THE EFFECTS OF MODALITY, ENGLISH LANGUAGE PROFICIENCY, AND LENGTH OF STAY ON IMMIGRANTS' LEARNING FROM AMERICAN NEWS ABOUT POLITICS

A Dissertation

presented to

the Faculty of the Graduate School

at the University of Missouri-Columbia

In Partial Fulfillment

of the Requirements for the Degree

Doctor of Philosophy

---

by

YULIA MEDVEDEVA

Dr. Glenn Leshner, Dissertation Supervisor

JULY 2017

The undersigned, appointed by the dean of the Graduate School, have examined the dissertation entitled

THE EFFECTS OF MODALITY, ENGLISH LANGUAGE PROFICIENCY,

AND LENGTH OF STAY ON IMMIGRANTS' LEARNING

FROM AMERICAN NEWS ABOUT POLITICS

presented by Yulia S. Medvedeva,

a candidate for the degree of doctor of philosophy,

and hereby certify that, in their opinion, it is worthy of acceptance.

Professor Glenn Leshner
Professor María Len-Ríos
Professor Esther Thorson
Professor Margaret Duffy
Professor Mitchell McKinney

DEDICATION

I would like to dedicate this dissertation to Galina Vladimirovna Lebedeva and Tatiana Petrovna Mishura, my teachers of English as a foreign language at School-Lyceum #34 in Kostroma, Russia. I know I wasn't your best student, but you both are the best English teachers I ever had. Thank you for piecing together a great curriculum despite having so few resources. Thank you for working so hard to make sure I master a universal language that allowed me to explore the world and discover my talents.

ACKNOWLEDGMENTS

My heartfelt gratitude goes to my brilliant dissertation committee, for the wisdom they shared with me during our work on this project. I would like to especially thank my dissertation chair, Dr. Glenn Leshner, for not giving up on me no matter how long it took me to get it done, but most of all, for his ability to ask a question that prompted me to understand I don't really know what I think I knew. Thank you to Dr. María Len-Ríos for the detailed comments and even line edits on my drafts. Thank you to Dr. Esther Thorson for always being available no matter the time of day. To the three of you, Drs. Len-Ríos, Leshner, and Thorson, please know that you are missed at Mizzou and J-School didn't feel the same after you left. Thank you, Dr. Margaret Duffy, for providing psychological support to me and to Dr. Leshner. And special thanks to Dr. Mitchell McKinney for finding the time to work with me amid all the responsibilities at the Department of Communication and the University of Missouri at large.

To the faculty and staff of the Missouri School of Journalism, thank you for building our J-School the way it is. I spent some of the happiest years of my life here, and I sincerely hope other students have the support and opportunities I had so that they may learn as I learned. To Professor Mike McKean, thank you so much for advising me to use Voila application for recording stories for my stimuli. And to Professor Shane Epping, thank you for accepting me to your section of J2150 to learn how to edit videos. Thank you to Drs. Cynthia Frisby, Amanda Hinnant, Beverly Horvit, and Tim Vos, for helping me with recruitment efforts or giving me a

graduate assistantship, or both. Thank you to Janelle Greening for the guidance with IRB compliance. To Kathy Hodges, thank you for keeping me on your radar and for making my Skype-in defense possible. Finally, thank you to all sponsors who funded my stay at J-School. Tuition-free education is one of the greatest gifts I ever received.

To the brilliant Amanda Montoya and to her advisor Dr. Andrew Hayes, thank you for promptly replying my emails asking for clarifications on the use of OGRS and PROCESS macros during the winter and spring breaks. And thank you for posting online the drafts of your manuscript before publication. If I didn't have access to your works, I would not have been able to analyze my data with the most appropriate models.

To my good friend Aleksandr Rumiantsev, thank you for all your help during these four years. You know better than anyone I know what it takes to achieve the impossible, and I hope to see you work for the good of others and be appreciated as you deserve. To my soulmate Dr. Roma Subramanian, thank you for surviving my sense of humor both during and after our stint at the J-School. Thank you to my cohort and a special thank you to Dr. Manu Bhandari for the wise but back then not really helpful assurances that everything is going the way it should be going.

A very special thank you to my boss at Zayed University, Dean Pamela Creedon, for making sure I "get this thing done." Thank Dr. Michael Ogden, also at ZU, for being so sensitive to my needs. Thank you to Zayed University for taking such a good care of me. Finally, to my Dubai friends Dr. Jessica Essary and Diane VanderPol, thank you for the wise advice and for letting me bounce ideas off of you.

Finally, to my parents, Marina and Sergei, thank you a thousand times for your love, support, encouragement, and self-sacrifice. And to my little brother, Stanislav, thank you for taking care of our parents while I'm so far away, and apologies for being a point of comparison a bit too often.

TABLE OF CONTENTS

LIST OF FIGURES

Figure Page

LIST OF TABLES

Table Page

THE EFFECTS OF MODALITY, ENGLISH LANGUAGE PROFICIENCY,

AND LENGTH OF STAY ON IMMIGRANTS' LEARNING

FROM AMERICAN NEWS ABOUT POLITICS

By Yulia S. Medvedeva

Dr. Glenn Leshner, Dissertation Chair

ABSTRACT

This dissertation explored how well immigrants in the United States learn from American political news. Predictions in this online experiment were based on a survey by Chaffee, Nass, and Yang (1990), in which Korean Americans with lower language proficiency and shorter length of stay in the U.S. demonstrated higher political knowledge scores when they reported relying on television news instead of print news. To test the findings of that survey, news media were operationalized through modality as two symbol systems: words, which need to be learned to be understood, and pictures, which need to be recognized. One-hundred-forty-six individuals born in 52 countries completed the online experiment in which each participant was exposed to one of the three conditions representing either television ("spoken words + pictures") or radio ("spoken words") or print ("written words") news. The verbal content in all three conditions was kept the same, and pictures in the "spoken words + pictures" condition, whenever possible, were matched in meaning to the meaning of words. The two outcome variables were (1) encoding, measured with 12 multiple-choice questions, and (2) comprehension, measured with three multiple-choice questions. Data were analyzed with multiple

regression analysis in SPSS and in PROCESS macro for SPSS (Hayes & Montoya, 2017). Data demonstrated that immigrants with lower self-reported language proficiency correctly recognized more multiple-choice answers to questions about stories from television news in comparison to print news. This finding establishes a causal relationship between the presence of pictures in television's two-channel stream and better outcomes of memory about news for immigrants with weaker English language skills. Years of education in the U.S. emerged as the only reliable predictor of comprehension. Furthermore, in the television condition, immigrants with higher language proficiency correctly recognized about half-an-answer fewer than did immigrants with lower language proficiency. Findings suggest that television news is indeed beneficial for immigrants' learning about American politics, yet it becomes less beneficial once immigrants' competence increase.

I. INTRODUCTION

In his seminal work, Herbert Hyman (1959/1969) addressed political socialization as learned behavior and stressed the need to focus on learning, motivation and emotion, and cognitive processes in the study of political behavior (1969, p. 9). Just like in the case of indigenous populations, immigrants' ability to gain political knowledge allows them to have a say in their host country's political life (Dalisay, 2012). Scholarly evidence provides disappointing data about levels of voting turnout among naturalized immigrants in the United States (Barreto & Munoz, 2003; File & Crissey, 2010; Junn, 1999). In 2000-2016, voter turnout among Hispanics and Asians lingered under 50%, compared to White Americans' turnout rate that fluctuated between roughly 60% and 70% (Frey, 2017). High levels of political participation are traditionally associated with high socio-economic status (SES; Verba, Schlozman, & Brady, 1995). Immigrants' tendency to be disengaged in political behavior may be explained by their low SES (Leal, 2002). For example, Latino households report having median wealth 18 times smaller than that of non-Latino whites (Kochhar, Fry, & Taylor, 2011). Verba and colleagues (1995) explained with data from a seminal survey that low SES groups' political participation builds on psychological engagement with politics, and one of the dimensions of political engagement is political knowledge.

Immigrants, refugees and asylees who arrive to the host country as adults do not have a chance to learn about American politics from school, an important socializing agent (Chaffee, Nass, and Yang, 1990). Unlike indigenous populations,

who learn the basic facts about the workings of the U.S. political system in school and get updated on current developments by the media (McLeod, 2000), immigrants must rely on learning about politics in the U.S. from media (Martinelli & Chaffee, 1995). With such a pertinent role of the media in immigrants' political socialization, it is important to know how effective different types of media, – television, newspapers, and radio – are in conveying information to immigrants who may lack language skills and background knowledge about the U.S. political system and civic life.

This dissertation focuses on the contribution of mass media communication to political knowledge as a basis for the meaningful political participation of immigrants. The first research goal of this project is to test in experimental setting hypotheses based on the findings of a survey carried out in late 1980s by Chaffee and colleagues. These researchers discovered that although immigrants who read newspapers were associated with higher levels of political knowledge, immigrants with weaker language skills and immigrants with shorter tenure in the U.S. possessed higher levels of political knowledge if reported relying on television for their news. The second research goal of this project is to provide explanation as to why television contributes to knowledge of immigrants with lower levels of acculturation.

To fulfill both goals, this study adopts a conceptual definition of media as modality suggested by Salomon (1979), who described modality as a symbol system. In Salomon's view, media employ two major symbol systems, words and pictures, which require different sets of skills from the viewer, listener, and reader.

Pictorial symbols such as photographic images depict their referents by resembling them. Words as symbols do not resemble their referents—they describe them. Decoding the meaning of words requires training in decoding letters and sounds and knowing the rules used to combine them into words and words—into sentences. At the same time, understanding pictures requires less skill. More precisely, unlike words, pictures need to be simply recognized (Salomon, 1979). From this perspective, newspapers and radio heavily employ the symbol system of words. Television tells the story with both words and pictures. This combination of symbol systems in television can accommodate information processing of audience members with varying levels of skill (Salomon, 1979).

