An Exploration of Social Modulation of Syntactic Priming

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Abstract

Adoption of other people's behaviors is a well-documented tendency termed social mimicry or the "chameleon effect." Although social psychologists have begun to document the subtle nuances that impact mimicry, there is little on the social variables that influence similar processes in psycholinguistics. In two experiments, we demonstrate the influence of social factors on syntactic priming and mimicry. Exp. 1 found increased syntactic priming of a liked interaction partner and less priming of a disliked partner. In Exp. 2, we rule out the influence of mood and argue that the goal to repair social interactions promotes this syntactic mimicry. In sum, we argue that social goals constrain syntactic use and mimicry.

Introduction

Most of us have experienced the inadvertent uptake of a close friend's curious intonation, gesticulation, or idiosyncratic word or phrase. Whether so subtle or as deliberate (and obnoxious) as the shadowing of a sibling's speech, such forms of mimicry or emulation (e.g., Tomasello, 1999) seem inherently intertwined in our everyday social existence. Subtle behavioral imitation in social interaction, such as face-touching or foot-shaking, recently dubbed "chameleon effects" (Chartrand & Bargh, 1999), are widespread. Indeed, under some circumstances even without direct social interaction, adults are compelled to walk slower in imitation of the elderly (Bargh, Chen, & Burrows, 1996) or perform with greater accuracy on a general knowledge quiz in imitation of professors (Dijksterhuis & van Knippenberg, 1998).

Certainly, examples of mimicry are many, but these effects can be attenuated. For example, not all people are mimicked to the same degree (Lott & Lott, 1961). Early correlational studies found that those who are liked or have an established rapport with the mimicker are more likely to be imitated than those with whom the same types of relationships are not established (Charney, 1966). In addition, nonconscious behavioral mimicry appears motivationally driven. Neuberg and colleagues (Neuberg, Smith, Hoffman, & Russell, 1994) demonstrated that imitation can be reduced by the characteristics of the marked target. To avoid the damage that follows from seeming similar to them, would-be imitators avoid mimicking a stigmatized target. That is, the desirability of associating oneself with another influences mimicry.

Some suggest that this behavioral coordination is deeply entrenched in our species, having direct evolutionary relevance (e.g., Lakin, Jefferis, Cheng, & Chartrand, 2003). Mimicry can be used, consciously and nonconsciously, as a functional tool to assist in social interactions. In addition, social coordination is found across a multitude of domains. Recent work shows that language production is one such domain, further underscoring the evolutionary significance of the imitative faculty (see also Dunbar, 1997). Garrod and Pickering (2004) argue that coordinative patterns of behavior are the consequence of powerful "interactive alignment" mechanisms in communication. From their perspective, people do not only model conversation partners' socially relevant behaviors, but actively align linguistic representations at multiple levels of description. One such level that has sparked considerable research is the alignment of syntactic patterns in dialogue.

Syntactic Priming

Many components of language are coordinated. For example, people imitate accents (Giles & Powesland, 1975), tone of voice (Neumann & Strack, 2000), pauses within speech streams (Capella & Panalp, 1981), rate of speech (Webb, 1972), stress patterns (Roelofs & Meyer, 1998), and the structure of syllables (Sevald, Dell, & Cole, 1995). As Garrod and Pickering (2004) argue, adult language seems to be continually modified through a process of aligning to the speech patterns and idiosyncrasies of verbal interaction partners.

These modifications of speech patterns can be produced by solely self-generated speech. Many have demonstrated the use of a particular syntactic structure increases the likelihood of its use in a new sentence when the individual generates both sentences. Basic demonstrations of syntactic priming suggest that the use of specific syntax can be influenced by previous exposure to the same type of syntax (Bock, 1986; Lombardi & Potter, 1992).

