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# Selective Grammatical Convergence: Learning From Desirable Speakers

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Models of language learning often assume that we learn from all the input we receive. This assumption is particularly strong in the domain of short-term and long-term grammatical convergence, where researchers argue that grammatical convergence is mostly an automatic process insulated from social factors. This article shows that the degree to which individuals learn from grammatical input is modulated by social and contextual factors, such as the degree to which the speaker is liked and their social standing. Furthermore, such modulation is found in experiments that test generalized learning rather than convergence during the interaction. This article thus shows the importance of the social context in grammatical learning and indicates that the social context should be integrated into models of language learning.

## INTRODUCTION

People differ in their speech style, and different speech styles are associated with different social groups. For example, it would be noticeable if a middle-aged man were to speak in the same speech style as a teenager. Similarly, speakers try to project a certain identity with their speech style and most middle-aged men, for example, would not want to sound like teenagers. Our linguistic knowledge, however, is shaped by the input we receive from the environment, and experience-based theories of language use often assume that we learn from *all* input we receive. They would thus assume that we would be equally influenced

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by the speech input provided by people of similar and different ages, genders, and social standings. Research on language use in interaction, in contrast, suggests we do not respond similarly to all linguistic input but that we treat some speakers as better language models than others. The questions this article pursues are whether we indeed learn from the input of some speakers more than from the input of others, and, if so, what makes individuals consider a speaker a better language model than another.

### Learning Language From the Environment

Our language is shaped by our linguistic input. For example, infants raised in different linguistic environments form different phonological categories (e.g., Best, 1994; Werker & Tees, 1984), and the structure of our language and the distributional patterns in it influence which cues we attend to during language processing (e.g., MacWhinney, Bates, & Kliegl, 1984). Importantly, our linguistic representations are in constant flux and continue to be shaped by further input we receive. Thus, even Queen Elizabeth II's pronunciation diverged with time from the Queen's English (Harrington, Palethorpe, & Watson, 2000).

There are several accounts of the way in which input shapes our representations. In general, connectionist accounts propose that we adjust the weights given to different items and their connections to others according to the distributional information in the input we receive. If the distributional pattern changes, so do the weights in our representations. More recent accounts integrate the notion of prediction error and suggest that listeners predict upcoming words and then adjust their representations according to the difference between the predicted word and the word that was actually said (e.g., Chang, Bock, & Dell, 2006; Jaeger & Snider, 2013). Both types of connectionist accounts assume shared representations in production and perception and thus argue that our comprehension experience influences both future comprehension and future production. The evidence that is often brought in support for such accounts is how exposure to certain distributional patterns influences later comprehension and production performance. For example, participants are more likely to describe a picture as "The boy is handing a valentine to a girl" than as "The boy is handing a girl a valentine" if they previously heard another sentence with a prepositional object construction rather than a double object construction (e.g., Bock, 1986; for an overview see Pickering & Ferreira, 2008). Importantly, such convergence occurs even in the absence of any lexical repetition. Furthermore, the influence of exposure to certain structures is in reverse relation to their predictability. For example, exposure to a prepositional object construction with a verb that is highly biased toward a double object construction, such as *owe*, influences later production more than exposure to a prepositional object construction in a sentence that has a verb that is biased toward a prepositional

object construction, presumably because the larger prediction error triggers a larger adjustment (Jaeger & Snider, 2013).

The studies described in this article, in line with previous research, show that representations are constantly shaped by exposure. Unlike previous studies, however, this set of studies shows that individuals do not adjust their representations in response to input from all speakers equally but adjust more in response to input from some speakers than from others. The studies here further examine which properties make speakers desirable language models. That is, they examine from which speakers individuals are more likely to learn.