Therefore, I hypothesized that in comparison to print and radio, television will be more beneficial for immigrants' learning from political news due the presence of the visual stream, which will help compensate for disadvantages of poor language skills. It should be noted that Chaffee et al. (1990) found positive associations between television viewing and political knowledge not only for immigrants with weaker language skills, but also for immigrants with shorter length of stay in the U.S. For experimental conditions where television is operationalized as pictures and words, Salomon's (1979) theory predicts that immigrants with longer, not shorter, residential tenure will benefit from watching television news. This will happen because interpretation of multiple meanings offered by pictures depends on knowledge of context. In addition, immigrants with longer residential tenure will have well developed knowledge structures about American politics that will incorporate news information better and result in its better comprehension.

This dissertations' findings inform theory on how individual characteristics of the audience member interact with defining characteristics of media in producing learning outcomes. In terms of practical implications, the findings can benefit the work of professionals whose goal is to accommodate refugees and immigrants. Knowing which medium has superior effects on memory and comprehension, these professionals may be able to encourage immigrant populations to get access to news media with a specific symbol system in order to engage in American political life. Findings can also be extrapolated to audiences with similar barriers to learning and participation, such as illiterate American citizens. Finally, although the stimuli in the proposed experiment are based on news stories devoted to local public affairs, results of this study can inform communication researchers about information processing in other content domains such as health-related news.

II. LITERATURE REVIEW

The goal of this literature review is to summarize scholarly evidence on how media and individual characteristics of the learner affect learning from current events news. To that end, this literature review first summarizes knowledge gap hypotheses, a theory that establishes relationships among the variables of media, learners' characteristics, and learning outcomes of media exposure. It then defines memory for news and comprehension of news as variables representing learning outcomes. After that, this review summarizes three different approaches to conceptualization of media and specifically focuses on symbol systems as the conceptualization that can explain the effects of media on learning of disadvantaged audiences. One section also clarifies why language proficiency and length of stay may be used as factors that influence immigrants' learning. Finally, this chapter includes predictions about how media modality influences immigrants' learning from current events news depending on their language skills and length of stay in the U.S.

In the absence of a significant body of experimental studies that focused on immigrants, this literature review builds on relevant surveys of immigrant populations as well as experimental studies that researched audiences with little political knowledge and developing language skills: adolescents and functionally illiterate American adults. Some of the studies on children audiences are also mentioned here because children are in the process of developing vocabulary.

Relevant research on general populations of young adults and adults is also reviewed.

Knowledge Gap Hypothesis

A discrepancy in political knowledge between groups with high and low socio-economic status (SES) is explained by knowledge gap hypothesis that connects levels of political knowledge, SES, and media use. The knowledge gap hypothesis states that with the increase of information about a topic in mass media, over time the strata of the society with higher SES will learn this information at a faster rate than will the strata of society with lower SES (Tichenor, Donohue, & Olien, 1970). It is important to note that knowledge gap studies usually operationalize SES as level of education (Gaziano, 2010; Hwang & Jeong, 2009), while it is also possible to measure SES as a total household income and subjective class identification (Lee & Zhou, 2004). Scholars explain the knowledge gap by a number of factors including differences in processing abilities, access to the media, and media use patterns (McLeod, Kosicki, & McLeod, 2002). When differences in media use are concerned, audiences with higher SES tend to rely on newspapers (Lee & Zhou, 2004), which are associated with more news space in column inches for comprehensive coverage of topics (Neuman, Just, & Crigler, 1992). Lower SES audiences tend to rely on television news, which has considerable time constraint. Furthermore, television is a complex medium that consists of two channels of information in a continuous flow, which puts a strain on the viewer's information processing system (Lang, 1995). In addition, viewers tend to watch TV in distracting

environments, particularly while multitasking, which can possibly lead to less retention of information.

Bridging role of television. Yet despite the disadvantages of television that include, notably, dual stream of information, perception of it as a source of entertainment, and environmental distractions accompanying viewing, some evidence supports a positive role of television in contributing to political knowledge. The body of research on the knowledge gap identifies television news use as a factor that narrows the education-related knowledge gap. More specifically, knowledge gaps between groups with low and high education are narrower for those who report heavier television news use than those who report lighter television news use (Eveland & Scheufele, 2000; Kwak, 1999). The bridging role of television hypothesis suggests that television provides basic information about politics that is necessary for comprehending more complex political information offered by newspapers (Atkin, 1981; Chaffee et al., 1990). Some support of this hypothesis comes from research on children. A survey of Mexican and Puerto-Rican children in grades 2, 4, and 7 demonstrated a positive correlation between television viewing and reading (Blosser, 1988). Findings supported the following model of reading ability: Television viewing leads to better skills in auditing and speaking, which in turn improve reading ability.

American media and knowledge gaps among immigrants. Some studies suggest that a positive effect of television news use on learning holds in the case of adult immigrants. In a survey study on a sample of Korean immigrants, Chaffee et al. (1990) discovered that although immigrants' newspaper use is associated with

higher levels of political knowledge, immigrants with shorter tenure in the U.S. and immigrants with weaker self-reported language skills had higher levels of political knowledge if they self-reported watching television news. These findings have not been supported in similar studies. For example, in another study of recently naturalized immigrants, findings provided strong evidence that political knowledge was linked to newspaper news use (Martinelli & Chaffee, 1995). A more recent survey of immigrants from over 30 countries failed to detect a correlation between the use of English-language media and current American political knowledge, though in this study the use of English-language print media was a significant predictor of current English-language proficiency (Dalisay, 2012).

Overall, despite the fact that immigrants must rely on media to fill in the gaps in their knowledge of American politics (Martinelli & Chaffee, 1995), few inquiries have wrestled to understand the mechanisms of how media contributes to immigrants' political knowledge. Scholars noted the need for more research inquiry into questions about conditions of immigrants' political socialization in general (Hoskin, 1989; Jennings, 2007) and learning from media in particular (Chaffee & Kanihan, 1997). Up-to-date research is needed to verify the unique findings of Chaffee's et al. (1990) survey in a controlled experimental setting. Such work can provide evidence of causal relationships between immigrants' viewing television public affairs news and their learning about American politics.

Knowledge as a Dependent Variable in Media Effects Research

Political thinking of an individual can be described, on one hand, by the number of pieces of factual information about politics and, on the other hand, by

organizational structure of facts and ideas which explains individual's opinions about politics (Eveland, Marton, & Seo, 2004). From the news, people learn "denotative," factual, information and "connotative" information that helps news audiences make connections between new facts obtained from the media and information already stored in the memory (Eveland et al., 2004). In experimental research, memory is a dependent variable that describes denotative information gain from exposure to an information stimulus, and comprehension is a dependent variable that captures connotative information about relationships among the concepts.

Memory. Lang (2000) explained how mediated messages are processed by human beings. Messages from an environment that are attended to and selected for future processing enter memory via senses. This information is stored in sensory stores for a very short time—no longer than 4-5 minutes in the case of auditory store—and is overwritten by new incoming information if it is not selected for further processing. Information that is selected is encoded in working, or short-term, memory where a mental representation of the message is constructed. Such representation is affected by portions of the message selected by the person and by the person's knowledge and goals for the use of the message. While individual's goals guide controlled selection of messages for encoding, message features also play important part in automatic selection for encoding. Characteristics of the message such as novelty and change have an effect on automatic selection process. Lang points out that evaluation of what is novel depends on the culture of the individual. Encoded mental representation of the message gets linked to the old

information stored in the long-term memory. Storage is the second sub-process of the information-processing model. The degree of completeness of storage of the new bit of information depends on the number of associations between the mental representation of the message and old information. The final sub-process in Lang's model is retrieval, the process of moving into the working memory the piece of information stored in long-term memory. Retrieval of relevant information is vital for comprehension of incoming information. Lang wrote that a message about elections will cause the move into working memory stored information about elections in general and knowledge about the elections in question.

With regard to memory for news as a dependent variable in media research, Lang (1995, 2000) argued for the definition of the working memory from the limited capacity information processing perspective. While her model is widely accepted and used by the scholars focusing on information processing, Lang (1995, 2000) specifically argued that studies on effects of television using inconsistent conceptual and operational definitions of memory yield inconsistent findings and prevent us from understanding the effects of television on learning. Lang (2000) noted that apart from individual's goals that guide message selection for encoding, television messages have a power to guide attention to certain parts of the message by their structure and content. In particular, novel stimulus will elicit orienting responses, which will increase cognitive resources making the novel stimuli more likely to be encoded. Continuity of the televised message also means that encoding and storage sub-processes occur simultaneously. Therefore, if a part of the message elicits orienting response, it will attract the limited information processing resources from

storage to encoding, which will positively affect encoding, but have a negative impact on storage. In addition, two kinds of retrieval should be considered with regard to television viewing. First, in cases when the viewer has a goal for viewing, information relevant to the goal is attended to, encoded, and stored for later retrieval. It is not retrieved during viewing but is stored for the time when it is needed. At the same time, concurrent retrieval of information already stored occurs during television viewing to aid understanding of incoming information and to link the new mental representation to the already stored knowledge. Resources required for retrieval of already stored information will decrease resources available for encoding and storage (Lang, 2000).

To be fully processed, information must go through all three processes while each of them happens simultaneously for different parts of the message. Short-term memory has a limited capacity, and a complex television message can place too much of a demand on the information processing system, which means that less information will be encoded, and consequently, stored and retrieved.

