 230-244.

Bargh, J. A., & Chartrand, T. L. (1999). The unbearable automaticity of being. *American Psychologist, 54*, 462-479.

Bavelas, J. B., Black, A., Lemery, C. R., & Mullett, J. (1986). "I show how you feel": Motor mimicry as a communicative act. *Journal of Personality and Social Psychology, 50*, 322-329.

Blascovich, J., & Tomaka, J., (1991). Measures of self-esteem: The self-esteem scale. In J. P. Robinson, P. R. Shaver & L. S. Wrightsman (Eds.), *Measures of personality and social psychological attitudes* (pp. 121-122). San Diego, CA: Academic Press.

Bock, J. K. (1986). Syntactic persistence in language production. *Cognitive Psychology, 18*, 355-387.

Bourgeois, P., & Hess, U. (2007). The impact of social context on mimicry. *Biological Psychology, 77*, 343-352.

Branigan, H. P., McLean, J. F., & Jones, M. W. (2005). A blue cat or a cat that is blue? Evidence for abstract syntax in young children's noun phrases. In A. Brugos, M. R. Clark-Cotton & S. Ha (Eds.), *Proceedings of the 29th annual Boston University conference on language development*, (pp. 109-121). Somerville, MA: Cascadilla Press.

Branigan, H. P., Pickering, M. J., & Cleland, A. A. (2000). Syntactic co-ordination in dialogue. *Cognition, 75*, 13-25.

Branigan, H. P., Pickering, M. J., McLean, J. F., & Cleland, A. A. (2007). Syntactic alignment and participant role in dialogue. *Cognition, 104*, 163-197.

Branigan, H. P., Pickering, M. J., Pearson, J., McLean, J. F., & Brown, A. (2010). *The role of beliefs in lexical alignment: Evidence from dialogues with humans and computers*. Prepared manuscript.

Branigan, H. P., Pickering, M. J., Pearson, J., McLean, J. F., & Nass, C. I. (2003). Syntactic alignment between computers and people: The role of belief about mental states. In R. Alterman & D. Hirsh (Eds.), *Proceedings of the 25ᵗʰ annual conference of the cognitive science society*, (pp. 186-191). Boston, MA: Routledge.

Branigan, H. P., Pickering, M. J., Pearson, J., McLean, J. F., & Nass, C. I. (2010). Linguistic alignment between people and computers. *Journal of Pragmatics, 42*, 2355-2368.

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

Brennan, S. E., & Clark, H. H. (1996). Conceptual pacts and lexical choice in conversation. *Journal of Experimental Psychology: Learning, Memory and Cognition, 22*, 1482-1493.

Brewer, M. B. (1979). In-group bias in the minimal intergroup situation: A cognitive-motivational analysis. *Psychological Bulletin, 86*, 307-324.

Chartrand, T. L., & Bargh, J. A. (1999). The chameleon effect: The perception-behavior link and social interaction. *Journal of Personality and Social Psychology, 76*, 893-910.

Chen, M., & Bargh, J. A. (1997). Nonconscious behavioral confirmation processes: The self-fulfilling consequences of automatic stereotype activation. *Journal of Experimental Social Psychology, 33*, 541-560.

Chen, M., & Bargh, J. A. (1999). Consequences of automatic evaluation: Immediate behavioral predispositions to approach or avoid the stimulus. *Personality and Social Psychology Bulletin, 25*, 215-224.

Cheng, Y., Lin, C. P., Liu, H. L., Hsu, Y. Y., Lim, K. E., Hung, D., & Dacety, J. (2007). Expertise modulates the perception of pain in others. *Current Biology, 17*, 1708-1713.

Clark, H. H., & Marshall, C. R. (1981). Definite reference and mutual knowledge. In A. Joshi, B. Webber & I. Sag (Eds.). *Elements of discourse understanding*. Cambridge, UK: Cambridge University Press.

Clark, H. H., & Murphy, G. L. (1982). Audience design in meaning and reference. In J.-F. Le Ny & W. Kintsch (Eds.), *Language and comprehension*, (pp. 287-296). Amsterdam, Denmark: North-Holland Publishing Company.

Cleland, A. A., & Pickering, M. J. (2003). The use of lexical and semantic information in language production: Evidence from the priming of noun-phrase structure. *Journal of Memory and Language, 49*, 214-230.

