Texting, techspeak, and tweens: The relationship between text messaging and English grammar skills

Drew P. Cingel
Wake Forest University, USA

S. Shyam Sundar
Penn State University, University Park, USA; Sungkyunkwan University, Korea

Abstract
The perpetual use of mobile devices by adolescents has fueled a culture of text messaging, with abbreviations and grammatical shortcuts, thus raising the following question in the minds of parents and teachers: Does increased use of text messaging engender greater reliance on such 'textual adaptations' to the point of altering one's sense of written grammar? A survey (*N* = 228) was conducted to test the association between text message usage of sixth, seventh and eighth grade students and their scores on an offline, age-appropriate grammar assessment test. Results show broad support for a general negative relationship between the use of techspeak in text messages and scores on a grammar assessment, with implications for Social Cognitive Theory and Low-Road/High-Road Theory of Transfer of Learning. These results indicate that adolescents may learn through observation in communication technologies, and that these learned adaptations may be transferred to standard English through Low-Road transfer of learning. Further mediation analyses suggest that not all forms of textual adaptation are related to grammar assessment score in the same way. 'Word adaptations' were found to be negatively related to grammar scores, while 'structural adaptations' were found to be non-significant.

Keywords
adolescents, English grammar, low-road/high-road theory of transfer of learning, observational learning, text messaging, textual adaptations

Corresponding author:
Drew P. Cingel, Wake Forest University, 1834 Wake Forest Road, 307 Carswell Hall, Winston-Salem, NC 27101, USA
Email: cingdp0@wfu.edu

Throughout the world, cell phones have become omnipresent in classrooms, cafeterias, and hallways. This boom in popularity has led to diverse uses by adolescents. No longer used solely to place a call, cell phones are increasingly used to send text messages (Jones and Schieffelin, 2009). Research has indicated that Americans use cell phones to send text messages more than they use them to place phone calls (Mindlin, 2008). A 2009 report by the International Association for the Wireless Telecommunications Industry found that 1.5 trillion text messages were sent and received in the United States in 2009 alone (CTIA, 2010). In addition, a 2010 report by the Nielsen Company found that American adolescents ages 13–17 send more text messages than any other age group, averaging 3339 a month, a rise of eight percent over the past year. Forty-three percent of teenage respondents indicated that they got a cellular phone primarily for text messaging (The Nielsen Company, 2010). However, this dramatic rise in popularity has led parents and teachers to question the effect of using this technology on adolescents' understanding of English grammar during a developmentally critical period of language-skills acquisition.

Similar to synchronous online communications such as instant messaging, the speed, ease, and brevity of text messaging have created a perfect platform for adapting the English language to better suit attributes of the technology. This has led to an evolution in grammar, the basis of which we shall call 'techspeak.' This language differs from English in that it takes normal English words and modifies them (what we call 'word adaptation'), using conventions of abbreviation, such as initialisms (lol for laughing out loud), omission of non-essential letters (wud for would), and the substitution of homophones (gr8 for great) (Jones and Schieffelin, 2009). In addition, techspeak adapts standard conventions of structure by de-emphasizing proper punctuation and capitalization (what we call 'structural adaptation'), all in the interest of quickness. This evolution of the English language is no longer confined solely to electronic communications, as these adaptations have found their way into day-to-day use of language in non-mediated settings. Indeed, there is much debate among leaders in education, teachers, and parents as to the effects of techspeak on the grammar and writing skills of adolescents in the classroom setting (Eger, 2007; Sidener, 2003).

Pre-adolescents and adolescents (henceforth referred to simply as 'adolescents') are an important age group to study when considering this question because they have long been considered the main source of linguistic innovation as they attempt to express themselves in unique ways (Baron, 2005). Adolescents often differ from college-aged individuals in that they are much more accepting of techspeak and use this language much more in text message conversations (Baron, 2005). As noted earlier, the 13–17 year-old age group sends more text messages per month than any other age group. However, the youngest half of this age group is most important to study with regard to training in grammatical skills because they are in their formative learning years in middle school. Routine use of textual adaptations by current and future generations of 13–17-year-olds may serve to create the impression that this is normal and accepted use of the language and rob this age group of a fundamental understanding of standard English grammar. This explains why parents, teachers, and school administrators worry about the effects of techspeak (Eger, 2007; Sidener, 2003). It is important to note, however, that the United States is not the only country currently experiencing this phenomenon. For example, researchers have examined the use of text messaging among Finnish

(Kasesniemi and Rautiainen, 2002), Swedish (af Segerstad, 2005), and British (Grinter and Eldridge, 2001) users. In all cases, these studies found that the use of text messaging among users resulted in the shortening of their respective language, similar to what has been seen in the United States. In addition, Grinter and Eldridge (2001) found that adolescents reported a preference for text messaging over other forms of communication due to its brevity and overall convenience.