Memory in this dissertation was conceptualized as two kinds of learning: encoding information into short-term memory, and comprehension of information by incorporating it into existing knowledge. The effects of news media on learning was tested by two different measurements. Encoding was measured by the most sensitive measure, a recognition test that in verbal form in similar studies required participants to identify which sentences they recognize as the ones stated in the news (Lang, 1995). Such measure provides multiple cues that help subjects in retrieving encoded information (Lang, 2000). Importantly, Lang (1995) reviewed

studies that tested hypotheses of effects of audio and video television streams and applied her conceptual and operational definitions of memory and audiovisual redundancy, the significance of which is explained later in this chapter. Based on new operational definitions of memory, Lang differentiated among encoding, storage, and retrieval in the reviewed studies and formulated new hypotheses for those studies. As a result, she found that 75% of results in published studies were in the predicted direction.

Comprehension. Simply remembering something does not mean that relevant parts of this information are used in cognitive processes when time comes to use it (Kintsch, 1998). That is why media scholars call for measures of political knowledge in addition to recognition and recall of factual knowledge (McLeod, Kosicki, & McLeod, 2002). Learning differs from remembering in person's ability to use information that is remembered in ways beside reproduction (Kintsch, 1994). On the example of reading, Kintsch (1994) explained that "one can infer new facts from the information in the text, use it in conjunction with previous knowledge to solve novel problems, and integrate it with what was already known" (p. 294). Therefore, learning is distinguished from memory by the fact that learning requires understanding of material to a degree that allows using it in a new domain. Following Kintsch (1998), understanding and comprehension are used here interchangeably.

Measurement of memory. Question remains, what exactly should be included into measures testing memory for news. A framework that may be used for developing items for the memory test is news and events schemas (Findahl, 2001;

Findahl & Höijer, 1985), which include the following elements: places, events, principals (persons or things), and causes and consequences (Findahl & Höijer, 1985). Some evidence suggests that media seem to differ in their effects on memory for different components of the news schemas. For instance, Kenyan and American students remembered names of people and numbers when they read them in print (Stauffer, Frost, & Rybolt, 1981) but they remembered names of places better when they have learned them from a televised newscast. Additional components of news and events schemas are causes and consequences of events. These elements of news schemas tap into knowledge structures because they link facts to each other by relationships among them. Including them in a memory measure is important because perception of causal relationships among political concepts forms political attitudes (Eveland et al., 2004). Inclusion of questions testing recognition of causes and consequences is particularly important in a study testing hypotheses about learning from print and from televised political news. As will be explained later, this dissertation was guided by theory that conceptualizes media as consisting of words as pictures with hypotheses grounded in understanding that pictures in television condition will assist immigrants with poor language skills in understanding news content. Given the views of print's ability to explain and conflicting opinions on pictures' potential to convey the relationships of causes and consequences, it is important to assess memory for those relationships.

To sum up, the two dependent variables in this dissertation were the following: (1) encoding measured as recognition of verbal information about elements of news schema including places, things, events, causes and consequences,

and (2) comprehension measured with a multiple-choice test with questions that require (a) inference of new facts from the story, (b) understanding the outcome of the event, and (c) applying existing knowledge to the situation addressed in the news story.

The Effects of Media on Memory and Comprehension

Conceptualizing media in media effects research. As tools of culture, media can be studied and as content, as formal features that characterize a medium, and as physical platform or hardware (Subrahmanyam & Greenfield, 2008). As mentioned earlier, the difference between newspapers and television may be explained by the differences in the volume of political news content as well as in its quality. Some other differences among media go beyond content and have to do with formal features of media. For instance, newspapers and magazines split text of their stories into paragraphs making it easier to understand (Corston & Coleman, 1997). Print and radio—both verbal media, first based on printed text, and the second based on text read out loud—let the audience imagine the content leading to better memory for news in comparison to television news that feed the audience the ready-made picture (Corston & Coleman, 1997). Finally, television possesses an array of formal features that are shown to have an effect on information processing. For example, cuts, which end one scene and start another, elicit orienting responses that increase attention to the content on the screen (Geiger & Newhagen, 1993). Novelty (Lang, 2000) and motion (Reeves & Nass, 1996) also affect information processing. More specifically, motion attracts or detracts attention depending on its direction and amount. Overall, formal features such as cuts, motion, background,

camera techniques, speed, and audio-visual mode of presentation influence news processing via increasing or decreasing attention (Lang, 1995; Lang, 1991; Thorson & Lang, 1992). At the same time, two continuous streams of visual and auditory information that characterize television place a taxing task on information processing system (Lang, 2000).

Approaches to modality. Modality is a concept relevant to research that involves questions about understanding the message. In psycholinguistics, modality is defined as "[t]he form in which a piece of language is produced" (Field, 2004, p. 179). Language has two modalities: spoken modality in the case of speech, and visual modality in the form of writing (Field, 2004). When it comes to modality as a form for media messages, media scholars disagree in their approaches to it. Classifications of media according to modality (Kozma, 1991; Mayer, 2002) suggest definitions of modality as an industry channel (e.g., radio, magazine, newspaper, and television), as sensory channel used to perceive the message (most often visual and auditory; Mayer, 2002), and as symbol systems (such as pictures and words; Salomon, 1979).

How modality is explicated has important implications for our understanding of media effects. When media are understood as industry channels, differences in effects of media on learning are attributed to journalistic quality of content (Crigler, Just, & Neuman, 1994). For example, newspapers and magazines are viewed as the ones that provide quality content with a distinction that newspapers specialize in in-depth reporting on current events and magazines—in features that provide more context. Television is viewed as a primary source of entertainment. Following this

approach, when content is held constant across experimental conditions, television is operationalized as "talking head" condition (Corston & Coleman, 1997; Furnham, Gunter, & Green, 1990). This does not fully reflect the complexity of television as a medium (Lang, 1995). Related to the classification of media as industry channels are experimental conditions that compare the effects of print and online newspapers (Yang & Grabe, 2011).

In educational research, media are examined from the point of view of the sensory system used to perceive messages. Mayer's (2002) cognitive theory of multimedia learning attributes significance to the fact that narration and visuals aids are first processed separately in sensory memory. In working memory, pictures and words are organized into verbal and pictorial models, which are integrated into one model together with prior knowledge stored in long-term memory. The need for distinction in sensory perception may be supported by the fact that auditory information stays intact in sensory memory longer than does visual information (Lang, 2000). Among the limitations of understanding of media as auditory and visual is that it does not explain how verbal messages—both as written text and spoken words—are decoded and understood. This is particularly important in the light of research on reading comprehension that lists decoding, language skills, and domain knowledge as vital factors of comprehension (Kintsch, 1998). It seems plausible that understanding media effects on audiences with varying language skills and background knowledge calls for a theory that is based on how people extract meaning from verbal and pictorial information. In the case of immigrants,

modality defined as symbol systems might lend the best explanation of the bridging role of television.

Modality as symbol systems. According to Salomon (1979), symbols are coding elements that convey knowledge. Symbol schemes are sets of symbols that have rules of combining them. Some schemes have strict rules, as in the case of language where single letters are combined into words, and words are combined into grammatical structures. Other schemes do not have strict rules, as in the case of paintings where rules of artistic expression do not strictly prescribe the parameters of every single line for it to convey the intended meaning.

A symbol scheme becomes a symbol system when it is "correlated with a field of reference" (Salomon, 1979, p. 31). Alphabetic symbols have sounds as a field of reference. A field of reference for photographs are objects.

In Salomon's view, media employ two major symbol systems, words and pictures, that require different sets of skills for understanding them. Salomon explains that symbols systems such as photographic images and film depict their referents by resembling them. On the contrary, words as symbols describe their referents. Decoding the meaning of what words describe requires training in decoding letters and sounds and knowing the rules used to combine them into words. At the same time, understanding pictures requires less skill because pictures consist of elements that have no identifiable universally accepted elements what would be linked to commonly accepted meanings. Although each line in the picture matters, pictures do not have strictly prescribed rules for combining the lines to convey meaning. Since there are no rules, no training is needed to understand them.

In fact, Salomon states that, unlike words, pictures are not understood, they are recognized.

From Salomon's perspective, newspapers and radio rely heavily on the symbol system of words. Television relies both on words and pictures. However, news stories that are considered to constitute substantive coverage of politics focus on issues, which often deal with abstract concepts rather than with concrete concepts (David, 1998). In Salomon's (1979) classification of symbol systems, symbols' relationships with their referents range from iconicity, or depiction of the referent, to abstractness, or description of the referent. Realistic pictures, as iconic signs, have little to offer for depiction of political issues, but they can depict event-driven news that offers footage of concrete events, people, and places. The meaning of abstract issues will be conveyed by digital signs such as words and numbers. Another important point concerns the difference between static pictures such as photos and moving pictures such as video. Static pictures, just like sculptures, convey only culmination of the event they depict (Kaltenbacher, 2004). Unlike photos, moving pictures combine multiple symbol systems. This results in television's unique ability to convey information about causal relationships. Finally, the multiplicity of symbol systems in television addresses the needs of audience members with varying levels of skill (Salomon, 1979).

With regard to the interaction between symbol systems and learner's characteristics, it is argued that when options of symbol systems are available, receiver of the message might choose the one that will have a lesser burden on their information processing system. Since pictures resemble their referents, it is possible

to predict that viewers with poor language skills will benefit from learning from pictures because their processing will be easier on their information-processing resources.

Because moving pictures allow easier information processing, it is reasonable to expect that in comparison to print and radio, television will be more beneficial for immigrants' learning from political news due to the presence of the visual stream. More specifically, visual stream in television most of the time consists of pictures that look like their referents, which means that they need to be recognized without the need of knowing the rules used for combining the elements of pictures. This should have positive effect on information processing for audience members regardless of their skills level, but it will be particularly beneficial for immigrants with weak English language skills because pictures offer the opportunity to compensate for poor language skills in learning from news.