Costa, P. T., & McCrae, R. (2004). *NEO personality inventory revised (UK edition)*. Retrieved from http://www.hogrefe.co.uk/?/test/show/33/

Dijksterhuis, A., & Bargh, J. A. (2001). The perception-behavior expressway: Automatic effects of social perception on social behavior. *Advances in Experimental Social Psychology, 33*, 1-68.

Estow, S., Jamieson, J. P., & Yates, J. R. (2007). Self-monitoring and mimicry of positive and negative social behaviors. *Journal of Research in Personality, 41*, 425-433.

Gallois, C., Ogay, T., & Giles, H. (2005). Communication accommodation theory. In W. B. Gudykunst (Ed.) *Theorizing about intercultural communication* (pp. 121-148). Thousand Oaks, CA: Sage Publications.

Garrod, S., & Pickering, M. J. (2004). Why is conversation so easy? *Trends in Cognitive Science, 8*, 8-11.

Giles, H., & Ogay, T. (2007) Communication Accommodation Theory. In B. B. Whaley & W. Samter, (Eds.) *Explaining communication: Contemporary theories and exemplars* (pp. 325-344). Mahwah, NJ: Lawrence Erlbaum Associates.

Gill, A., Harrison, A., & Oberlander, J. (2004). Interpersonality: Individual differences and interpersonal priming. In K. Forbus, D. Gentner & T. Regier (Eds.), *Proceedings of the 26th annual conference of the cognitive science society*, (pp. 464–469). Hillsdale, NJ: Lawrence Erlbaum Associates.

Guegen, N., & Martin, A. (2008). Incidental similarity facilitates behavioral mimicry. *Social Psychology, 40*, 88-92.

Harmon-Jones, E., Greenberg, J., Sheldon, S., & Simon, L. (1996). The effects of mortality salience on intergroup bias between minimal groups. *European Journal of Social Psychology, 26*, 677-681.

Hartsuiker, R. J., Pickering, M. J., & Veltkamp, E. (2004). Is syntax separate or shared between languages? *Psychological Science, 15*, 409-414.

Hove, M. J., & Risen, J. L. (2009). It's all in the timing: Interpersonal synchrony increases affiliation. *Social Cognition, 27*, 949-960.

Jaeger, T. F. (2008). Categorical data analysis: Away from ANOVAs (transformation or not) and towards logit mixed models. *Journal of Memory and Language, 59*, 434-446.

Kendon, A. (1970). Movement coordination in social interaction: Some examples described. *Acta Psychologica, 32*, 100-125.

Lakin, J. L., & Chartrand, T. L. (2003). Using nonconscious behavioral mimicry to create affiliation and rapport. *Psychological Science, 14*, 334-339.

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.

Leary, M. R., & MacDonald, G. Individual differences in self-esteem: A review and theoretical integration. (2003). In M. R. Leary & J. P. Tangney (Eds.), *Handbook of self and identity.* New York, NY: Guildford Press.

Likowski, K. U., Muhlberger, A., Seibt, B., Pauli, P., & Weyers, P. (2008). Modulation of facial mimicry by attitudes. *Journal of Experimental Psychology, 44*, 1065-1072.

Linell, P. (1991). Accommodation on trial: Processes of communicative accommodation in courtroom interaction. In H. Giles, J. Coupland & N. Coupland (Eds.), *Contexts of accommodation: developments in applied sociolinguistics* (pp. 103-130). Cambridge, UK: Press Syndicate of the University of Cambridge.

Malatesta, C. Z., Grigoryev, P., Lamb, C., Albin, M., & Culver, C. (1986). Emotion socialization and expressive development in preterm and full-term infants. *Child Development, 57*, 316-330.

Metzing, C., & Brennan, S. E. (2003). When conceptual pacts are broken: Partner-specific effects on the comprehension of referring expressions. *Journal of Memory and Language, 49*, 201-213.

Miles, L. K., Griffiths, J. L., Richardson, M. J., & MacRae, C. N. (2010). Too late to coordinate: Contextual influences on behavioral mimicry. *European Journal of Social Psychology, 40*, 52-60.

Mondillon, L., Niedenthal, P. M., Gil, S., & Droit-Volet, S. (2007). Imitation of in-group versus out-group members' facial expressions of anger: A test with a time perception task. *Social Neuroscience, 2*, 223-237.