### Communication Accommodation During the Interaction

Convergence of syntactic structures can be seen as part of the larger phenomenon of communication accommodation. When individuals interact, they often converge on all aspects of the interaction, from pitch, speech rate, pause rate, pause duration, and use of regional variants, up to lexical items, grammatical structures and body language (e.g., Barr & Keysar, 2002; Branigan, Pickering, & Cleland, 2000; Chartrand & Bargh, 1999; Coupland, 1980; Jaffe & Feldstein, 1970; Gregory & Webster, 1996; Street, 1982; Thekarer, Giles, & Cheshire, 1982). Convergence at the grammatical level might therefore be partially guided by the same mechanisms that guide convergence at other levels. One factor argued to influence convergence, especially at the phonetic level, is a wish to affiliate with the speaker. Thus, at the phonetic level the degree of convergence has been shown to be influenced by the degree that individuals like the speakers or find them attractive (Babel, 2010, 2012; Gregory, Dagan, & Webster, 1997; Pardo, Gibbons, Suppes, & Krauss, 2012). Similarly, having a higher need of approval has been shown to increase converge at the phonetic level (Natale, 1975; Putman & Street, 1984). Convergence of bodily gestures has also been shown to depend on empathy as well as to enhance liking (Chartrand & Bargh, 1999). Additional evidence for the nonautomatic nature of convergence processes comes from studies showing that animosity can lead to divergence (Bourhis & Giles, 1977) and that convergence, in general, seems to be toward what individuals expect or believe to hear rather than the properties of the speech itself (for a review see Giles, Coupland, & Coupland, 1991; Thekarer et al., 1982).

The reliability and representativeness of the input and the speaker have also been shown to influence adjustment to the speaker, at least at the phonetic level. For example, the same speech input leads listeners to adjust their phonological categories when they believe the speech to be produced in ordinary circumstances but not when they believe the speaker produced it while holding a pen in her mouth (Kraljic, Brennan, & Samuel, 2008). Similarly, when encountering an unrepresentative speaker, such as a non-native speaker, listeners are able to learn the speaker's patterns of speech but do not adjust their general representations

according to it, and therefore such speech does not influence the way they process the speech of representative (i.e., native) speakers (Lev-Ari & Peperkamp, 2014).

Studies at the phonetic and nonlinguistic levels, then, show that convergence during interactions is not a purely automatic process but is influenced by top-down factors, including the listeners' impression of the speaker (attractiveness, likability) and their expectations of them (e.g., representativeness). In contrast to the vast literature on the social motivation of convergence at the phonetic and nonlinguistic level, research at the grammatical level has rarely examined the role of social factors in convergence. In fact, one of the main accounts for grammatical convergence (e.g., Pickering & Garrod, 2004) presumes that this is an automatic process. Another central account, that of implicit learning, could integrate social factors (indeed, this is the approach taken here), yet it frequently describes learning as being insulated from social factors or is simply modeled without them (e.g., Chang et al., 2006; Ferreira & Bock, 2006). One exception is Slocombe et al.'s (2013) study that examined whether individuals with autism are less likely to converge to their interlocutors. Considering the fact that autism has often been reported to lead to impairments in the social aspects of communication, the authors hypothesized that individuals with autism might show less convergence. Results, however, showed similar levels of convergence among autistic and nonautistic individuals. Branigan and colleagues approached this issue by comparing convergence with human versus computer interlocutors (Branigan, Pickering, Pearson & McLean, 2010; Branigan, Pickering, Pearson, McLean & Nass, 2003). They initially interpreted the similar degree of convergence with both types of interlocutors as indicating that convergence is purely automatic (Branigan et al., 2010). In a later review of the literature, they acknowledged that convergence might be driven by several factors, including communication efficiency, and social affiliation, but maintained that during human-to-human interactions the implicit automatic component is dominant (Branigan, Pickering, Pearson & McLean, 2013). In fact, they explicitly suggested that the grammatical level might be less vulnerable to the influence of social factors compared with other linguistic levels.