Chaffee et al. (1990) found a positive association between television viewing and increased political knowledge for immigrants with shorter residential tenure in the U.S. (in comparison to short-tenure immigrants who relied on newspapers for news). From the point of view of Salomon's (1979) theory, immigrants with longer residential tenure will benefit from watching television because interpretation of multiple meanings offered by pictures depends on knowledge of context. This is particularly evident in the case of abstract news when concrete news pegs for liberty and justice are used (David, 1998). Salomon (1979) notes that anticipatory schemata determines what information will be attended to and how it will be perceived. I predict that schemata of immigrants with shorter residential tenure will

be, in Spiro's terms, "insufficiently general and overly tied to personal experience" (cited in Luke, 1985, p. 96). This will limit their schemata's ability to efficiently link incoming information and existing knowledge. On the contrary, immigrants who stayed in the U.S. longer will possess wider and more detailed background knowledge about American politics. Thus, better-developed news schemas will help immigrants with longer residential tenure and weaker language skills to decode the true meaning of pictures.

From the point of view of symbol systems, linguistic information in radio and television has a "transient, dynamic format" (Subrahmanyam, & Greenfield, 2008, p. 170). At the same time, words in print are in a stable format. From here on, I will refer to television's symbol systems as "spoken words + pictures" to convey that words are spoken and transient. I will refer to the symbol system of print as "written words," and to the symbol system of radio as "spoken words."

Interestingly, a study of third and sixth graders supplied evidence that television is a unique medium for learning (Pezdek, Lehrer, & Simon, 1984). Pezdek et al. (1984) reported that children's sentence recognition and comprehension scores were similar in reading and watching conditions while scores in listening condition were lower. But, despite the similarity in levels of comprehension and recognition for reading and for watching, performance scores in reading and in watching conditions were not correlated. Instead, reading and listening scores on comprehension and memory were statistically correlated: Children who scored high on reading also scored high on listening. Both activities rely on knowing words, and modality of these two media conditions is the same apart from the transiency of

words in radio (Kozma, 1991). The fact that performance in reading and television viewing condition were not correlated while they were at approximately the same level might suggest that there is something about television that can level the performance of children with weak reading skills to the level of memory and comprehension performance of those who read information. A plausible option is relatedness of the meaning of audio and visual streams in television, which is called audiovisual redundancy.

Audiovisual redundancy. Television news varies in the degree of semantic overlap between pictures and words, in other words, in the degree of audiovisual redundancy (Lang, 1995). Audiovisual redundancy is indeed a continuum ranging from no redundancy in single-channel medium to low redundancy in the case of conflicting information in two channels to medium redundancy when both channels contain matched or related information to high redundancy when both channels convey the same information (Lang, 1995).

What do variations in redundancy mean for information processing? Lang (1995) explains that single-channel audio-only messages that completely lack redundancy due to the lack of the second channel contain less information, which might mean that they are "easier" on information-processing resources. At the same time, single-channel messages have fewer structural features that could elicit orienting response, which will increase attention and chances of encoding the message. When it comes to multiple-channel messages, Lang (1995) predicts that redundant still pictures require less processing resources than do redundant moving pictures. The most resource demanding are multiple-channel messages with

moving pictures and low levels of redundancy (i.e., pictures and words have conflicting meanings).

In reality, high redundancy, or "one-to-one correspondence between picture and copy" (David, 1998, p. 186), is unlikely. News media tend to rely on standard news pictures that convey the news event without one-to-one correspondence of meaning in video and audio (Brosius, Donsbach, & Birk, 1996), and pictures simply serve as supplements to the verbal information. This contradicts Salomon's (1979) view of television as medium based primary on pictorial information. The current study attempts to test the condition when television takes advantage of its pictorial symbol system by having a high level of redundancy so that it may be expected that audiovisual stimuli will enhance memory and comprehension for political news. Hypotheses in this study are developed on the premise that measures of memory for news are developed from information that was conveyed by words and pictures with either one-to-one correspondence or with moderate degree of semantic overlap. The latter condition is expected to be more likely than the occurrence of one-to-one correspondence.

Predictors of Immigrants' Learning From News

Knowledge gap hypothesis is based on the concept of social-economic status, which media research studies often operationalize as level of education. In the case of immigrants, schooling does not necessarily happen in the host country, which devalues education as a proxy for SES. Moreover, immigrants' education and professional skills tend to be devalued after immigration, which lowers their SES in the host country. According to the U.S. Census Bureau American Community Survey

data from years 2010-2012, 20 percent of college-educated immigrants who held degrees from non-U.S. institutions were in low-skilled jobs, compared to 12 percent of native-born college-educated individuals who were in low-skilled jobs (Batalova, McHugh, & Morawski, 2014). More specifically, rates of underutilization of education is higher among immigrants who earned their bachelor's degree abroad: Twenty-six percent of those who hold bachelor's degree from a non-U.S. institution were unemployed or were in low-skilled jobs (Batalova et al., 2014). Because relationship between education and SES changes in the case of immigrants, other measures are needed to serve as viable factors in experimental study of effects of media on learning.

Along with traditional SES variables, language proficiency and length of stay in the U.S. tend to be among the factors that predict immigrants' political socialization (Barreto & Muñoz, 2003; Chaffee et al., 1990). Some of the other relevant factors include attitudes toward opportunities in the U.S. (Barreto & Muñoz, 2003), intention to stay, age at immigration, interpersonal contacts, and self-identification (Chaffee et al., 1990). Interestingly, measures associated with language use––language spoken at home and interview language––are the two measures used in a reliable four-item proxy acculturation scale (Cruz, Marshall, Bowling, & Villaveces, 2008). The other two measures employed in the proxy acculturation scale are related to residence: proportion of life lived in the U.S. and generation status. This suggests the importance of language skills and residential tenure as indexes of immigrants' socialization. Given the evidence of these two indices ability to convey levels of immigrant acculturation, this study follows

Chaffee et al. (1990) in using the same two concepts as individual factors that have an impact on learning from news.

The two subsections below address how language proficiency influences memory measures and how length of stay contributes to comprehension. Also included is information on two more characteristics viewed to be important predictors of immigrant learning: acculturation and trickle-down political socialization.

Language proficiency. Poor language proficiency leads to limitations in ability to receive information, which in turn narrows cognitive structures of political information (Tam Cho, 1999). A telling example illustrates how important it is to know words and grammatical structures to understand the news:

> … Lamar Alexander was behind in the polls. However, the former Tennessee governor remained optimistic. He considered it likely that a moderate candidate with new ideas would win the Republican nomination (Zwaan & Radvansky, 1998, p. 163).

Zwaan and Radvansky (1998) explain that to remember and comprehend this information, reader needs to set a referent for Lamar Alexander in her memory and add all the information that follows including fact that he is the former governor to the same referent. In understanding if "former governor" is still related to "Lamar Alexander," the reader will need to base her judgment on the meaning supplied by the definite article "the." On the contrary, indefinite article "a" would have signaled that "a former governor" and "Lamar Alexander" are two different people, and "a former governor" would require a new referent. Failure to catch the meaning of

articles, nouns, and pronouns will lead to creation of different referents, which will have an impact on memory and understanding of this piece of news.

It is reasonable to expect that the both language proficiency and length of stay will contribute to immigrants' learning from television news. To remember and comprehend news including television news, the audience needs to understand the meaning of words thus comprehending the surface structure of the newscast (Findahl, 2001). This part of news comprehension that relies on words, sentences, and pictures is termed "bottom-up process" and is believed to be more salient for less experienced audiences (Findahl, 2001). Since this is a surface structure of news, I expect that ability to understand words will have higher impact on the measure of memory, encoding.

Length of stay. Returning to the passage about Lamar Alexander, to comprehend the meaning of the third sentence, another kind of knowledge is needed. Specifically, immigrants will need to know Alexander's political leaning, a moderate Republican. This knowledge is related to domain knowledge. To know this, immigrants should be exposed to American political life for at least some time. It is reasonable to expect that length of stay in the country will have an effect on immigrants' domain knowledge.

Two strands of resocialization theory argue for the need of taking into account immigrants' life cycle, length of stay in the home country and length of stay in the host country. One strand is the theory of exposure which posits that immigrants' adaptation to the new political system is facilitated by exposure to it; another strand is the theory of transferability, which states that immigrant's existing

beliefs and behaviors transfer from home country's political system to host country's political system (White, Nevitte, Blais, Gidengil, & Fournier, 2008). Length of stay in the host country serves as an estimate of effects of exposure to the life in the host country (White et al., 2008). Following the resocialization theory of exposure, I expect that length of stay will be correlated to the level of background political knowledge, which has been shown to be the best predictor for news story recall (Price & Zaller, 1993).

Comprehension requires understanding of new information beyond the surface meaning of words and pictures. New information has to be incorporated into existing events and news schemas (Findahl, 2001). This is a "top-down" process of comprehension, in which audience member draws on her knowledge of culture and social context and on her education and experiences (Findahl, 2001). Research shows that those with more expertise in politics recalled and inferred more inconsistent information than did political news novices (Fiske, Kinder, & Larter, 1983). Since information inconsistent with existing schemas is harder to catch and to process, it is suggested that political news experts probably have more processing resources available to them due to tighter organization of their knowledge (Fiske et al., 1983). I expect that immigrants' length of stay in the country will be positively correlated with their background knowledge about American life and with well-established news and events schemas.

Acculturation. Immigrant's learning about their new homeland depends, among other factors, on acculturation. Acculturation is a process of changes experienced by individuals and groups when they encounter and live in another

culture (Williams & Berry, 1991). A widely accepted understanding of acculturation posits that it is a multidimensional process in which immigrants retain aspects of their native culture while they acquire the host society's culture through adopting its attitudes, values, norms, and behaviors (Dalisay, 2012). Choices of acculturation strategies are influenced by such factors as views of the dominant group (e.g., the dominant group enforces or constrains certain strategies by national policies or multicultural ideologies; Berry, 2003), and minority's physical appearance (those who look differently from the mainstream society are less likely to attempt to assimilate in the fear of rejection; Berry, 2003).