Bock (1986) pioneered such an enterprise. In a picture description task, she asked participants to read aloud priming sentences containing either double-object (DO) constructions (1) or object-preposition (OP) constructions (2):

1. The waiter brought the customers a tray of drinks
2. The waiter brought a tray of drinks to the customer.

After repeating a prime sentence aloud, participants described a picture containing an agent, a recipient, and an action. Participants were more likely to describe the picture in accordance with the prime type. For example, participants more frequently supplied a DO type construction after repeating the DO sentence than after repeating a OP sentence. Similarly, more pictures were constructed in passive voice after a passive prime than after an active one. Likewise, Fox

Tree and Meijer (1999) demonstrated that participants' memory for the dative form biases the dative construction of a target sentence used in a distracter sentence.

More recently, Ferreira (2002) offered that syntactic priming is the result of an autonomous syntactic process, independent of external, perhaps social, constraints. In these experiments, Ferreira suggests that the role "that" plays is integral to the grammatical use of "that" in the recalled sentence. Although there are caveats, this line of research provides evidence that using a particular structure in speech encourages the renewed use of that structure in upcoming speech.

Current studies

Our goal is to take a first step towards connecting psycholinguistic and social research. Specifically, we demonstrate that syntactic priming effects can be modulated by social function, much as other imitative behaviors reviewed above. Chartrand and Bargh (1999) demonstrated that people develop a rapport with those who mimic foot and hand movements, indicating they like their mimickers more. Conversely, others (e.g., Charney, 1966) have observed that we mimic those we like. The current experiments seek to manipulate likeability of the to-be-mimicked target and investigate the consequences of such interpersonal dynamics on syntactic priming in Bock's (1986) picture-description task. We propose that reuse of structures can be scrutinized under a social mimicry spotlight: selection of syntactic structure will be in part a function of the desirability to mimic the interaction partner. It is expected then that participants will reuse or "imitate" the grammatical structure of an amiable confederate while refraining from imitating the syntax of one who is considerably less so. In addition, our second experiment addresses a concern regarding the influence of mood on mimicry, while suggesting that the goal to repair social interactions promotes mimicry.

The theoretical goal, discussed in more detail later, is to bridge the rift between linguistic and social processes. In theories of language production, the social environment and goals within such an interactive setting may be relevant. We argue that such theories should address the possible integration of multiple sources of information. Whatever the proposed autonomy enjoyed by grammatical abilities, it may be tempered by influences coming from the social relevance of its operation.

Experiment 1

Participants

Thirty Cornell undergraduates participated for extra credit in their psychology or human development course.

Materials

The task participants completed was modeled after Bock's (1986) picture-description task. From Bock's original set, we selected 10 drawings at random that contained an agent, recipient, and an action that could be described in either active or passive voice. In addition, we selected 12 drawings at random that added an indirect object and could thus be described with either a DO or OP structure. Ten fillers were selected from Bock's set and a database of photographs. All fillers lacked either an action or a recipient thus could not be described in active or passive voice or with DO or PO structures (i.e. a photograph of a dog's large tongue). The order of these pictures was randomized for each participant.

Bock's original paradigm had participants read a scripted sentence meant to prime a grammatical structure. After reading this scripted sentence, participants generated a description of a drawing. In the current research, we intended to use the sentences spoken by an interaction partner as a prime. The partner in these studies was always a same-sex confederate. Instead of freely generating descriptions of drawings, the confederate read scripted sentences that served as a controlled prime for the sentences participants generated. Before drawings that lacked an indirect object and could thus be described in either the passive or active voice, confederates read 1 of 10 sentences in either active or passive voice (i.e. "The woman hugged the astronaut"). Before drawings that included an indirect object, confederates read 1 of 12 sentences in either DO or OP form (i.e. "The waitress took the man the drink"). Before the filler pictures, confederates read 1 of 10 filler sentences (i.e. the man looks like Jesus). The priming sentence that preceded a picture was randomly selected.