Since some of the writing that occurs in school is relatively informal in nature, it is not too surprising that techspeak has begun to enter the classroom setting. Daily, adolescents are asked to write in journals, express creatively, or take notes. These are considered to be more informal modes of writing because they are rarely used for assessment purposes in the classroom. On the other hand, writing activities such as essay composition would be considered a more formal mode of writing because they are often used for assessment purposes (Lenhart et al., 2008). However, the tendency to write informally appears to be stronger among those who use mobile texting devices. A recent Pew survey for the National Commission on Writing found that American adolescents who own a cell phone were more likely to use informal writing styles in other electronic communications, such as instant messaging and email, than adolescents who did not own a cell phone. Survey results indicate that the more adolescents use electronic communication to speak with their friends, the more likely they are to ignore punctuation and capitalization rules (70 percent) or use text shortcuts, such as abbreviations (57 percent) in other electronic communications (Lenhart et al., 2008).

It is not currently known, however, whether techspeak is associated in any way with the writing skills of adolescents outside the context of electronic communication. Although we will argue that there is theoretical evidence for a causal link between text messaging adaptations and adolescent grammar, it is important to note that this research study will not be able to show this causal link, given its survey design. It will, however, explore the previously untested relationship between text messaging and grammar among adolescents in a correlational manner. With sixth, seventh, and eighth grade students as a sample, a group that has grown up using both normal English grammar and techspeak, we used the following research questions to guide this study:

RQ1: What is the relationship between the number of text messages an adolescent sends (and receives) and his/her scores on a grammar test?

RQ2: Is the use of different styles of adaptation common in text messages (word and structural) related differently to the grammar assessment scores of adolescents?

Literature review

Before investigating the relationship between texting and grammar, we must ask two fundamental questions: why do adolescents engage so heavily in text messaging and how do they view the writing that they compose through electronic transmissions? The Pew survey for the National Commission on Writing found that 85 percent of all 12–17-year-olds used some form of electronic media to send messages (text messaging, instant messaging, email, or commenting on social message sites). Interestingly, a majority of the adolescents

(60 percent) do not view this type of communication as 'real' writing, with 64 percent of the respondents admitting to the use of informal writing style while using these forms of media (Lenhart et al., 2008). Rather than seeing text messaging as a form of writing akin to composing an essay in class, adolescents in this survey reported electronic compositions, such as text messaging, as being in the same category as phone calls and hallway greetings (Lenhart et al., 2008). This recognition of the difference between writing and texting is important because the survey also found that a vast majority of adolescents, 86 percent, think that having good writing skills is important for success in life. Only 11 percent reported that electronic communications have a negative effect on their writing skills.

Adolescents are active consumers of electronic media and will therefore tend to downplay or ignore the potential for negative effects. The theoretical framework of uses and gratifications would posit that adolescents are interested in the utility of a technology and therefore have the motivation as well as prior interest for using it (Palmgreen et al., 1985). In studying adolescents' motives for texting, the concept of 'perceived utility' has proven quite important. Defined as the extent to which individuals adopt a new technology due to its convenience (Leung, 2007), this concept has been operationalized through the use of Likert-type scales, many of which combine a variety of potential gratifications. For instance, Leung (2007) used a 20-question index representing such gratifications as escape, affection, convenience, entertainment, fashion, inclusion, sociability, and relaxation, and found that text messaging was most closely linked to the gratification of convenience. In keeping with this, Kim et al. (2008) found that perceived usefulness and perceived ease of use are major factors in the adoption of text messaging, along with perceived enjoyment and perceived monetary value. Based on this, we can hypothesize:

H1: Adolescents who score high on perceived utility of text messaging will report higher rates of text messaging.

Social cognitive theory is also useful in the context of discussing motivations behind engaging in techspeak while using electronic media. This theory argues that humans are self-developing and self-reflecting while relying on observational learning for expanding their knowledge and guiding their behaviors (Bandura, 1986). Observational learning depends on four main sub-functions: attention, retention, production, and motivational processes. In order to learn by watching someone else, one must be able to pay attention, remember the information learned, figure out how to recreate the learned behavior, and be motivated to repeat the behavior when an appropriate situation arises (Bandura, 1986). Braaksma et al. (2001) found that adolescents who learn to write through observation have high levels of motivation to recreate the writing behavior. Thus, they can more easily deploy their previous skills and knowledge in order to learn a new set of skills and transfer those new skills to different situations. This could have implications for our study in that adolescents who learn techspeak through observation should be more motivated to recreate the language in an effort to keep up with their peers and also the speed requirements of interacting via text messaging.