Acculturation strategies differ across groups and individuals (Berry, 2003). They depend on environmental factors such as volitional intent, access to resources in the new country, experiences of discrimination, and similarity of the home and host cultures (Gamst, Liang, & Der-Karabetian, 2011). Acculturation strategies have two components: attitudes (i.e., preferences) and behaviors (i.e., outcomes) manifested in everyday intercultural experience (Berry, 2003). Berry's bidirectional model of acculturation is most probably the most influential (Gamst, Liang, & Der-Karabetian, 2011). Berry (2003) explained that acculturation takes place at least over two dimensions of orientations toward one's heritage culture and toward the larger society. Berry developed a model of acculturation strategies that result in four strategies from crossing the two dimensions: (a) the degree to which maintaining one's group cultural identity is considered important and (b) the degree to which contact and involvement with other groups in the host society is considered important. Assimilation strategy of acculturation is used when the

acculturating individuals do not consider maintaining their own native cultural identity as important and likely participates in interactions with other groups (Berry, 1997). A separation strategy is evident when the acculturating individuals consider maintaining their cultural identity as important and avoid interactions with the host group. Integration occurs when the acculturating individuals value both maintaining their own cultural identity and interacting with other groups in the larger society. Finally, a marginalization strategy manifests itself in the loss of original culture and denial of participation in the host culture. Such approach allows comparing individuals from different nondominant groups (Berry, 2003).

Measuring individuals' preferences for the four strategies of acculturation is problematic for multivariate analyses (Berry, 2003), where the use of two dimensions is more preferable. In addition, identifying four strategies requires scales with large numbers of items (Donà & Berry, 1994). Berry's questionnaires usually probe for each of the four acculturation strategies. At least two research projects used assessment of strategies along two dimensions without crossing them to obtain four groups (Sabatier, 2012; Dona & Berry, 1994). One of the two projects was conducted on a sample of refugees from Central America in Canada and developed a scale taking into account themes and domains relevant for the Latin American communities (Dona & Berry, 1994). Another scale-development project was based on a sample of parents and second-generation adolescents from nine ethnic groups in Canada and France (Sabatier, 2012). Overall, both scales are not suitable for the sample in the current study on a sample of adults with a variety of immigration statuses from various ethnic groups. Hence multicultural

bidimensional measure that doesn't require crossing dimensions into four groups is needed for this study. In addition, such measure should contain items measuring attitudes in several acculturation domains (or lifestyle facets) such as language use, daily habits (e.g, food and media preferences), ethnic norms, social relationships (e.g., friends and marriage partners), political and religious affiliations (Cruz, Marshall, Bowling, & Villaveces, 2008; Gamst et al., 2011).

Gamst et al. (2011) identify nine multicultural measures among the 48 acculturation-related measures they reviewed (Gamst, Liang, & Der-Karabetian, 2011). Among them, the American-International Relations Scale and Acculturative Stress Scale for International Students are meant to assess international students' acculturation. Acculturation, Habits, and Interests Multicultural Scale for Adolescents is developed for adolescents. Orthogonal Cultural Identification Scale and Minority-Majority Relations Survey are tested on youth samples. Among the remaining four multicultural acculturation scales, Cortes, Rogler and Malgady Bicultural Scale (Mezzich, Ruiperes, Yoon, Liu, & Zapata-Vega, 2009) has a relatively low inter-item reliability coefficient (Cronbach alpha = .80) for the dimension measuring participation in host country's culture. This variable is of the most interest in the current study, and for this reason this scale was rejected. Abbreviated Multidimentional Acculturation Scale (AMAS-ZABB; Zea, Asner-Self, Birman, & Buki, 2003) was tested on a sample of Latino young adults and adults, and the size of the sample prevented authors from running factor analysis. Stephenson Multigroup Acculturation Scale (SMAS; Stephenson, 2000) has high reliability coefficients (ethnic dimension $\alpha = .97$; dominant society dimension $\alpha = .90$). Fifteen out of 32

items in this measure are related to language. While this measure evaluates a number of other domains, one of the independent variables, language proficiency, measures the language domain of acculturation. Finally, Vancouver Index of Acculturation (VIA; Ryder, Alden, & Paulhus, 2000) has a relatively high inter-item reliability (mainstream dimension $\alpha = .87$; heritage dimension $\alpha = .91$) and high face validity. Therefore, VIA was used in this dissertation as a control variable of acculturation strategy because interest in the U.S. political news might be impacted by individual's acculturation strategy.

Bi-directional nature of political socialization in immigrant families. The classical model of political socialization is transmission model of learning, which is a unidirectional model in which knowledge, norms, values, and skills are passed from the adult or teacher to the child or student (Hyman, 1959). Recent scholarship suggests the reciprocity of influence between parents and children in the process of socialization (McDevitt & Chaffee, 2000, 2002). A phenomenon of "trickle-up influence" in socialization after being exposed to civics classes at school children start talking about politics at home, and parents in attempt to maintain authority by appearing knowledgeable increase their political knowledge and engage with children in discussions thus improving their political competence (McDevitt & Chaffee, 2002, p. 282). Research on immigrants supports the new bi-directional model of political socialization. Due to their dexterity with English, children of immigrants in the U.S. serve as language and cultural brokers for their parents (Morales & Hanson, 2005). Translating documents such as naturalization forms and workplace policies against discrimination, as well as explaining the

parents such concepts as electoral college, children socialize parents into American politics (Wong & Tsang, 2008). The reciprocity of the model is beautifully demonstrated by the example from an interview with a 12-year-old Gabriela (Katz, 2010). The girl recalled how she sometimes translated the local American television news to her father into Spanish, and her father explained the significance of the news. Therefore, having K-12-aged children was employed as a control variable in this dissertation.

Predictions About the Effects of Focal Predictors on Outcome Variables

Predictions about the main effects of language proficiency and length of stay on memory and comprehension. Hypotheses 1a-b about the main effects of language proficiency on participants' performance were based on understanding that decoding of information depends on the level of language skills.

Therefore,

H1 predicted that as language proficiency increases, scores for **(a)** encoding, and **(b)** comprehension will also increase.

Hypotheses 2a-b about the effects of length of stay on participants' performance were based on understanding that length of stay serves as a proxy for prior knowledge and for well-developed schemas that assist in incorporating new information as well as in remembering it. Therefore,

H2 predicted that as length of stay increases, scores for **(a)** encoding, and **(b)** comprehension will also increase.

In addition, Research Question 1 inquired which of the elements of the news schema—things, action, places, and causes and effects—was affected the most by language proficiency and by length of stay.

Predictions about the main effects of modality on memory and comprehension. With regard to the memory measure of encoding, Stauffer et al. (1981) offer some empirical evidence on learning of speakers of English as a second language. Their study included a group of students in Kenya who were on average 22 years old and spoke English on average for 13.5 years. On a multiple-choice recognition measure, English-speaking Kenyan students performed similarity in both television and newspaper conditions (Stauffer et al., 1981). Their performance in the radio condition was on average 24 percent lower. In another study on a sample of children, overall levels of performance on sentence recognition tasks were similar in reading and watching conditions, and sentence recognition scores in radio condition were lower (Pezdek, Lehrer, & Simon, 1984). In a study of children of 11 and 13 years old and of college students, cued recall was equal in both television and print conditions (Furnham, De Siena, & Gunter, 2002). Other studies show evidence of superior effects of print on information retention and comprehension (Gunter, 1987; Walma van der Molen, 2001b). For example, on measures of free recall and cued recall of a political broadcast, adults performed better in print condition than in television condition (Gunter, Furnham, & Leese, 1986). Print superiority effect is explained by more control over information processing it offers in comparison to television (Walma van der Molen, 2001b). Citing her data and previous studies, Walma van der Molen (2001b) argued that

such results are due to low degree of audiovisual redundancy in TV news for adults. She demonstrated that when presented with stimulus material that has a higher degree of semantic overlap between video and audio, adults and children learn more from television than from print. Therefore,

H3a predicted that participants in the "spoken words + pictures" condition will score on encoding higher than will participants in the "written words" condition; participants in the "spoken words" condition will have the lowest scores among the three modality conditions.

Findings of Stauffer et al. (1981) suggested that newspaper condition had a positive effect on encoding of people's names and numbers while television produced positive effects on encoding of names of places. However, names and numbers were not explicitly included among the news schema elements in this study. Therefore,

RQ2 was posed to inquire encoding of which elements of news schema—things, action, places, and causes and effects—was affected the most by the effects of modality.

With regard to comprehension, Salomon (1979) argued that modality can have varying effects on information retention (such as encoding) and on comprehension. He wrote that television's "principal symbol system is pictorial" and addresses nonlinguistic system (p. 70), thus the meanings one can secure from television are segmented, concrete and are less inferential. At the same time, reading addresses one's linguistic system, and meanings extracted from it "have a higher likelihood to be better tied to one's stored knowledge and thus are more

likely to be inferential" (Salomon, 1979, p. 81-82). Empirical data shows no difference in comprehension from television and newspapers. In the previously cited study by Pezdek et al. (1984), children's comprehension scores were similar in television and print conditions, which were higher than scores in radio condition. Moreover, English-speaking Kenyan viewers and readers scored significantly higher than did listeners on multiple-choice inference questions that required participants to place the information they have just learned into "a different or more general context" (Stauffer et al., 1981, p. 257). Taking into account empirical data,

H3b predicted that participants in the "written words" and "spoken words + pictures" conditions will not differ in their scores in comprehension, but participants in the "spoken words" condition will score on comprehension lower in comparison to the other two conditions.