Schoot, Menenti, Hagoort, and Segaert (2014) are among the only studies so far to present evidence for the role of social factors in convergence at the grammatical level. Schoot et al. (2014) measured participants' response time when they needed to produce a sentence with the same syntactic structure as the prime versus a different one. They found that the ratio between participants' response time for primed and unprimed structures converged to the response time ratio of their interlocutor. They interpreted the finding as indicating that convergence has an interactional aspect. Some mixed results come from a study by Balçetis and Dale (2005), who found that participants indeed converged more to a likable interlocutor than to a "mean" interlocutor, yet the pattern reversed once the behavior of the "mean" interlocutor indicated impatience and lesser willingness to

do the task. The authors interpreted this as deriving from the prioritization of the goal of smoothing the interaction over liking. This suggests that social factors play a role in structural convergence, yet that their role and importance depends on context. Interestingly, Coyle and Kaschak (2012) found that men's grammatical convergence with women is influenced by women's fertility and perceived flirtatiousness but that these factors have opposite effects. Although higher fertility reduced convergence, supposedly because it encourages displays of creativity and nonconformity, higher perceived flirtatiousness increased convergence. To conclude, although some evidence suggests a role of social factors in grammatical convergence, the picture is a bit murky, and most research on grammatical convergence assumes that it is insulated from social factors.

One of the goals of this article is to extend previous findings by showing that convergence, in terms of structural selection, is influenced by social factors and, specifically, to examine whether listeners are influenced by some speakers more than by others. Furthermore, this article examines whether social factors influence general adjustment of one's grammatical representations rather than examining convergence during the interaction. The experiments in this article thus pose a stronger test for the role of social factors and examine whether they have potential to influence long term grammatical learning from the environment. These studies also examine which properties make a speaker a desirable language model to which listeners are more likely to converge.

### Communication Accommodation and Long-Term Adjustment

Most literature on communication accommodation focuses on convergence during the interaction. It has been proposed, however, that convergence during the interaction is related to long-term adjustment of one's representations. Trudgill (1972) has even suggested that communication accommodation could lead to language change and argued that frequent interactions between speakers of different dialects can lead to dialect leveling (but see Hinskens & Auer, 2005).

Few empirical studies have examined the influence of exposure or of convergence during interaction on long-term representations. Exceptions to that are two paradigms that examine convergence at the phonetic level: the perceptual learning paradigm and shadowing tasks. These paradigms are able to tap general representations by testing adjustment with a different task from the one in which participants have been exposed to the speech and often without any clear addressee or with a different speaker than the one participants listen to during exposure. For example, in the common perceptual learning paradigm, participants perform a lexical decision task during exposure but a phoneme categorization task in the test phase, often with a novel speaker. Such studies have shown not only that exposure can influence general representations but that such an influence on general representations can also be moderated by social

factors such as attractiveness (Babel, 2012). Even more convincing evidence for socially moderated long-term convergence comes from a study that shows previously unacquainted college flat-mates modestly converge to each other's pronunciation during the first semester of living together and that convergence is higher the closer their friendship is (Pardo et al., 2012).

It should be noted that procedural learning models and prediction error learning models also assume that structural exposure and structural convergence in interaction have long-term effects. Bock and Griffin (2000) argue that convergence is a form of implicit learning and thus should influence long-term representation. At the same time they tested long-term influence by comparing the magnitude of priming on production 10 versus 2 sentences after the prime. Because the magnitude at the two time intervals did not differ, they concluded that the effect is long term. Considering the long-term effect was demonstrated after a relatively short interval and, more importantly, within the same task and context in which priming occurred, further studies are needed to see whether such priming influences individuals' general representations. Kaschak and colleagues examined the persistence of (self-)priming after about a week's delay. Interestingly, they found that priming persists when participants are tested with the same task but does not persist when the task is changed. This is despite the fact that priming did transfer across tasks when both tasks were performed on the same day (Kaschak, Kutta, & Coyle, 2014; Kaschak, Kutta, & Schatschneider, 2011). That said, although the long-term cross-task priming effect did not reach significance, the numerical pattern of results was in line with a priming effect. Therefore, one can only conclude that the effect of priming is smaller when the task changes and there is a long delay. Future studies are therefore required to better understand the nature and limitations of the effect of priming on general representations.