H2: Adolescents who receive more text messages from their peers will report higher levels of textual adaptation in the text messages that they themselves send.

Braaksma et al. (2004) also found that students who learn writing through observation develop a better base for writing. This base helps them in the orchestration of the writing process. Previous research has indicated that observational learning is an effective way of learning how to write (Graham and Harris, 1994; Zimmerman and Kitsantas, 2002). Braaksma et al. (2001) found that when students observe others in order to learn writing skills, they focus and reflect upon the actual writing approach taken by the models. Also, students do not write when learning observationally, which allows them to focus solely on the actions of the behavior. Graham and Harris (1994) found that observational learners use the strategies of observation, evaluation, and reflection, which allows them to gain information and refine strategies for new writing skills. When adolescents observe instead of act, they are able to learn more procedural knowledge, which deepens schemas about the task at hand. Therefore,

H3:   Adolescents who self-report receiving a high number of adaptations will also report employing a large number of adaptations in their own writing.

Observational learning also raises self-efficacy levels or personal beliefs in one's own capabilities (Bandura, 1986). Research by Schunk (1991) found that the effectiveness of observational learning and self-efficacy levels depended on the perceived similarity in competence between the model and the observer. A study by Braaksma et al. (2002), as well as research by Schunk and Hanson (1985), found that model-participant similarity facilitated learning. In addition, participants with weak writing skills benefited from observational learning. Instead of focusing on executing writing tasks, they focused on watching others and putting ideas together coherently in order to form an argument. Previous writing skills were not relevant in their ability to learn written argumentation from others.

This research can be applied to the learning of techspeak. Generally, adolescents converse with others who are of similar competence via text messaging. In doing so, they observe the writing skills of others. Much of the evolution of techspeak centers on shortening language in order to type more quickly. If an adolescent were to see a particular construction that aids in this process, s/he would be more likely to remember it and use it the next time a similar situation arises. Based on the work of Braaksma et al. (2001), it can be concluded that since adolescents do not focus on learning to write while online or while texting, they are more likely to focus on the writing approach taken by the model. If an adolescent is motivated to recreate the action, s/he will do so more quickly and will be able to do it across various mediums. However, as techspeak differs in form from standard English, there should be a change in grammar skills as adolescents begin to use their texting and online writing styles in offline contexts.

In addition to social cognitive theory and observational learning, Salomon and Perkins (1989) proposed an alternative theory of learning that can be used to better understand how adolescents come to use techspeak in place of normal, everyday English. Called the Low-Road/High-Road theory of transfer of learning, it predicts that two tasks similar in nature, such as composing a text message and composing standard English writing, will involve an automatic transfer of skills (Salomon and Perkins, 1989). This phenomenon is considered to be low-road transfer. As previously discussed, a majority of writing that

occurs in schools is informal in nature (Lenhart et al., 2008); therefore, low-road transfer is quite likely given that writing in schools matches texting in terms of informality of context. Over time, such a direct, unconscious transfer of textual adaptations from tech-speak to informal writing in school is likely to result in lower grammatical ability. This lowered ability should then be seen even when the situation is more formal, such as on a classroom-administered grammar assessment.

The other mechanism, called high-road transfer, is said to occur when previously learned behaviors are used with a higher degree of forethought. Therefore, if an adolescent were to deliberately sacrifice grammar for speed while composing a text message, thereby using many textual adaptations, this would be considered high-road transfer. Upon the mastery of the adaptations commonly found in text messaging, adolescents may come to use them with more forethought, even when the situation is formal in nature but necessitates speed, as in the case of a timed test in the classroom.

Therefore, both routes of transfer help to explain why higher levels of adaptation in text messaging may transfer over to an adolescent's performance on a standard English writing test. Based on this rationale and the preceding discussion on observational learning, we put forward the following predictions:

H4: The more an adolescent sends or receives text messages each day, the lower their scores on a grammar assessment.
H5: The more adaptations an adolescent reports using in sent text messages, the lower their score on a grammar assessment.

Method

A self-report survey of texting behaviors and message characteristics, coupled with an in-class grammar assessment, was conducted with middle-school students in order to address the research questions and hypotheses of our study.

Participants

Participants were sixth, seventh, and eighth grade middle school students from a mid-sized school district on the east coast of the United States. English teachers were approached prior to the beginning of the study and asked to volunteer class time. The school district's administration was approached for consent prior to data collection. In all, 542 surveys were administered to students in the classroom; 228 completed surveys were returned, for a response rate of 42.1 percent. Of this final sample, 36.8 percent were from sixth grade ($N = 84$), 21.5 percent from seventh grade ($N = 49$), and 41.7 percent were from eight grade ($N = 95$). Ages ranged from 10 to 14, with a mean of 12.48. Males represented 39.1 percent of the final sample.