Predictions about the two-way interaction effects between language proficiency and length of stay on memory and comprehension. Hypotheses 4a-b were based on understanding that stronger language skills will have stronger effects on a memory measure of encoding while longer residential tenure was viewed to be associated with prior knowledge and existing schemata that can aid in comprehension of news, therefore residential tenure was expected to have stronger effects on comprehension.

More specifically, Hypothesis 4a about the interaction effects of length of stay and language proficiency on encoding was based on prediction that language proficiency widens the gap in performance on a memory measure of encoding

between participants with shorter length of stay and participants with longer length of stay. Therefore,

H4a predicted that as language proficiency increases, participants with long length of stay would increase their encoding scores at a faster pace than would participants with low length of stay; the difference on encoding scores between long- and short-tenure participants with high language proficiency will be wider than will be the difference on encodings scores between long- and short-tenure participants with low language proficiency.

In addition, **RQ3** inquired encoding of which elements of news schema—things, action, places, and causes and effects—was affected the most by the interaction of language proficiency and length of stay.

At the same time, H4b about the interaction effects of language proficiency and length of stay was based on understanding that length of stay narrows the gap in comprehension scores between participants with low language proficiency and high language proficiency. Therefore,

H4b predicted that as length of stay increases, low-proficiency participants will keep up in their scores on comprehension with the high-proficiency participants.

Predictions about the two-way interaction effects between modality and language proficiency and length of stay on memory and comprehension. Please recall that language proficiency in this study is hypothesized to be stronger linked to the memory measure of encoding, while length of stay is expected to be

stronger linked to comprehension. Below are the explanations on how modality is expected to interact with these two variables.

Some of the empirical evidence about the effects of modality and language proficiency on encoding comes from studies with children because children are still developing language skills, can provide some evidence for hypotheses in this study. In one study, on a cued recall children aged 10 and 11 remembered information from television better regardless of readings skills than in print. More specifically, children performed better in television than in print on questions that tested them on information that conveyed information when pictures and words were matching (Gunter, Furnham, & Griffiths, 2000). In another study, children also did better on cued recall in television condition than in print (Furnham et al., 2002). Also, children aged 11 benefitted from audiovisual redundancy, while children aged 13 did not. Vig (1980) did not find an interaction effect of modality and age or ability on a sample of 8th, 10th, and 12th grades. She concluded, "Experimental results to not support the intuitively appealing idea that pictures somehow help to simplify difficult learning material and might therefore be relatively more helpful to poorer learners" (Vig, 1980, p. 90). In her study, stimuli originated from CBS and NBC and were not chosen for the experiment specifically for audiovisual redundancy.

Based on Salomon's (1979) theory of symbol systems and on Chaffee's et al. (1990) survey findings, I expect that immigrants with low language proficiency will be able to rely on the meaning of pictures, which will let them remember television news better than news in radio and print conditions. Due to the transiency of the

only information channel in radio, I expect that the means in the "spoken words" condition will be the lowest for both groups of language proficiency. Therefore:

H5 predicted that immigrants with weaker language proficiency in the "spoken words + pictures" condition will encode information better (resulting in higher recognition scores on multiple-choice test) than in the "written words" condition, followed by the "spoken words" condition.

In addition, **RQ4** inquired encoding of which elements of news schema—things, action, places, and causes and effects—was affected the most by the interaction of modality and language proficiency.

As mentioned earlier, Salomon (1979) argued for varying effects of modality on memory in comparison to comprehension. According to his logic, television's pictorial symbol system addresses nonlinguistic system of the information processor. Meanings conveyed by television are concrete and less inferential than meanings conveyed by words—Salomon discussed this question in the context of reading print. At the same time, reading addresses one's linguistic system, and meanings extracted from it are better incorporated into schemas and "thus are more likely to be inferential" (Salomon, 1979, p. 82). In addition, length of stay in this dissertation was viewed as an approximation for well-developed background knowledge. Thus, predictions for interaction effects hypothesized that the "spoken words + pictures" condition will increase the gap in performance on comprehension between long- and short-tenure participants in comparison to the "written words" and "spoken words" conditions. Therefore,

H6 predicted that participants with long length of stay would score higher on comprehension in the "spoken words + pictures" condition than they would in the "written words" condition and even higher than they would in the "spoken words" condition.

Predictions about three-way interaction effects of modality, language proficiency, and length of stay on memory and comprehension. Once again, relationships hypothesized in this study were based on understanding that television as medium that employs pictures aids immigrants with poor language skills in overcoming language barrier by explicitly showing them the objects, people and events covered in the newscast. Language skills were expected to have stronger effects on encoding sub-processes of memory. Longer residential tenure is associated with prior knowledge and existing news schemas that can aid in comprehension of news thus length of residential tenure is expected to have stronger effects on comprehension.

In theory, understanding of pictures does not require special training for decoding their meaning (Salomon, 1979). However, interpretation of pictures dependents on context: Pictures do not follow rules for their composition, and because of lack of rules, pictures do not convey concrete meanings, as words do (Salomon, 1979). Salomon posits that when pictures communicate information better, they do so because the symbolic codes of what they are communicating are close to internal representations of the learner. Experience in living on the host country might supply immigrant with representations consistent with American life and help immigrants to correctly understand the meaning of pictures. This will

increase pictures' ability to convey meaning and bring them closer to words. As discussed earlier, understanding the language is more powerful on memory rather than on comprehension. In sum, pictures in television will help immigrants with lower language proficiency compensate their language barrier. Longer residential tenure will increase their ability to correctly interpret the contextual meaning of those pictures. Therefore,

H7a predicted that low-proficiency participants with long residential tenure in the U.S. in the "spoken words + pictures" condition will perform on encoding best, followed by low-proficiency participants with long tenure in "written words" condition, followed by low-proficiency participants with short tenure in the "spoken words + pictures" condition, followed by low-proficiency participants with short tenure in the "written words" condition.

In addition, **RQ5** inquired encoding of which elements of news schema—action, things, places, and causes and effects—was affected the most by the three-way interaction among modality, language proficiency and length of stay.

Finally, **H7b** predicted that long-tenure high-proficiency participants will perform best in both the "written words" and "spoken words + pictures" conditions; high-tenure low-proficiency participants will follow them in the "spoken words + pictures" condition while performing weaker in the "written words" condition.

A summary of hypotheses is provided in Appendix C.

III. METHOD

The first research goal of the present study is to experimentally test Chaffee's et al. (1990) hypothesis about the positive role of television public affairs news in narrowing the knowledge gap for first-generation immigrants. The second research goal of this study stems from the need to theoretically explain the evidence of bridging role of television in the knowledge gap hypothesis. The theoretical explanation tested here is based on Salomon's view of modality as symbol systems that proposes advantages in learning from television due to the ability of the pictorial nature of visual stream to compensate for poor language skills and shorter residential tenure.

Design

Each participant of this study was randomly assigned to one of the three modality conditions: "spoken words," "written words," or "spoken words + pictures." Modality was the only manipulated independent variable. A discrete variable of language proficiency and continuous variable of length of stay were measured (as opposed to being manipulated), and their scales were preserved for data analysis.

Participants

Foreign-born adults living in the U.S. were recruited to participate through two channels: researcher's personal network and marketing service provided by Qualtrics. Data collection started in Columbia, Missouri, and spread to other states by snowballing technique and by cold calls and emails to immigrant-serving

organizations. Printed out flyers were left with representatives in immigrant-serving organizations in New York City were made in June 2016 in Flushing, Jackson Heights, and on Manhattan. A banner advertising the study was displayed for one month in Spring 2016 on the website of *Our Texas*, a twice-monthly newspaper that serves Russian-speaking population of Texas with headquarters in Houston, see Figure 1.

Figure 1. An online recruitment banner on Our Texas newspaper website, www.ourtx.com.

Participants took the study on their own computers and smartphones. They were told that the study explores immigrants' learning from American news.

Analysis run with G*Power software indicated that the required sample size for medium-size effects for analysis using ANOVA is 158 participants (Appendix A). However, specific analytical techniques based on multiple regression were used for data analysis because no naturally occurring groups were identified in the final sample (N = 146) based on language proficiency and length of stay.

Procedure

Subjects received a link to the study by email and were randomly assigned into one of three modality conditions.

Upon the completion of the study subjects were thanked for their participation. Subjects recruited by the researcher were redirected to the Google

Documents Form where they could leave their contact information to receive a $10-dollar Target gift card. Qualtrics Panels subjects were compensated differently.

Stimulus Materials

Stimuli were created based on existing news videos. At the first stage of stimuli development, the researcher searched for television news stories that had a relatively close match between the meaning of the words and the meaning of pictures. The researcher started the search by visiting websites of local news stations in the northeast of the United States. The researcher performed a search for the key word "politics" and viewed stories in search that were local and had videos. The researcher gradually moved the search to investigative stories in local media following the logic that investigative reporters have more time to find relevant footage for their stories. The researcher reviewed listings of winners of Peabody Awards and Edward R. Murrow Awards. Majority of stories were found among regional award winners of the latter award listed on the website of The Radio Television Digital News Association. One story was found though performing a search on Google video search with a key word "ghost voting," which allowed identifying a video with a good match between audio and video.

Ten videos were identified as suitable for the purposes of the study. Some were transcribed verbatim, and those that had a text version online, were edited to match the words in the audio. The text was matched with the screen shots of scenes in the video in an Excel spreadsheet. The matched words and pictures were then coded to document the degree of their correspondence following the coding scheme by Walma van der Molen (2001a). The coding also identified the scenes that had

rapid movement, text on screen and loud sounds, see Appendix B for the shortened version of the coding sheet.