## Current Studies

The aim of this article is to investigate whether exposure to grammatical structures leads to general long-term grammatical adjustment of representations and, importantly, whether such learning from exposure is socially modulated, such that individuals are more likely to learn from some speakers than from others. Furthermore, the studies explore which factors render individuals into model speakers whose language is more likely to be learned. The studies in particular examine the role of prestige, liking, and similarity to self. Importantly, the studies use a grammatical structure that is not a priori associated with social factors. That is, the structural alternatives used in the experiments are not known to vary with register, gender, age, socioeconomic status, or other social factors. Therefore, social modulation of learning in this case would be particularly strong evidence for the role of social factors in determining from whose language individuals learn.

## EXPERIMENT 1

Experiment 1 tests whether people adjust their general grammatical representations more in response to input from more prestigious versus less prestigious speakers. Research on communication accommodation has found that speakers are more likely to converge to more prestigious speakers. For example, an analysis of Larry King's speech in the interviews he conducts on his television show indicated that King accommodates more to the interviewees that are of a higher status (Gregory & Webster, 1996). Similarly, research on language change posits that the spread of language change depends on prestige. For example, language change from above usually spreads as each group imitates the linguistic patterns of the socioeconomic group above it (e.g., Labov, 1972).

This study tests whether Dutch university students would be more likely to adjust their grammatical productions in response to the grammatical patterns in the speech of a particularly bright student than in response to the grammatical patterns in the speech of a not-so-bright student. Specifically, participants listened to a recorded monologue of a previous participant in the experiment. In this monologue the speaker explained the strategies he used when answering the "intelligence test" that participants had just completed and were told they would have to complete later again. That monologue included either many sentences with a verb-subject order or only sentences with a subject-verb order. Both orders are possible in Dutch. Subject-verb order is considered the regular order in declarative sentences. At the same time if the sentence starts with something other than the subject, such as a locative or a temporal expression, the word order changes such that the verb precedes the subject. Prestige was manipulated by telling participants that the speaker scored either in the top 10% or the bottom 10% in this test. The manipulation of prestige in terms of academic excellence or intelligence is less common than other operationalizations of prestige, yet intelligence might be a particularly valid factor in a student population.

Before and after listening to the monologue, participants performed a scrambled sentences task in which they needed to put a string of words in order, such that it would make a grammatical sentence. Target sentences could be constructed in two ways that did not differ in meaning: using a subject-verb word order and a verb-subject order. This was the dependent measure. This task was chosen because it is a controlled production task that minimizes uncodable responses, because any grammatical sentence produced from these scrambled sentences would necessarily be of a subject-verb or a verb-subject order. Additionally, this task does not have a clear addressee and thus minimizes the interactional component and allows testing of participants' general representations.



## Methods

*Participants.* Sixty-seven university students who were native Dutch speakers participated in the experiment for pay.

*Stimuli.* The audio recordings for the exposure phase were prepared by recording one male native Dutch speaker read a monologue that described the Operation-Span task and the strategies he supposedly used when he performed it. The content of the monologue did not indicate how well the speaker had done, and no real strategies were provided. Mentioned strategies were along the lines of not stressing out and trying not to answer too fast, which could lead to errors. The speaker read two versions of the monologue in similar speed and intonation. One version of the monologue included only sentences with subject–verb order. In the other version of the monologue, all sentences that included adverbials were rephrased to verb–subject sentences (24 sentences). Below is an example of one of the sentences that had a different word order in the two versions. The subject of the sentence is underlined, and the verb appears in bold:

*Tijdens deze taak **verscheen** er eerst een rekensom bestaande uit ieder geval twee berekeningen.*

In this task, there first appeared an equation with at least two operations

*Er **verscheen** tijdens deze taak eerst een rekensom bestaande uit in ieder geval twee berekeningen.*

There first appeared in this task an equation with at least two operations.

The monologue was 758 words long in the subject–verb condition, 760 words long in the verb–subject condition, and took 253 and 250 seconds, respectively. These recordings were used for both the low prestige and high prestige conditions.