Dependent measure

The dependent measure was a 22-item diagnostic grammar assessment instrument. This assessment was adapted from a ninth-grade grammar review test. The test was reviewed

to ensure that students had been taught all of the concepts covered in this assessment by sixth grade so that the same version of the grammar assessment could be administered to all three grades. This was done so that adolescents' scores could be compared to one another across grades. The first portion of the assessment consisted of 16 questions designed to test the student's grasp of verb/noun agreement, use of correct tense, homophones, possessives, and apostrophes. These questions asked adolescents to respond by circling the word needed to make the sentence correct. For example, participants were asked to answer 'The pictures in this new magazine (show, shows) the rugged beauty of the West.' The second portion of the assessment asked participants to indicate whether or not a sentence was correct, such as 'The boy yelled, "Please help me"!' (Correct/ Incorrect). This portion tested the student's understanding of comma usage, punctuation, and capitalization. Sixth graders scored a mean of 17.26 ($SD = 3.11$), seventh graders scored a mean of 17.92 ($SD = 2.74$), and eighth graders scored a mean of 18.27 ($SD = 2.66$). For a complete listing of items used in the grammar assessment, please see Appendix A.

Independent variables

Usage. Adolescents were first asked to think about their average day and record the time they spend using a variety of technologies. Importantly, participants were asked to self-report the number of text messages they send and receive on an average day. In addition, respondents were asked to indicate the amount of time they spend studying, watching television, listening to music, and reading for pleasure. Finally, they were asked for the amount of free time they have each day. Answers were reported with a number which indicated the average amount of time spent engaging in each activity or the average number of sent and received text messages. Adolescents reported receiving 46.03 ($SD = 83.61$) and sending 45.11 ($SD = 85.24$) text messages per day. This method was used instead of a usage diary in an attempt to promote a higher response rate because it would be more efficient and less onerous than completing a diary every day.

Attitudes toward text messaging. Next, the survey asked adolescents to record their attitudes toward text messaging by using a 5-point Likert-type scale, where an answer of 1 indicated that the respondent strongly disagreed and an answer of 5 indicated strong agreement. They were asked questions regarding the convenience and overall utility of the technology, such as 'The speed of text messaging makes it convenient to use.' Questions were also included to determine if an adolescent's use of these technologies is primarily driven by parents or friends. For instance, 'I text because my parents do' or 'I text because most of my friends do.'

Following an exploratory factor analysis, the text messaging attitudes scale was split into 3 indices: perceived usability of text messaging, parent-driven text messaging, and peer-driven text messaging. The perceived usability index consisted of the following 6 items: 'I think texting is a fun thing to do,' 'If I don't use text messaging, I won't be considered "cool" by my classmates,' 'Texting helps me to feel connected,' 'The speed of text messaging makes it convenient to use,' 'Texting is a waste of my

time' (reverse-coded), and 'I hate the way people spell when they text' (reverse-coded) (Cronbach's α = .78). The mean score on this index, obtained by averaging the 6 items, was 3.74 (*SD* = .76). The parent-driven text messaging index consisted of two items: 'I text because my parents do' and 'I use text messaging to talk with my parents.' This index had a moderate but significant correlation (Pearson's *r* =.31, *p* < .01) and a mean of 2.42 (*SD* = .89). Finally, the peer-driven index consisted of two items: 'I text because most of my friends do' and 'I primarily use text messaging to speak with my friends.' (Pearson's *r* =.34, *p* < .01). The mean score on this index was 2.43 (*SD* = .78).

Textual adaptation. The independent variable of sent and received message adaptation was assessed by asking participants to self-check their last three sent and their last three received text messages to separate individuals and record the number of adaptations present in each text message. This was done to ensure greater generalizability by including a wider range of messages, with a wider range of text message length. Also, it increased the chances of the text messages involving different groups of individuals, such as friends, parents, or siblings. For each of the three received text messages, participants were asked to list their relationship to the sender. This was also done for each sent text message. Participants then self-reported the number of adaptations they found in each text message and classified a given adaptation into one of five categories. The five categories of common text message adaptation identified in the survey were use of abbreviations or initialisms, omission of non-essential letters, substitution of homophones, punctuation adaptations, and capitalization adaptations. The first three are common types of word adaptation identified by Jones and Schieffelin (2009). The last two are more common structural changes found in text messaging. Adolescents were instructed to read their text message, paying attention to the grammar used, before reporting the amount of each type of adaptation with a single number. They were instructed to not record any adaptations unless they were completely sure that it was an adaptation.