Original videos were recorded with screen-recoding software Voila available through Apple Store in the U.S. The scenes with direct and indirect correspondence between words and pictures were chosen to be a base for questions testing encoding and storage. Excel cells with scenes with fewer degrees of correspondence were grayed out as scenes that may be cut during editing down. After the questions were created, which provided evidence that selected scenes offer sufficient content for questions and multiple-choice answers, the researcher edited the videos down in iMovie video editing program making sure that scenes with content tested in the questionnaire remained in the script and making sure that the story flows clearly after editing down. Words in lower thirds were blurred in Final Cut Pro to avoid confounding "spoken words + pictures" with elements of "written words" modality. The resulting videos were converted into lighter versions and uploaded on Qualtrics data-collection website as files in mp4 format. The "written words" condition was produced by copying the text in Excel sheets that survived editing down into a Word document and editing it slightly to compensate for the missing picture. Screen shots of the Word page with text in Georgia font size 12 were uploaded on Qualtrics data-collection website as files in PNG format. The "spoken words" condition was created by separating the audio track from the video track in iMovie and uploaded in mp3 format.

It is important to note that verbal content of the message was kept as identical across conditions as was possible. However, minimal editing was applied

to wording and ordering of information in the "written words" and "spoken words" conditions to compensate for the lack of pictures in those conditions. While the "written words" condition could be easily edited, editing the "spoken words" condition was limited to moving around and to cutting out the words already available in the audio track without the opportunity to add words in cases when clarification such as a name and title of the speaker were needed. See Table 1 for an example of editing across conditions.

Table 1. Example of differences in an excerpt from "Street Fee" story across the three modality conditions.

"spoken words + pictures"	"spoken words"	"written words"
NARRATOR: Another suggestion [pause, intonation of the female narrator goes up] a redo of the way the fees are calculated, leaving out schools and public institutions. FEMALE SPEAKER [name and title are blurred]: "It's a ridiculous notion that we want to take more money away from our children, away from your public institutions. It's embarrassing in my opinion." [Audience applauses].	NARRATOR: Another suggestion [pause, intonation of the female narrator goes up] a redo of the way the fees are calculated, leaving out schools and public institutions. FEMALE SPEAKER'S VOICE: "It's a ridiculous notion that we want to take more money away from our children, away from your public institutions. It's embarrassing in my opinion." [Audience applauses].	Another suggestion was a redo of the way the fees are calculated, leaving out schools and public institutions. "It's a ridiculous notion that we want to take more money away from our children, away from your public institutions," restaurant owner Renee Gorham said. "It's embarrassing in my opinion." Gorham's speech prompted applause.

Ten selected stories and questionnaire was tested in August and September 2015 on 28 international students in Columbia, Missouri, and on a few students outside Missouri and outside the U.S. who spent some time in the U.S. Some students went through the entire pool of stories in one of the three conditions, and some of

them tested as few as one story in their condition. A pretest was also held at a language school for immigrants and refugees in Iowa City in early August 2015. The pretest was held with 8 participants in one classroom on laptops with Windows software but had to be stopped due to the low language and computer skills of the participants.

Pretest results were screened in search for stories that seemed to have a reasonable distribution of correct and incorrect answers, had effective comprehension and cause-and-effect questions, had relatively straightforward fill-in responses, and had no negative feedback from students. For example, two stories were disqualified because one multimedia expert said the sound on her audio was of poor quality. In addition, one student said he noticed a negative slant toward the Republican party in many of the videos. It should be noted that whenever possible, information on both parties was included into videos at the editing stage but other considerations such as the need for close correspondence and a quest for making the stimuli as short as possible to release the burden for participants made balancing political stances secondary concerns.

Overall, 3 stories were selected to be included as stimuli based on the quality of questions and other criteria explained above. Some of the previous television effects research studies had stimulus materials as single stories (Grimes, 1990; Gunter, 1979; Wilson, 1974), three stories (Brosius et al., 1996), six stories (Graber, 1990), and even 14-15 stories (Gunter, 1979; Stauffer et al., 1981; Vig, 1980). Three stories were chosen as a middle ground to balance the disadvantages of single-message designs and the burden placed on participants.

Among the three stories included into the stimuli, “Panhandling” story focused on how the city of Muskogee, Oklahoma, regulates panhandling by issuing panhandling permits. “Street Fee” story covered a townhall meeting in Portland, Oregon, where business owners voiced their opinions about a proposed fee on businesses meant to be directed toward road repairs in the city. Finally, “Senators Flee” story covered a day of events when Wisconsin's Democratic senators left the State Senate and the state of Wisconsin to avoid voting on Gov. Scott Walker's bill proposing cuts to government to employees’ paycheck by 7% and limit collective bargaining rights. Stimulus materials for all conditions are available from the author.

Characteristics of stimulus materials are summarized in Table 2.

Table 2. Stimuli description.

Characteristic	Story		
	“Panhandling”	“Street Fee”	“Senators Flee”
Length, words			
“spoken words”	≈ 375	≈ 213	≈ 382
“written words”	385	297	417
“spoken words + pictures”	375	213	382
Length, seconds			
“spoken words”	115	88	117
“spoken words + pictures”	115	88	121
Speed of speech, words per second			
“spoken words”	≈ 3.26	≈ 2.42	≈ 3.16
“spoken words + pictures”	3.26	2.42	3.16
Distance between cuts, seconds			
“spoken words + pictures”	3.59	5.5	3.46

Overall, the presentation of the entire stimulus material in the “spoken words + pictures” and “spoken words” conditions lasted for 5.4 minutes. Subjects in the “written words” condition were not limited in the amount of time then could spend

on reading in attempt to increase the external validity of this experiment. However, the time the study was available for participants once started was constant across the three conditions.

The median completion time was 23.12 minutes for the "spoken words" condition, 26.09 minutes for the "spoken words + pictures" condition, and 27.45 minutes for the "written words" condition. Participants spent on average 1 hour 47 minutes to complete the study ($\overline{X} = 107.43$ minutes, SD = 421.21). The fastest participant completed the study in 11.28 minutes, and the slowest participant completed the study in 2.5 days. On average, participants spent the least time, 50 minutes, completing the "spoken words" condition, ($\overline{X} = 50.40$, SD = 107.43). Participants in the "spoken words + pictures" condition spent on average 1 hours 38 minutes to complete the study, ($\overline{X} = 98.93$, SD = 269.81). Participants in the "written words" condition spent on average 2 hours 46 minutes to complete their study, ($\overline{X} = 166.84$, SD = 662.47). Importantly, the sizes of standard deviation estimates reported above suggest that the range of times for completion varied greatly.

Measures

Independent variables. Three independent variables are employed in this study: modality, length of stay in the U.S., and English-language proficiency.

Modality. Modality variable took on a form of "spoken words + pictures" to represent television condition, "spoken words" to represent radio condition, and "written words" to represent print newspaper condition. The two essential characteristics of this variable were, first, identical verbal content across modality

conditions, and, second, correspondence in meaning between verbal and pictorial content in "spoken words + pictures" modality, which was established with a coding procedure developed by Walma van der Molen (2001). Intercoder reliability between two coders was calculated in ReCal 1.0 online calculator available on dfreelon.org. On the variable of correspondence between text and pictures only for the scenes that were used for testing encoding and storage (n = 22), Krippendorff's *alpha* reached .645. The two coders disagreed in their coding decision in 4 cases. The disagreements were between coding choices as direct correspondence versus indirect correspondence. Because only scenes with direct or indirect correspondence were used for testing memory, intercoder reliability was deemed to be acceptable.

Language proficiency. English language proficiency was measured as self-reported competence in the following language skills: reading, listening, speaking, and writing. The measure followed the one employed by Chaffee et al. (1990) who used a question "How good is your English in terms of (a) hearing [listening], (b) speaking, (c) reading, and (d) writing?" (p. 274) and recorded an answer on a scale from "Not at all" = 0 to "Very good English" = 5. Interitem reliability of the summed scale in Chaffee's et al. (1990) study was *alpha* = .93. Following Chaffee et al., scores on all four items were summed up to result in a measure of English language proficiency. Cronbach's *alpha* for the four-item scale reached .916 (N = 145). The scale variance was maintained for the use in statistical analysis, that is this independent variable was not dichotomized for the use in ANOVA analysis. Instead,

language proficiency was kept discrete as required for the use in multiple regression analysis.

Length of stay. Length of residential tenure in the U.S. was measured as a total number of full years spent on the U.S.

Dependent variables. Two dependent variables were used in this study: encoding, one of the three sub-processes of information processing in memory, and comprehension. A third independent variable, storage sub-process of information processing, is not reported in this dissertation for conciseness of findings. It is important to note that hypotheses about storage mirrored hypotheses about encoding, yet the performance scores for storage were expected to be lower than encoding scores because storage measure provided fewer cues to measure memory for news. Storage was measured as cued recall of story's content prompted by a single question asking subjects to type in the answer to an open-ended question mimicking the essence of the multiple-choice question used to measure encoding. Each storage question preceded a corresponding encoding question. Hypotheses about the effects on storage mirrored the hypotheses about the effects on encoding.

Encoding. The encoding sub-process of information processing was measured as recognition of facts in a multiple-choice questionnaire (Lang, 2000). Questions originated only from sentences and clauses that were scored as having direct, one-to-one correspondence or indirect, partly matching meaning of pictures and words in the "spoken words + pictures" condition. Questions tested participants on action, things, places, and causes and consequences. Such distinction was based on slightly modified Findall and Hoijer (1985) news event schema. While Findall

and Hoijer (1985) depict news schema as a process with four elements—people, places, causes and consequences—this study treated elements of news schema as elements of the Five W's and an H, which appear in every lead of the inverted pyramid. This journalistic formula translates into telling each news story in terms of Who (people), did What (action which sometimes includes and object, i.e., "thing"), Where (place), When, Why and How (causes and consequences). See Appendix F for indicators of questions that tested various elements of news schema.