As a counterbalancing tactic, between participants a prime sentence was alternated between passive and active voice or alternated between DO and PO forms. That is, in one counterbalancing condition, a confederate would read, "The cheerleader saved her boyfriend a seat." In the other counterbalancing condition, a confederate read "The cheerleader saved a seat for her boyfriend." Thus the content of priming sentences read by the confederate was consistent across all participants however the structure was counterbalanced between participants. There was no effect of this counterbalancing measure on the pattern of mimicry and will not be discussed further.

Procedure

Participants expected to complete a task on memory and listening skills. The experimenter explained that this study investigated how well we communicate ideas to each other and how well we retain information presented to us verbally by a partner. After this brief explanation, the experimenter explained that in order to improve performance, the two partners should get to know each other. The experimenter handed both people a survey asking them general questions about themselves including hobbies, pet peeves, goals, and less common questions such as "if you could be any food, what would you be and why?" The confederates completed this survey with scripted responses pretested to either make the confederate seem mean or nice.

For those participants randomly assigned to a mean confederate condition, the female confederate stated her

hobbies included trying on Manolo Blahnik heels, making her boyfriend buy them for her, and collecting Coach purses. The male confederate described such hobbies as watching NASDAQ tickers, sailing on the yacht his father bought him, and drinking expensive scotch. When asked about pet peeves, mean confederates claimed annoyance that people wear a particular style of clothing actually worn by the participant in that session. Finally, mean confederates described themselves most similar to Russian vodka because "it's expensive. It's rare…everyone wants it and only a select few get to have it."

The nice female confederate proclaimed a love for Frisbee and talking with friends, considered herself most like chocolate because it makes people happy, and is most annoyed that not enough people smile on the streets. The nice male confederate liked playing pool and soccer, considered himself most like pizza because it is enjoyed with a group of friends, and wishes there was more time to relax with friends.

After completing this survey, the two partners exchanged surveys to read the others' responses. By request of the experimenter, each person listed their initial impressions of their partner. The mean confederate always indicated that they would not be friends with such a person outside of the lab and thought it improbable that the participant would accomplish his/her goals. The nice confederate always indicated they would choose this type of person as a friend, found their partner's goals exciting, and thought the person ambitious.

After establishing the confederate as either nice or mean, the experimenter explained the procedure for the second phase, a picture-description task. The partners were seated in front of their own computer in such a way that neither could see the other's screen. The experimenter reiterated that the purpose of the study was to investigate how well ideas are communicated and retained. For this reason, an audio recording was made of the session to record the responses of both partners. In 1 round, each member of the team was shown a picture on their screen from the set of 32 described above. In alternation, the partners described in a single sentence the contents of the drawing. After each described 4 pictures, both wrote down the sentences produced by their partner as a test of memory. The confederate was always selected ostensibly at random to describe the first picture and thus begin the alternation. Although the participant actually saw drawings, the confederate's computer screen displayed only the scripted sentences that served as primes for the pictures shown to the participant. The partners completed 1 practice round where they were given example descriptions meant to encourage the use of complete sentences. Then, in alternation, the confederate and participant each described 32 pictures across 8 rounds. After these 8 rounds, participants completed a questionnaire that asked about their performance and their impression of their partner.

Scoring

Descriptions of the target pictures were transcribed and scored for syntactic form. Modeled after Bock (1986), descriptions of the transitive pictures were scored as *active*, *passive*, or *other*. To be scored as *active*, a description needed to include a transitive verb with the agent of the action as the subject of the sentence and contain a direct object. To be scored as *passive*, the object of the action (the patient) had to appear as the subject with the main verb preceded by one form of "be" or "get" and followed by the agent of the action contained within a "by" phrase. Any sentences that contained verbs that could not be transformed into the other voice were coded as *other*.

Descriptions of the dative pictures were scored as *double-object*, *prepositional*, or *other*. *Double-object* constructions required that the indirect and direct objects followed the verb. *Prepositional* descriptions required a dative verb followed by a direct object and a prepositional phrase incorporating the indirect object. If prepositional phrases could not be transformed into double object forms, they were scored as *other*.