Moran, G., Krupka, A., Tutton, A., & Symons, D. (1987). Patterns of maternal and infant imitation during play. *Infant Behavior and Development, 10*, 477-491.

Nass, C., Fogg, B. J., & Moon, Y. (1996). Can computers be teammates? *International Journal of Human-Computer Studies, 45*, 669-678.

Nass, C., Steuer, J., & Tauber, E. R. (1994). Computers are social actors. In B. Adelson, S. Dumais & J. Olson (Eds.), *Human Factors in Computing Systems: CHI'94 Conference Proceedings* (pp. 72-77). New York, NY: ACM Press.

Neuberg, S. L., Smith, D. M., Hoffman, J. C., & Russel, F. J. (1994). When we observe stigmatized and "normal" individuals interacting: Stigma by association. *Personality and Social Psychology Bulletin, 20*, 196-209.

Okada, R. (2008). *Rosenberg self-esteem scale.* Retrieved from http://www.yorku.ca/rokada/psyctest/rosenbrg.pdf

Over, H., & Carpenter, M. (2009). Priming third-party ostracism increases affiliative imitation in children. *Developmental Science, 12*, F1-F8.

Pickering, M. J., & Branigan, H. P. (1999). Syntactic priming in language production. *Trends in Cognitive Sciences, 3*, 136-141.

Pickering, M. J., & Garrod, S. (2004). Toward a mechanistic psychology of dialogue. *Behavioral and Brain Sciences, 27*, 169-226.

Pickering, M. J., & Garrod, S. (2006). Alignment as the basis for successful communication. *Research on Language and Computation, 4*, 203-228.

Scheflen, A. E. (1964). The significance of posture in communication systems. *Psychiatry, 27*, 316-331.

Sidanius, J., Pratto, F., & Mitchell, M. (1994). In-group identification, social dominance orientation, and differential intergroup social allocation. *The Journal of Social Psychology, 134*, 151-167.

Sonnby-Borgstrom, M., Jonsson, P., & Svensson, O. (2003). Emotional empathy as related to mimicry reactions at different levels of information processing. *Journal of Nonverbal Behavior, 27*, 3-23.

Snodgrass, J. G., & Vanderwart, M. (1980). A standardized set of 260 pictures: Norms for name agreement, familiarity and visual complexity. *Journal of Experimental Psychology: Human Learning and Memory, 6,* 174-215.

Spengler, S., Brass, M., Kuhn, S., & Schutz-Bosbach, S. (2010). Minimizing motor mimicry by myself: Self-focus enhances online action control mechanisms during motor contagion. *Consciousness and Cognition, 19*, 98-106.

Spengler, S., von Cramon, D. Y., & Brass, M. (2009). Control of shared representations relies on key processes involved in mental state attribution. *Human Brain Mapping, 30*, 3704-3718.

Tajfel, H. (1970). Experiments in intergroup discrimination. *Scientific American, 223*, 96-102.

Tajfel, H., Billig, M., Bundy, R., & Flament, C. (1971). Social categorization and intergroup behaviour. *European Journal of Social Psychology, 1*, 149-178.

van Baaren, R. B., Holland, R. W., Kawakami, K., & van Knippenberg, A. (2004). Mimicry and prosocial behavior. *Psychological Science, 15*, 71-77.

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

van Baaren, R., Janssen, L., Chartrand, T. L., & Dijksterhuis, A. (2009). Where is the love? The social aspects of mimicry. *Philosophical Transactions of the Royal Society B, 364*, 2381-2389.

Weyers, P., Muhlberger, A., Kund, A., Hess, U., & Pauli, P. (2009). Modulation of facial reactions to avatar emotional faces by nonconscious competition priming. *Psychophysiology, 46*, 328-335.

Wilks-Gibbs, D., & Clark, H. H., (1992). Coordinating beliefs in conversation. *Journal of Memory and Language, 31*, 183-194.

Yabar, Y., Johnston, L., Miles, L., & Peace, V. (2006). Implicit behavioral mimicry: Investigating the impact of social group membership. *Journal of Nonverbal Behavior, 30*, 97-113.

Zwaan, R. A., & Radvansky. G. A. (1998). Situation models in language comprehension and memory. *Psychological Bulletin, 123*, 162-185.