Additionally, participants were instructed, both verbally by the researcher and in the written instructions, to count an adaptation in one category only. This was done in an effort to ensure that adaptations were counted only once. Participants were reminded in writing to follow this self-reporting rule during each self-assessment section. Also, participants were instructed to only report adaptations that were commonly found in text messaging. Following each category, examples of these adaptations were provided so that respondents would be better able to self-assess their text messages. For instance, respondents were given the examples of 'lol' and 'btw' for abbreviations or initialisms, 'wud' and 'u' for the omission of non-essential letters, and 'be4' and 'gr8' for homophones. Overall, participants self-reported 7.17 (*SD* = 5.39) adaptations per received text message and 5.48 (*SD* = 5.37) adaptations per sent text message.

Procedure

Participants were introduced to the study by way of an opening statement in their classroom. After this was completed, they were given a grammar assessment, which

was completed during class time. The grammar assessment lasted about 10 minutes. Once it was completed, participants handed in the grammar assessments and were in turn given a survey to complete at home. Attached to the take-home survey was a letter to parents, informing them about the procedure of the study, and seeking their informed consent by way of a signature for their child's participation in this research. In addition, adolescents aged 14 were asked to sign the informed consent form themselves. Adolescents aged 13 and below were told that they would be given the opportunity to verbally assent when the researcher returned to collect the surveys. Participants were told about the types of questions that they would need to answer on the survey and given time to begin completing the survey during class time, at the teacher's discretion. Participants were informed that they were to think of their average day when completing questions regarding their media use. Finally, those who did not use a certain technology were told only to answer questions that applied to the technologies they have used. They were also given the opportunity to ask any questions they may have. Participants were given one week to return the completed surveys to class. After one week, surveys were collected and participants were verbally notified in the classroom about the study's completion. Take-home surveys were linked to the grammar assessments through the use of unique identification codes. Once both portions of the study were linked, the identification codes were removed.

Results

Preliminary analysis indicated a significant difference ($p < .05$) in grammar assessment scores between sixth and eighth grades. With this in mind, all subsequent analyses were performed with grade as a control variable, in order to statistically isolate and rule out the effect of grade level on dependent variable of interest. In addition, all collected data were reviewed to ensure that self-reported answers matched in certain key areas. Specifically, surveys of adolescents who reported sending and receiving text messages were checked to make sure that they did not skip the self-report message adaptation section of the survey. Similarly, the surveys of adolescents who reported not sending or receiving text messages were reviewed to ensure that they did not respond to the self-report message adaptation section, since they should not conceivably have any text messages to self-assess. Surveys which did not match either constraint were excluded from data analysis. Twelve surveys matched these exclusion criteria and were therefore discarded.

Researchers first tested the relationship between perceived utility and total number of text messages sent and received. This resulted in a significant relationship ($\beta = .35$, $p < .01$), indicating support for H1, which predicted that adolescents high in perceived utility of text messaging would in turn send more text messages. In addition, the relationship between an adolescent's average number of reported adaptations in text messages and perceived utility approached significance ($\beta = .15$, $p = .08$), adding to the understanding of the relationship proposed in H1. The relationship of H2, predicting that adolescents who receive more text messages from their friends will report higher

levels of textual adaptations in their own text messages, was tested next in order to see if adolescents who are peer-driven to send text messages will use more adaptations. This test was not statistically significant (β = .10, p = .24). However, the average number of adaptations in sent text messages was significantly related to the average number of received adaptations (β = .52, p < .01). This result indicates support for the predicted positive relationship of H3.

Importantly, a significant negative association was found between the total volume of text messages (combining both sent and received messages) and grammar assessment score, as predicted by H4 (β = -.14, p < .05). The proposed negative relationship between average sent message adaptation and grammar assessment score was tested next and found to be significant (β = -.22, p < .01), lending support to H5. In sum, the results of these five hypotheses help to answer the question posed in RQ1, as to the relationship between the number of sent and received text messages and grammar assessment scores.

In order to better understand the variance in grammar assessment scores, predictor variables were tested as part of a stepwise multiple regression model. Specifically, four variables were tested in the following order: grade, average amount of sent message adaptation, total number of text messages sent and received, and perceived utility of text messaging. The average number of message adaptations in received text messages was excluded from this model due to this variable's multicollinearity, or high correlation, with average sent text message adaptation. This analysis yielded two statistically significant predictors of grammar scores: grade (β = .23, p < .01) and average sent message adaptation (β = -.20, p < .01). Neither total number of text messages (β = -.09, p = .10) nor perceived utility (β = -.12, p = .14) were found to be significant predictors. This result gives additional support to the negative relationship between average sent message adaptation and grammar assessment score, as predicted by H5.