For the scrambled sentence task, 24 sentences that could be phrased in either a subject–verb or verb–subject order were constructed. Twenty-four additional sentences that could only be constructed in one manner were generated as well and served as fillers. All sentences were scrambled by reordering the words in them using a random sequence generator. Two lists were then created, such that each list consisted of 12 scrambled experimental sentences and 12 scrambled filler sentences. In both lists the filler and experimental scrambled sentences were interleaved in one fixed random order. One list served as baseline, and one list served as the postexposure test.

*Procedure.* Participants were told that the experiment consisted of several tasks. First, participants answered one list of scrambled sentences (baseline). Then, participants performed the O-Span working memory task (Unsworth, Heitz, Schrock, & Engle, 2005), which was presented as an intelligence test. After this task participants were told that the goal of the experiment was to see

whether participants were able to improve their score on the task by learning strategies from each other. They were then presented with the recording, supposedly of a previous participant. Before playing the audio recording, the experimenter pretended to check the list of recordings and then announced either that the participant was about to listen to someone whose score was in the top 10% or the bottom 10% of all participants. After listening to the recording, participants were told they would need to do another scrambled sentence task before taking the intelligence test again. After participants completed the second scrambled sentences task, they were thanked and debriefed. During debriefing the experimenter probed participants for any suspicion regarding the authenticity of the recording to ensure participants believed it was the natural speech of a previous participant.

## Results

During debriefing, three participants expressed suspicion regarding the authenticity of the recording. They were therefore excluded from all analyses. To test whether participants were influenced by the word order the speaker had used, the sentences that participants wrote down in the scrambled sentence task were coded as 1 if they had the same order as in the monologue participants had listened to and 0 if they had the alternative order. The data were analyzed with a mixed model analysis with Participants and Items as random variables and Prestige (Low, High) as a fixed factor. The random structure included both intercepts for the random variables and a slope for Prestige for the Items variable. Results revealed a significant effect of Prestige ( $\beta = .3$ ,  $SE = .15$ ,  $Z = 2.08$ ,  $p < .04$ ; see Table 1 for the full results). Participants were more likely to use the same word order as the monologue speaker if the speaker was introduced as scoring among the bottom 10% (58%) than in the top 10% (47%). In fact, participants in the high prestige condition were not more likely than chance to use the same word order as the one in the monologue.

The results of Experiment 1, then, support the hypothesis that individuals are more likely to learn the linguistic patterns of some speakers than of others.

TABLE 1  
Results of Experiment 1 Showing the Effect of Low Prestige (Baseline = High Prestige) on Use of the Same Word Order as the Monologue Speaker

	$\beta$	<i>SE</i>	<i>Z</i>	<i>p</i>
(Intercept)	-.11	.10	-1.09	.27
Prestige (Low)	.30	.15	2.08	<.04

The analysis was conducted using a log odds linking function. Therefore, the  $\beta$  and SE results are in log odds.

In contrast to the original hypothesis, however, participants showed greater learning from the interlocutor of low prestige. There are several reasons why this might be the case. First, it could be that participants believed they themselves did poorly on the task and therefore believed the speaker in the low prestige condition was more similar to them. This is likely because participants did not receive feedback about their performance and the task is challenging. If people are more likely to learn the linguistic patterns of similar speakers, this account could explain the pattern of results. A second possibility is that participants liked the speaker in the low prestige condition better. Even though the recordings in the high and low prestige conditions were identical, participants might have felt differently about the speaker in the two conditions, finding the speaker in the high prestige condition, for example, more arrogant. If people learn more from speakers they like better, similarly to the way that speakers accommodate more to speakers they like better, such an account could explain the pattern of results in Experiment 1. These two accounts of similarity to self and liking were tested in Experiment 2.

## EXPERIMENT 2

Experiment 2 tested whether the reason participants learned more from the speaker in the low prestige condition in Experiment 1 was because people prefer learning from speakers similar to themselves (and participants believed they had done poorly) or because participants liked the speaker in the low prestige condition better and learn more from speakers they like. This was tested using the same paradigm as in Experiment 1, except that instead of being told that the speaker scored in the top or bottom 10% of participants, participants were told that the speaker performed better than them, similarly to them, or worse than them. Additionally, at the end of the task, participants rated how much they liked the speaker.