Sentences that were constructed in the same style as the prime that preceded them received a score of +1. Those constructed in the alternative form as the prime that preceded them received a score of 0. We then summed within each of the four prime types to compute a score representing the amount of mimicry of each prime type: active, passive, DO, PO.

Results

Manipulation checks. In comparison to those partnered with a nice confederate, those partnered with the mean confederate clearly liked their partner less, $t(28) = 3.44$, $p < .01$, did not get along as well with their partner, $t(28) = 5.52$, $p < .001$, did not find them personable, $t(28) = 3.97$, $p < .001$, and would not like having the same partner in future tasks, $t(28) = 2.48$, $p < .05$.

Mimicry. We used a 2 (confederate style: mean, nice) X 4 (prime type: active, passive, DO, OP) repeated-measures analysis of variance (ANOVA) with prime type as a within-subjects factor. In addition, we included as a covariate the number of sentences that were coded as *other* to control for the unequal number of descriptions that received such a coding.

First, there was a main effect of prime type, $F(3, 25) = 3.32$, $p < .05$, suggesting some sentence structures were generally mimicked more regardless of likeability of the confederate. In addition, the marginally significant effect of the number of sentences coded as *other* argues for the importance of its inclusion, $F(1, 27) = 3.63$, $p = .07$.

We expected more mimicry of all prime types when working with a nice partner in comparison to a mean partner. The average number of mimicked structures in each prime type suggests that participants mimicked a nice partner (M = 2.76) more than a mean partner (M = 2.54), yet the main effect of confederate style did not reach a conventional level of significance, $F(1, 27) = 1.69$, $p = .20$. Importantly though, the interaction between prime type and confederate style suggests we look specifically at the pattern of mimicry at the level of the particular prime, $F(3, 25) = 2.49$, $p = .08$. As can

be seen in Table 1, the expected pattern emerged in 3 of the 4 prime types. That is, participants mimicked the active, passive, and object-preposition primes of the nice partner more than the mean partner. In fact, an investigative post-hoc 2 (confederate style) X 3 (prime type: active, passive, OP) repeated-measures ANOVA supports this. When looking at the influence of confederate style on mimicry of these 3 prime types, the main effect of confederate style supports our prediction. F (1, 27) = 7.63, p = .01. Unexpectedly, the pattern of mimicry within DO primes, the 4th structure, does not differ between confederate styles, F (1, 27) = 2.5, p = .13.

Table 1: Percent of mimicked sentences in each prime type as a function of confederate style

Confederate	Prime Type				
	Active	Passive	DO	OP	M
Nice	73.6	55.2	39.5	37.2	50.2
Mean	62.4	35.4	55.0	32.8	46.2

Discussion

This study offers preliminary support for the position that likeability of an interaction partner influences the priming of syntactic structure. Participants were more likely to mimic the active, passive, and OP structures in subsequently generated sentences when a likable interaction partner first used these structures. Participants mimicked these structures less when working with a dislikable partner. While the DO structure nonsignificantly trends towards the reverse pattern, it was not reliably nor statistically affected by confederate conditions. Nevertheless, 3 of 4 structures were significantly influenced by the likeability of the confederate in the expected direction.

Experiment 2

Although the results of Experiment 1 are a first step towards uncovering an influence of social mimicry on syntactic processing, an alternative mechanism could explain the findings. Some have found that social mimicry occurs more when in a positive mood and less when in a negative mood (Chartrand, 2005). Despite the goal to manipulate the likeability of the interaction partner, it is possible that such manipulations directly influenced participants' mood. Exp. 2 serves to rule out such a mediating influence.

To do so, we created a situation where syntactic priming or mimicry might serve a social function. That is, we created the feeling that a social interaction was off to a bad start and was in the need of repair. If a social interaction is problematic, mimicry is arguably a means to repair as it leads to smoother and more harmonious social interactions (Lakin, et al., 2003). Thus, we sought to investigate the use of syntactic priming as a potential means of ameliorating a troubled social interaction.