To further understand this relationship and examine which forms of textual adaptation were associated negatively with the grammar score, adaptations were split into two groups: Word Adaptations (consisting of abbreviations or initialisms, omissions of non-essential letters, and homophones) and Structural Adaptations (consisting of punctuation

Table 1. Stepwise Multiple Regression analysis of text messaging variables on participants' grammar assessment scores.

Independent variables	β	R^2	p
Grade	.230	.054	.004*
Average sent adaptation	−.197	.101	.007*
Total text messages	−.094	.118	.095
Perceived usability	−.124	.132	.137

Note: R^2 statistic is cumulative
*indicates significant result (p < .05)

and capitalization changes). These two groups were then used as predictors of grammar scores.

With this in mind, a separate stepwise multivariate regression analysis was performed while incorporating these two variables in place of average sent message adaptation. Interestingly, average sent word adaptation became a stronger predictor of grammar assessment score (β = -.30, $p < .01$) without structural adaptation, with grade remaining a significant predictor (β = .20, $p < .05$). When removed from average sent adaptation, average sent structural adaptation was a non-significant predictor of grammar assessment score (β = .02, $p = .84$) (please see Table 2), thus providing an answer for RQ2, which asked about the relationship between word adaptations, structural adaptations, and adolescent grammar assessment scores.

Thus, given support for H3, which proposed that average received adaptations and average sent adaptations are significantly related, average sent word adaptation was added to a separate model as a covariate, with average received word adaptation as the predictor variable and grammar assessment score as the outcome variable. The effect of average received word adaptation on grammar assessment score now became insignificant ($p = .08$), thereby revealing a full-mediation effect (Baron and Kenny, 1986). This result indicates that the average number of sent word adaptations mediates the relationship between average number of received word adaptations and grammar assessment score (please see Figure 1).

In order to further illustrate this relationship, average sent word adaptation was entered as a mediating variable in the Preacher and Hayes (2004) SPSS macro. Here, the relationship between average received word adaptation and grammar score (total effect = -.24, $p < .01$) became insignificant when average sent word adaptation was added as a mediating variable (direct effect of average received word adaptation = -.15, $p = .08$). These coefficients are unstandardized, accounting for the differences between these and the coefficients reported in Figure 1. A 5000-sample bootstrap analysis yielded a point estimate of -.09 and a 95 percent bias-corrected and accelerated confidence interval of -.17 to -.03. The absence of a zero in this interval lends support for the indirect effect of received word adaptation on grammar assessment score via sent word adaptation. This analysis further clarifies results for RQ2.

Table 2. Stepwise Multiple Regression analysis of techspeak variables on participants' grammar assessment scores.

Independent variables	β	R^2	p
Average sent word adaptation	−.307	.105	.001*
Grade	.196	.143	.014*
Average sent structural adaptation	.018	.143	.835

Note: R^2 statistic is cumulative
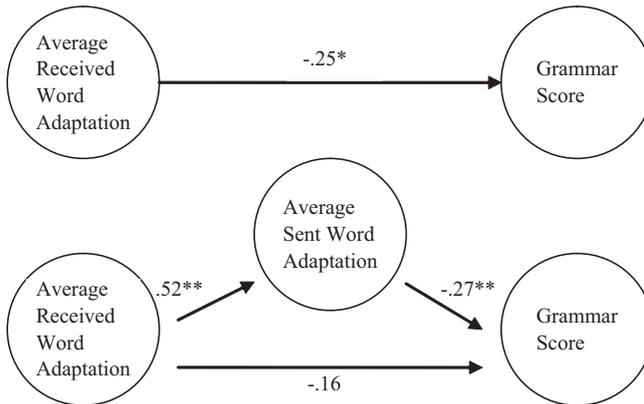*indicates significant result ($p < .05$)

Figure 1. Mediation analysis of average sent word error on the relationship between average received word error and grammar assessment scores.
* indicates *p* < .05
** indicates *p* < .01
Reported coefficients are standardized beta weights

Discussion

The results of this study lend support to a general negative relationship between text messaging and adolescent grammar skills. First, adolescents who find text messaging to be a useful technology will use this technology more often. Overall, they scored quite high on both usage measures included in the survey. Furthermore, findings indicate that those who perceive text messaging to be high in utility report sending and receiving more textual adaptations. Coupled with the previous finding, this suggests that most adolescents encounter a sizeable number of grammatical adaptations while text messaging on a daily basis. These results add to the findings of Leung (2007) and Kim et al. (2008). Adolescents are active participants when engaging with text messaging technologies and perceive them to be useful and convenient. It is in this nearly constant engagement with the technology that adolescents encounter the grammatical adaptations of techspeak. Although the freedom to use adaptations of language in text messages may make an adolescent perceive it to be a more useful medium for communication, results of this study show clearly that these adaptations are negatively related to an adolescent's grasp of standard English grammar.