### Methods

*Participants.* One hundred fourteen students who were native speakers of Dutch participated in the experiment for pay.

*Stimuli.* The stimuli were identical to those in Experiment 1.

*Procedure.* The procedure was identical to that of Experiment 1, except for the following changes. After participants completed the “intelligence test” and before they listened to the monologue, the experimenter opened their results file pretending to check their score. Then, after explaining to them the goal of the experiment, she checked the details of the speaker they were about to listen to and told them the speaker did better than them, similarly to them, or worse than them.

Additionally, after completing the experiment, participants were asked to rate how much they liked the speaker on a 7-point scale.

## Results

During debriefing, eight participants expressed suspicion over the authenticity of the recordings. They were therefore excluded from further analyses. Next, it was examined whether the prestige manipulation influenced participants' liking of the speaker. A linear regression on liking ratings did not reveal any effect of prestige (all  $p > .1$ ). This indicates that participants do not like those who do poorly more than those who do well, at least not when they believe they did better (as in this case, participants in the low prestige condition were told the speaker's performance was worse than theirs). The independence of liking and prestige also allows assessing the contribution of both. Therefore, a mixed model analysis was conducted with Participants and Items as random variables and Prestige, Liking, and their interaction as fixed factors. The random structure included intercepts for the random variables as well as a slope for Prestige for the Items variable.<sup>1</sup> Results showed an interaction of Liking and Low Prestige ( $\beta = .43$ ,  $SE = .16$ ,  $Z = 2.74$ ,  $p < .001$ ; see Table 2 for the full results). This interaction reflects the fact that in the low prestige condition, participants showed greater learning from the speaker the more they liked him. To better illustrate participants' performance, Figure 1 shows participants' likelihood of producing sentences with verb–subject order as depended on word order in exposure and on liking ratings.<sup>2</sup> As can be seen, the more participants liked the speaker, the more likely they were to produce the same word order he used: verb–subject sentences in the verb–subject exposure condition and subject–verb in the subject–verb exposure condition. The pattern also suggests that it is not only the case that greater liking increases convergence but also that lower levels of liking lead participants to adopt a diverging pattern, because production of the opposite construction well surpassed 50% at low levels of liking.

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<sup>1</sup>The model did not include a slope for Liking, because its inclusion led to singular convergence. The model with singular convergence, however, reported the Liking slope to explain none of the variation, and the significant effects were identical to those with the model without the slope.

<sup>2</sup>The results presented in Figure 1 are different from the statistical model reported in the article. The reported statistical results are from an analysis that collapses over order and uses the coding of whether participants used the same order they were exposed to as the dependent measure. Both types of analyses, both here and in Experiment 1, yield identical results. We opted for presenting the plot of the uncollapsed analysis because it provides more details (e.g., symmetry of the effect). We opted for reporting the statistics of the analyses that collapse over order because they are more clearly sufficiently powered, because they have half the number of cells. Therefore, the null effects, as in the high prestige condition, are less likely to be due to insufficient power.

TABLE 2

Results of Experiment 2 Showing the Effects of Liking, Level of Prestige (Baseline = High), and Their Interaction on Use of the Same Word Order as the Monologue Speaker Had Used

	$\beta$	SE	Z	p
(Intercept)	.1	.10	1.02	.31
Liking	-.06	.11	-.53	.60
Prestige (low)	.02	.16	.15	.88
Prestige (same)	-.19	.14	-1.33	.18
Liking $\times$ prestige (low)	.43	.16	2.74	<.001
Liking $\times$ prestige (same)	.03	.17	.17	.87

The analysis was conducted using a log odds linking function. Therefore, the  $\beta$  and SE results are in log odds.