To generate such an environment, we changed the manner in which the confederates behaved at the beginning of the session. Instead of using the self-descriptive surveys as in Exp. 1, we manipulated the degree to which the confederate made salient the problems within the social interaction. In one condition, the confederate acted annoyed and reacted rudely to the inefficient experimenter. In another condition, the confederate reacted patiently to the problems the experimenter experienced. That is, the annoyed confederate made salient the problematic nature of the social interaction and thus activated the need to repair social relations. The patient confederate did not make salient such issues or needs. Importantly though, the annoyed confederate presumably elicits negative affect while the patient confederate elicits relatively more positive affect. If affect simply drives the amount of mimicry, we should see greater mimicry of the patient confederate in comparison to the annoyed one. However, the social repair mechanism predicts greater mimicry of the annoyed confederate than the patient one.

Participants

To earn extra credit in their psychology and human development course, 46 Cornell undergraduates participated.

Materials

The materials used here were those in Exp. 1.

Procedure

Participants again expected to complete a task on memory and listening skills. In exactly the same manner as in Exp. 1, the experimenter explained the general instructions for how the picture description task would proceed. As the experimenter was providing this overview, he/she was also setting up the computer program and recording device for the partners. In all cases, the experimenter acted out technical difficulties at this point. The annoyed confederate partner responded to the experimenter's problems by tapping his/her pen on the table rapidly and asked in an annoyed tone, "How long is this going to take? Do you want me to just do it for you?" When the experimenter replied that no help was needed, the confederate rolled his/her eyes. The patient confederate, however, smiled, sat patiently and said, "It's not a problem. Don't worry about it" while backing his/her chair up to give the experimenter more space.

After this manipulation, participants and confederates completed the interactive picture description task and their statements were coded in exactly the same manner described in Exp. 1.

Results

Manipulation checks. In a pretest of these two scenarios, a group of participants independent of those who participated in the actual experiment described their reactions towards the two types of confederates. These pretest participants read a description of either the annoyed or the patient confederate. Although they did not perceive any differences in the quality

of the experimenter's work, $t(57) = .01$, $p = .996$, participants indicated that the annoyed confederate seemed to make salient the problems the experimenter was having ($M = 3.4$) more so than did the reaction of the patient confederate ($M = 2.7$), $t(57) = 3.50$, $p = .001$.

Mimicry. To analyze the data, we once again used a 2 (confederate style: annoyed, patient) X 4 (prime type: active, passive, DO, OP) repeated-measures ANOVA with prime type as a within-subjects variable. In addition, we included as a covariate the number of sentences that were coded as *other*.

We found a main effect of prime type, $F(3, 41) = 3.00$, $p < .05$. There was also an effect of the covariate, $F(1, 43) = 18.20$, $p < .001$. However, the 2-way interactions between prime type and confederate style and prime type and the covariate were not significant, F's < 1.

Most importantly, we expected a main effect of confederate style, and this is in fact what we found, $F(1, 43) = 5.15$, $p < .05$. As can be seen in Table, 2, participants generally were more likely to mimic the annoyed confederate than the patient confederate.

Table 2: Percent of mimicked sentences in each prime type as a function of confederate style

Confederate	Active	Passive	DO	OP	M
		Prime Type			
Nice	75.0	34.6	52.8	27.0	47.3
Mean	84.0	48.4	59.3	27.3	53.6

Attention capture. It is possible though that the actions of the annoyed partner are simply more attention capturing given that these behaviors were more unusual than one would normally expect in the laboratory. In fact, a group of participants on whom these scenarios were pretested strongly agreed that the actions of the annoyed partner captured their attention and were more unusual than one would normally expect, ($M = 3.87$ out of 5 where higher numbers indicate more agreement), one sample tested against the midpoint 3, $t(22) = 5.74$, $p < .001$. The behaviors, including syntactic use, may simply be attended to more when the confederate acts in an unusual manner. If attention is the mechanism, then we should find that memory for the sentences spoken by the annoyed confederate should be more accurately remembered.