Our findings also indicate that the number of reported adaptations in received text messages was significantly related to the number of adaptations in sent text messages as well as to grammar assessment scores. A multivariate regression analysis found that average sent adaptation was negatively predictive of grammar assessment score, accounting for nearly five percent of the variance in the latter. However, further analyses indicated that not all forms of adaptation in text messages are negatively predictive

of grammar scores. Specifically, average sent word adaptation, consisting of abbreviations, letter omissions, and homophones, was found to negatively predict grammar score, so much so that it accounted for more variance (more than ten percent) than grade (five percent). Average structural adaptation, consisting of capitalization and punctuation adaptations, was not found to be a significant predictor of grammar score. This relationship could be due to a push in younger grades to ensure that students know a good sentence starts with a capital and ends with a period. This may have made it easier for participants in our study to code-switch between writing a text message and using appropriate English grammar in terms of punctuation and capitalization.

Perhaps the most interesting result of this study is that the average number of sent word adaptations mediated the relationship between the number of received word adaptations and grammar assessment score. Here, the data would seem to indicate that adolescents use adaptations of language in their sent messages based on what they have seen in their received text messages, in accordance with the observational learning paradigm proposed by social learning theory.

In general, results of this study indicate that adolescents may be able to learn writing skills through observation in an electronic medium, adding to the results of Braaksma et al. (2001), Graham and Harris (1994), and Zimmerman and Kitsantas (2002). These previous studies found that observational learning played an important role in writing, but they were all referring to standard paper and pencil writing. Our study extended these findings to electronic media. As predicted by social learning theory, adolescents are more focused on the observed approach to writing and therefore are even more likely to pick up ideas from the writing to which they are exposed in text messages.

The overall findings of this study are important in light of the continuing trend in schools to use new forms of electronic technologies for educational purposes and the continuing trend among adolescents to use them at higher rates. This study lends empirical support for anecdotal evidence provided by teachers. There is no question that techspeak has crept into classrooms; however, the question to date was whether or not adolescents were able to switch between writing text messages and using correct English grammar for class work. The results of this study indicate that most adolescents are not able to do so.

Techspeak is an important part of the writing process, aiding the efficiency and brevity of sending a text message, a communication platform where speed is of utmost importance. While the use of word and structural adaptations is normal, useful, and not inherently incorrect when confined to text messaging, problems do occur when these adaptations carry over into standard writing practices, especially in the classroom. There is no question that there are differences in grammar between techspeak and standard English. In fact, results of the Pew survey indicate that adolescents do not view electronic communication, such as text messaging, as 'real' writing (Lenhart et al., 2008). This would mean that they may not be using word adaptations consciously, with a great deal of forethought, in a real writing test or task. Therefore, we may be able to rule out the high-road transfer mechanism. The carry-over of grammatical compromises of text messaging to grammar tests appears to be due to context similarities such as informality of the settings, as predicted by low-road transfer.

Practically, these findings have many implications, especially in the classroom. Adolescents should be educated to understand the differences between techspeak and standard English grammar, recognizing that there is a time and a place for both forms of communication. It is impossible to stop techspeak entirely; indeed, it is a very useful form of communication when confined to places where formality takes a backseat to efficiency and speed. Electronic technology usage for the purposes of teaching should be monitored to ensure that this does not allow adolescents to further habituate to using techspeak in the classroom.

Limitations

A major limitation of our study is the inability to tap into texting as it occurs in a temporally dynamic fashion. The essence of texting is the immediacy of sending and receiving messages, thereby affording plenty of opportunities for priming by one's communication partners. Unfortunately, this study was unable to examine techspeak under the lens of priming theory. It would have been helpful to see if seeing adaptations in a received text message from a certain friend primed an adolescent to use adaptations in another text message. However, when adolescents were asked to report their relation to either the sender or the receiver, they were only asked to indicate whether that person was a friend, parent, or relative. This did not allow researchers to accurately match text messages and therefore did not allow for priming analysis.