These results further support the claim that individuals do not learn from the linguistic input of all speakers equally. These results also suggest that it is not the case that individuals learn more from speakers they believe to be similar to themselves, because participants were not more likely to show learning when told that the speaker performed similarly to them. In contrast, the results do indicate that the degree to which individuals like the speaker matters, although only in

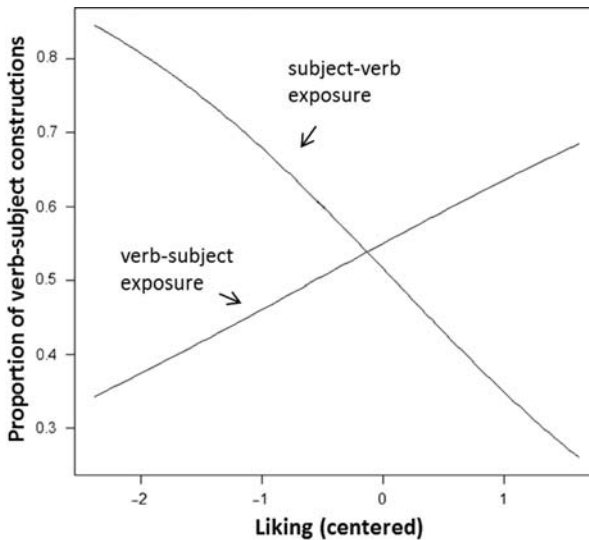


FIGURE 1 The proportion of verb-subject sentences that participants in the low prestige condition produced (y-axis) as dependent on liking rating (x-axis) and the word order in the monologue during exposure (plotted lines).

certain contexts. In Experiment 2 liking modulated the degree of learning when participants believed the speaker to perform more poorly than they did but not otherwise. It is unclear whether liking was the factor driving the greater learning from speakers of low prestige in Experiment 1, as in Experiment 2 participants did not rate their liking of the speaker in the low prestige condition higher than in other conditions. At the same time it is possible that in Experiment 1 participants believed themselves to perform poorly as well and consequently liked and empathized with the speaker better, leading to greater learning.

One finding that unites both experiments is that effects of learning and modulation of learning are restricted to cases where the speaker supposedly performed poorly. An alternative interpretation of the results, then, is that participants processed the monologue in a different manner when they believed the speaker performed poorly. For example, participants might have been less worried or felt less threatened when listening to the speaker who performed poorly, allowing them to concentrate more on the content. In general, it is known that worries, such as those induced by stereotype threat, can reduce cognitive resources and interfere with performance (Beilock, Rydell & McConnell, 2007). It might then be the case that only when listening to the speaker who supposedly performed poorly did participants pay enough attention to the speech of the speaker. Alternatively, one may hypothesize that the enhanced effects at the low prestige condition might be due to a shift of attention from content to surface features. The speaker was describing the strategies he used during the task. When his performance was reported to be poor, participants should be less motivated to adopt them. Participants might have therefore paid less attention to the content of what he said and processed it at a shallower more surface-focused level.

The results of Experiment 2, then, support the claim that individuals do not learn to the same degree from all input they receive but learn more from certain speakers or in certain contexts. Although the results do not provide an unequivocal answer regarding which speakers are considered model speakers whose language is particularly likely to be learned by others, they do indicate that the degree to which listeners like the speakers enhances learning in some cases and might lead to adjusting to a divergent pattern when the speaker is disliked.

## GENERAL DISCUSSION

Individuals learn language, including its grammatical patterns, from their linguistic input. This process of learning is often described as automatic and invariant across contexts. Individuals are assumed to track the statistics of all input. Although accounts differ regarding how the input leads to a modification of the representations, the accounts tend to assume that this process of adjustment occurs regardless of the source of the input or the context. The results reported in

this article show that this is not the case and that individuals do not learn equally from all speakers and in all contexts, but that factors such as the speaker's status and likability influence the degree to which listeners will learn from his or her patterns.

This article is not the first to show variability in the way individuals treat linguistic input from different speakers. Previous research has shown that social factors can influence interpretation of speech (e.g., Niedzielski, 1999), expectations regarding its content and form (Trude & Brown-Schmidt, 2012; Van Berkum, Van Den Brink, Tesink, Kos, & Hagoort, 2008), degree of accommodation in interaction (Giles et al., 1991), and potentially long-term phonetic convergence (Pardo et al., 2012). This notion of the social modulation of processing and learning, however, has not adopted in the domain of grammatical learning and has rarely been integrated into models of language learning in general. This article shows that even at the grammatical level, learning is vulnerable to social and contextual factors.