To test this possibility, we had an assistant blind to the purpose of the study and condition of the participant code the sentences the participant recalled during the memory test after each round. Each of the confederate's sentences a participant recalled was scored using the following system. If all key components were present and the wording exact (e.g., "the referee was punched by one of the fans"), it received a score of 3. If all key components were present but the specific phrasing of the sentence was not exact (e.g., "referee got punched and a fan did it"), it received a score of 2. If the general content of the sentence was correct but lacked a key component (e.g., "referee got punched"), it received a score of 1. We created a total score representing the breadth and accuracy of participant's memory by summing across the score each sentence received. We found no significant differences in the accuracy of participants' memory for the sentences spoken by each type of confederate, $t(42) = 1.20$, $p = .24$. If anything, there was a slight tendency for greater accuracy when partnered with the patient confederate ($M = 44.6$) than the annoyed confederate ($M = 38.9$), which runs counter to the predictions of the attention-capture alternative explanation.

General Discussion

These studies aimed to open a relationship between two usually disparate fields: social psychology and psycholinguistics. More importantly, they aim to foster a union between two assumed disparate cognitive processes: social mimicry and syntactic processing. For social psychology, we provide additional experimental evidence that people mimic those they like but also provide one of the first demonstrations that people mimic less those they do not like. Within language, we argue for a modulation of sometimes presumed autonomous language processes by both linguistic information and complex social information. Although it is well established that basic linguistic processes and related phenomena (e.g., lexical repetition, activation of syntactic structures, etc.) contribute to sentence construction, this work proposes an impact of social influences: The unfolding of sentence production may be constrained by information concerning the social context. These data contribute to the current debate on the nature of linguistic mechanisms and have implications for the presence of broader integration of information in an interactive cognitive system.

Both mood and attention were ruled out as obvious mediators of syntactic priming. First, both forms of unusual confederate behavior (mean and annoyed) likely produce negative affect or mood. However, these behaviors resulted in opposite patterns of mimicry. Secondly, if the annoyed confederate simply attracted more attention than the patient one, memory for sentences spoken by the annoyed confederate would be more accurate. However, we find no differences in accuracy between confederate conditions. Our data instead suggest that syntactic priming is influenced by the nature of the social interaction. The relevance of the confederate's behavior implies differing functions for syntactic mimicry that depend on the social context.

In this paper, we have finessed the often-detailed discussion of "mimicry" and its various definitions (e.g., emulation, Tomasello, 2000). This is not to imply that these distinctions and definitions are not important, but rather to emphasize the potential for a relationship between such psycholinguistic processes as syntactic priming, and those more often associated with "higher-order" social happenings, under such headings as imitation, mimicry, or emulation. One direction this research recommends is exploring online measures of syntactic priming. For example, Smith and

Wheeldon (2001) demonstrated speeded construction of a sentence to describe a picture when a prime sentence had a similar syntactic structure. Likewise, such online measures in production and comprehension under the conditions of possible social influences may reveal that online *production* of sentences, which reflects more on the participant's social goals, would be more amenable to social influences than *passive comprehension* of sentences, which may have little direct relevance to social evaluation or social goals of the participant. Finally, future work might address the seemingly disparate influence of social information on DO construction. Although the impenetrability of DO construction only appears in Exp. 1, further study might look into why social influences appear less powerful here.

Several decades of work have led to the often-assumed cognitive autonomy of language. Currently, social and linguistic cognition are held to be separate fields, composed of different literatures, and disparate subject matters. The past two decades, however, are seeing a trend away from such cognitive balkanization (e.g., Karmiloff-Smith, 1995). In this paper, we have recommended realms of social psychology and language that may serve as a valuable theoretical and empirical intersection. The many dimensions of interaction between social information and language processing may serve to further the goal of unifying our separate compartments of cognitive processing.

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