In addition, rather than asking adolescent respondents to complete a usage diary for their electronic communications, we asked them to estimate their usage of a number of different media. This was done to help ensure a greater response rate, since it required each participant to fill out the section only once, rather than having to return to it each day over the course of a week. Since participants did not receive compensation for their time, every effort was made by the researchers to craft an instrument that was easy for adolescents to complete in a timely fashion. While there is a chance that participants artificially raised the amount of time they spend engaged with each medium to appear more popular, efforts were made to ensure that this section, being the first part of the survey, was completed in the classroom first, so that students would not bias their responses by discussing it with other students. This potential for socially desirable outcomes is less worrisome in retrospect given the absence of a ceiling effect for this variable and the presence of statistically significant relationships involving this variable.

To ensure that our respondents remained anonymous, they were asked to self-assess their own text messages, rather than submitting the text messages to the researcher for coding. Although by the sixth grade adolescents have been taught the skills necessary to recognize common adaptations as being different from standard English grammar, thereby allowing them to self-assess their text messages for these types of adaptations, it is entirely possible that not all respondents were able to report these numbers with the same level of precision. This, however, would only serve to underestimate the number of adaptations actually present in the text messages. It would seem that adolescents with poor grammar skills would report a

conservative estimate while adolescents with strong grammar skills would report an estimate closer to the true number of adaptations present. If this indeed is the case, we would expect to see better grammar scores among those who report more adaptations, which would be exactly counter to our hypothesis (and findings), thereby making our procedure a conservative test of the proposed relationship between adaptations and grammar skills. Participants were also asked to record an adaptation into the one category in which it best fit, so as to not overestimate the number of adaptations present in text messages. Multiple examples of each of the adaptations were given in the instrument, so that participants would be better able to self-assess their text messages in a more accurate manner. Further, participants were instructed to only count an adaptation if they were sure that it was, in fact, an adaptation. This again would seem to provide a more conservative estimate of the number of adaptations actually present in respondents' text messages. In hindsight, since significant results were found in regard to the relationship between adaptations and grammar skills, this does not appear to be a major limitation either.

Finally, as referenced previously, due to the correlational nature of the research, causation cannot be inferred from these results. It could be that adolescents who are naturally weaker in their knowledge of English grammar use more adaptations in their text messaging.

Directions for future research

This research lays the groundwork for future studies. First, it would be helpful to examine an adolescent's use of techspeak in text messaging under the auspices of priming theory. This would allow for increased theoretical knowledge of this relationship, particularly in the common context of messages flying back and forth. Furthermore, it would be helpful to more closely examine those who do use word adaptations in their text messages but whose grammar skills do not seem to be affected, so that we can understand the strategies used by these adolescents to cope with the tension between the use of these adaptations and standard English grammar. This research could be used by teachers in the classroom to help those students who do use these adaptations in English writing. These and other related lines of investigation can help uncover the theoretical mechanisms governing the role of text messaging in shaping grammar and writing skills at a developmentally critical time for adolescent learners.

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Drew P. Cingel is a graduate student at Wake Forest University. His research focus is on new media technologies, children, and adolescents, as well as self-concept on the internet.

S. Shyam Sundar is a distinguished professor and co-director of the Media Effects Research Laboratory at Penn State University and World Class University (WCU) visiting professor of Interaction Science at Sungkyunkwan University in Seoul, Korea. His research investigates social and psychological effects of technological affordances in digital media interfaces.

Appendix A: Grammar assessment

1. There (is, are) two ways to make enemies.
2. One of the men forgot to bring (his, their) tools.
3. Gail and Sue (make, makes) friends easily.
4. The coach thought he had (tore, teared, torn) a ligament.
5. During the flood, we (dranked, drank, drunk, drunked) bottled water.
6. The boy called for help, and I (swum, have swam, swam) out to him.
7. Fortunately, Jim's name was (accepted, excepted) from the roster of those who would have to clean bathrooms because he was supposed to go downtown to (accept, except) a reward for the German Club.
8. I don't know how I could (lose, loose) such a big dress. It is so large that it is (lose, loose) on me when I wear it!
9. The man around the corner from the sandlots (come, comes) to our meetings.
10. The man and his little girls (was, were) not injured in the accident.
11. The pictures in this new magazine (shows, show) the rugged beauty of the West.
12. The orders from that company (is, are) on your desk there.
13. The (boys, boys', boy's, boys's) hats were lost in the water because they were careless in not tying them to the side of the boat.
14. (Its, It's, Its') an honor to accept the awards certificates and medals presented to the club.
15. Worried, and frayed, the old man paced the floor waiting for his daughter. (Correct/Incorrect)
16. The boy yelled, 'Please help me'! (Correct/Incorrect)
17. She got out of the car, waved hello, and walked into the house. (Correct/Incorrect)
18. When Suzie arrived at the dance, no one else was there. (Correct/Incorrect)
19. Dad and I enjoyed our trip to new york city. (Correct/Incorrect)
20. The boy's mother picked him up from school. (Correct/Incorrect)