Although the studies indicate variability in grammatical learning, the exact pattern of variability that was found might differ across situations. Most notably, whereas effects of structural priming have been found and replicated many times (Pickering & Ferreira, 2008; but see Healey, Purver, & Howes, 2014), they do not appear in all conditions in the current studies. The difference is probably due to several aspects of the studies. First, the current studies differ from others by testing grammatical convergence in a different task from the one in which participants were exposed to the grammatical structures. In this manner the studies examined an adjustment of individuals' general representations. In general, priming and learning are stronger when context and task remain fixed (Godden & Baddeley, 1975; Kolers & Roediger, 1984). The smaller convergence effects that were found might therefore be representative of generalized learning and smaller than context-specific learning.

These studies, similarly to other structural convergence studies, also differ in one potentially crucial way from most communication accommodation studies at the phonetic level. Many phonetic convergence studies examine convergence on aspects of speech in which there are relatively stable individual differences. That is, although speakers vary in the exact formant values they use each time for the different vowels or in their pitch, speech rate, or use of regional variants, their variance is still restricted to a specific range. Some speakers speak faster than others on average, have a higher pitch in general, use less standard variants in general, and so forth. In contrast, the grammatical structures that are often manipulated in structural convergence studies do not seem to reflect stable individual preferences. In fact, in this study baseline preferences were collected to control for them if needed, yet participants' baseline performance was not predictive of participants' postexposure performance in either study (all  $Z < 1$ ), suggesting no stable structural preferences. This lack of stable individual

preferences might reduce the degree to which social factors modulate learning, because the patterns are less associated with the individual speaker and less reflective of that speaker's style. Therefore, the fact that there was modulation of social factors, such as liking, even in this case is particularly impressive and suggests that effects might be stronger in other cases, where the variation at hand has higher intraindividual consistency.

The current findings also differ from previous literature by failing to find greater learning from high status speakers. There are several potential reasons for that. One possibility is that status matters more at the phonetic level, where effects of prestige have been previously found (Gregory & Webster, 1996). This might be especially true for grammatical constructions that do not differ in grammaticality or register and are not indexical of social standing or identity. Alternatively, it might be the case that status influences convergence in the interaction but not the adjustment of one's general representations. That is, it might be the case that people manifest greater compliance when interacting with high status individuals but do not learn more from them. Another option mentioned earlier is that the high and similar status conditions imposed a high cognitive load or pressure that prevented participants from attending to the details of the speech. Finally, the possibility that seems most likely is that the role that status plays, as well as other social factors, depends on the context, and at different contexts different goals and factors take precedent. This account fits with Balçetis and Dale's (2005) finding of greater convergence toward the likable interlocutors in one case but lower convergence toward them in other circumstances. Further research should continue investigating whether and how the influence of social factors on accommodation and learning depends on the situation at hand.

The discussion above assumes that prestige was indeed successfully manipulated in the study. One limitation of the study, however, is its use of performance on an intelligence test as a proxy for prestige. In other words, it might be the case that the study failed to replicate the effect of prestige because it failed to induce differences in prestige. Considering the participant population—college students—it is reasonable to assume that intelligence is something they value. That said, being more intelligent might not be associated with the same type of prestige as being rich, popular, or successful in another manner. It is possible then that manipulating prestige by manipulating popularity or another aspect of success would yield different results.

To conclude, this article shows that language learning, even at the grammatical level, is modulated by social factors. It shows that individuals' learning from others' linguistic patterns depends on the others' social standing and the degree to which individuals like them. It also shows, however, that the roles that such factors play interact and might change from context to context. The findings thus indicate that further research should examine how the social



context influences learning and that models of language learning should integrate such social and contextual factors into their learning mechanisms.

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