Appendix A

Rosenberg Self-Esteem Scale questionnaire

Pre-Experiment Questionnaire

Please record the appropriate answer for each item, depending on whether you strongly agree, agree, disagree, or strongly disagree with it.

1 = Strongly agree

2 = Agree

3 = Disagree

4 = Strongly disagree

_____ 1. On the whole, I am satisfied with myself.

_____ 2. At times I think I am no good at all.

_____ 3. I feel that I have a number of good qualities.

_____ 4. I am able to do things as well as most other people.

_____ 5. I feel 1do not have much to be proud of.

_____ 6. I certainly feel useless at times.

_____ 7. I feel that I'm a person of worth.

_____ 8. I wish I could have more respect for myself.

_____ 9. All in all, I am inclined to think that I am a failure.

_____ 10. I take a positive attitude toward myself.
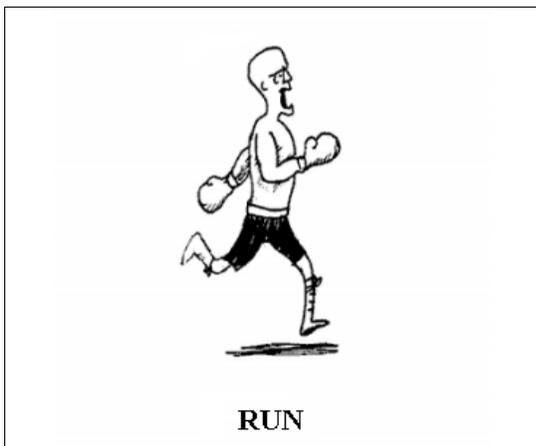
Appendix B

Game instruction sheets for events and objects sessions

Player B

Game Instructions: Events Session

Matching turn: You will first complete a matching turn, during which you will see a picture of an event on the screen, and the other player's description of the picture that s/he saw. Please press <Y> if the description matches the picture, and <N> if it does not.

Description turn: You will then complete a matching turn, during which you will see a picture of an event on the screen, with a verb printed below it. Please type a description of this event using the printed verb, and press <Enter> to send it to the other player.

For example, if you see this picture:

RUN

You might type this description:

The boxer is running

The other player will then complete his/her matching turn, and you will get a message that indicates whether they pressed <Y> or <N>. You will then alternate between matching and description turns.

Apendix B (continued)

Player B

Game Instructions: Objects Session

Matching turn: You will first complete a matching turn, during which you will see two pictures on the screen, and the other player's description of one of these pictures. Please press <1> if the description matches the picture on the Left, or <2> if the description matches the picture on the Right.

Description turn: You will then complete a description turn, during which you will see two pictures on the screen. A yellow outline will appear around one of these pictures in order to highlight it. Please type a word that describes this picture, and press <Enter> to send it to the other player.

For example, if you see this picture:
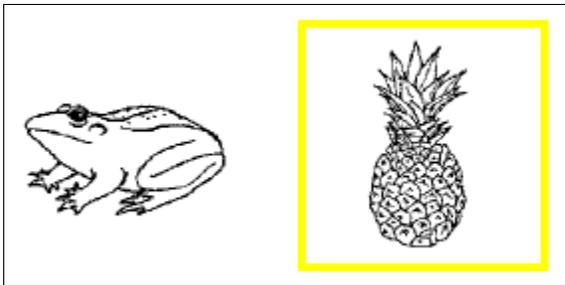
You might type this description:

Pineapple

The other player will then complete his/her matching turn, and the picture they selected (the one on the right or the one on the left) will be outlined in red. You will then alternate between matching and description turns.

Appendix C

Transitive verbs and lexical terms used in critical items

Transitive verbs:

1. Chase

2. Follow

3. Kick

4. Push

5. Tickle

6. Touch

Lexical terms:

Favored	Disfavored
1. Axe	Hatchet
2. Basket	Hamper
3. Bench	Seat
4. Bowl	Dish
5. Bus	Coach
6. Church	Chapel
7. Frog	Toad
8. Sofa	Settee
9. Glasses	Spectacles
10. Gun	Pistol
11. Jacket	Coat
12. Jug	Pitcher
13. Lamp	Light
14. Mushroom	Toadstool
15. Necklace	Pearls
16. Rubber	Eraser
17. Glass	Tumbler
18. Chair	Seat