For each question, participants were asked to choose the answer from six options: One option contained the correct answer, three more options were foils. The fifth option allowed the participants to state that they "don't remember that part of the story," which was made available to alleviate stress for adults who are not used to multiple-choice questions and to encourage them to keep on taking the study. The sixth option allowed subjects to choose "I don't understand this question" option to account for participants who did not understand the language of the question. This option was included to record answers missing due to the participants' not understanding the language of the question. All responses but the correct answer were recoded as incorrect answers. The maximum possible score for encoding was 12, the minimum was "zero."

Since conflicting views exist on ability of pictures to convey information about causal relationships, after performing analysis on overall scores for this measure, separate analyses were run on scores on questions about causes and consequences and on scores for recognition of action, things, and places.

Comprehension. Comprehension was measured by three multiple-choice questions testing participants' inference, see Appendix F. Answer options were relatively longer when compared to most of the encoding questions. Giving a correct answer required participants to correctly recognize the overall outcome of the event in the case of "Street Fee" story, understanding what was the misconception about panhandling caused by the introduction of permits in "Panhandling" story, and knowing that the reason why Democratic senators in "Senators Flee" story sabotaged the vote was because they could not change the outcome of the vote due to their being a senate minority. The maximum possible comprehension score was 3 points.

Control variables. Four groups of control variables were included to account for characteristics that theoretically could have significant effect on the outcome variables. The first group included age, gender, having K-12 children, and number of years of education received in the U.S. The second group of control variables accounted for characteristics specific to immigrant population: plans to go back to one's home country, acculturation to mainstream American culture, and psychological wellbeing. The third group included one control variable of news consumption. Source of recruitment was added as a fourth control group after data revealed significant differences between participants recruited by the researcher and participants recruited by Qualtrics Panels.

Age. Age was measured by asking participants to type in their age in full years.

Gender. Options for gender included "Male (Man)" and "Female (Woman)."

Years of education in the U.S. Years of education in the U.S. was measured by asking participants to type in the number of years.

Having K-12 children in American educational institution. Participants were asked to answer "Yes" or "No" to the question asking them whether or not they had children attending a K-12 educational institution. Participants who gave a positive answer were directed to the question asking them to list the ages and K-12 grades of their children.

Plans to go back to the country of origin. Plans to go back to home country were measured with a "yes" or "no" question.

Psychological wellbeing. Psychological wellbeing was measured on an 11-point scale that combined items from Life Satisfaction Scale (Diener, Emmons, Larsen, & Griffin, 1985) and an adapted scale gauging depression (Chorpita, Reise, Weisz, Grubbs, Becker, & Krull, 2010).) The eight items in the resulting scale were reverse-coded to make sure that the lowest score corresponds to the lowest estimate of one's wellbeing, and all items were summed up to arrive to the overall measure of wellbeing ($\overline{X}$ = 34.46, *SD* = 6.09). Cronbach's *alpha* for the 11-item scale reached .885 (*N* = 145).

Acculturation to American culture. Bi-dimensional Vancouver Index of Acculturation (Ryder et al., 2000) that consists of 10 questions about attitudes toward heritage culture and 10 questions about attitudes toward mainstream culture. The heritage subscore is the mean of the odd-numbered items, *alpha* from authors of the scale reaches .91. Mainstream culture subscore is the mean of the even-numbered items, *alpha* = .87. Only mainstream culture acculturation subscale

was used in this study. Reliability for the 10-item mainstream acculturation subscale in this study reached Cronbach's *alpha* = .858. For the record, reliability for the acculturation to the heritage culture, which was not used in this study's analysis because participants came from various heritage cultures and because the study focused on learning from mainstream American news, reached *alpha* = .865.

News consumption. News consumption was measured with two scales. One of the scales asked subjects to evaluate how closely they follow each of several types of news – political news, international affairs news, business and finance news, and science and health news – regardless of whether the news came from the newspaper, television, radio, or on the Internet on a scale from 1 ("Very closely") to 4 ("Not at all closely:" Dutta-Bergman [2004]). Each item was reverse-coded so that the lowest score corresponded to the least interest in following different kind of news. Cronbach's *alpha* for the five-item scale equaled .811 (N = 143). An average score across five items was calculated for every participant ($\overline{X} = 2.80$, SD = .68).

Another measure of news consumption was taken from American National Election Study (1996). This scale measured the frequency of consumption in days per week (from 1 "zero days" to 8 "every day of the week") of national news on TV, local news on TV, reading a daily newspaper, listening to radio news, and reading news online. Items were recoded so that the lowest measure, zero, corresponded to the response indicating zero days spent with the medium. Cronbach's *alpha* for the five-item scale equaled .615 (N = 144). Due to low reliability of this scale, this measure was not used in further analysis.

Transfer-appropriate processing. Concerns about transfer-appropriate processing might be raised when subjects are exposed to pictures and words in stimuli, but are tested with text-based questionnaire, as is the case in this study. Specifically, the mismatch in exposure and test modalities might put participants in the "spoken words" and "spoken words + pictures" conditions in a disadvantaged position in comparison to participants in "written words" condition when retention of information is tested. As evidence provided below suggests, picture superiority effect on retention holds even in studies that used test materials only in written words and in studies that compared performance on test materials in pictures and in words. In addition, the reversal of picture superiority effect is observed in implicit but not explicit tasks. Measures in this study—recognition, cued recall (not reported in this dissertation), and comprehension—are explicit measures. Below is a detailed analysis of transfer-appropriate literature.

Several studies that used word recognition test with questionnaire in printed-words form supported picture superiority effect on information retention (Borges, Stepnowsky, & Holt, 1977; Defeyter, Russo, & McPartlin, 2009; Jenkins, Neale, & Deno, 1967; Madigan, 1983). For example, on the sample of college students, free recall and recognition tested with questionnaire in printed-word form was the best for color pictures, followed by recognition for black-and-white pictures, flowed by recognition for written words (Borges et al., 1977). In a study that replicated some of the conditions of Borges' et al. (1977) study, adult participants recognized concepts studied as pictures and tested as words better than concepts studied as words and tested as pictures (Defeyter et al., 2009). In an

earlier study, college students' recognition levels of pictures tested with words were similar to recognition levels of words tested with words (Jenkins, Neale, & Deno, 1967). In the same study, recognition of pictures tested as pictures was superior to the recognition of words tested as words. Superiority effect for pictures in comparison words was observed despite incorrect verbal labeling of pictures in the stimuli, a brief—20 msec long—exposure, and printed-word form test (Madigan, 1983, p. 69).

The general conclusion about recognition measures is that changing the test modality from picture at the time of study to words at the time of test slightly reduces the accuracy of recognition in comparison to cases when material was studied and tested as pictures, but this change in modality does not produce effects strong enough to make picture-word recognition levels lower than word-word recognition (Madigan, 1983).

Roediger and Weldon (1987) note that free recall always presents advantage to words because this measure is verbal even when pictures are recalled, yet nonetheless, recall of pictures is usually better than recall of words.

There is evidence that picture superiority effect also holds for measures of comprehension mismatched with modality of exposure. When materials learned from audiovisual stimuli were tested with still pictures, gaps in recognition and comprehension decreased between higher and lower educated people in comparison to the condition when both measures were tested verbally, but the gaps themselves remained significant (Grabe, Bas, Ingeborg van Driel, 2015).

The reversal of picture superiority effect (i.e., superior retention of words in comparison to pictures) was found when a distinction between explicit and implicit measures of retention is made. Transfer-appropriate processing theory explains picture superiority effect by the interaction of encoding and retrieval (Morris, Bransford, & Franks, 1977). Processing of information that requires the processing of the meaning is referred to as semantic or conceptual processing. If conceptual processing occurs, when tested on the studied material people consciously attempt to retrieve what they have learned. The processing of the meaning of stimuli is captured by explicit measures of retention such as free recall, cued recall, and recognition (Roediger & Weldon, 1987). Perceptual or sensory processing is processing of stimulus features, and people do not consciously realize what they have learned when this type of processing is employed. Retention resulting from perceptual processing of stimuli is measured by implicit measures that are based on priming subjects by exposure to stimuli and then testing them by materials that repeat the stimuli in some form (Roediger & Weldon). Such measures of retention include word stem completion, word fragment completion, and lexical decision tasks, among other measures (Roediger & Weldon, 1987). Performance on conceptually-driven measures such as semantic cued recall test and general knowledge test was better in concept-driven (semantic processing) study condition than in data-driven (perceptual processing) study condition (Leshner & Coyle, 2000). This study manipulated viewer's perspective by formulating the task as requiring to rate stories meaningfulness vs. rating stories' features such as pace and reporter's voice in television news.

Transfer-appropriate processing may also be applied to explanation of effects that the change of modality between study and test conditions may have on test performance. Pictures are believed to be more likely than words to access meaning at the encoding stage (Roediger & Weldon, 1987), that is why when subjects are tested on information received from pictures or words with recall and recognition, which are the tasks that require conceptual processing—picture superiority effect is consistently observed (McBride & Dosher, 2002).

Because implicit measures of retention rely on perceptual processing of stimulus features, a reversal of picture superiority effect occurs, which manifests itself in findings that studied words result in better word fragment completion task while studied pictures result in better performance on picture fragment identification task (Roediger & Weldon, 1987). Scholars suggest eliminating the picture-word effect by engaging subjects in semantic processing of concrete words (Madigan, 1983), that is, the task that requires subjects to process the meaning of presented stimuli (McBride & Dosher, 2002).

My dissertation used measures that required conscious effort: recognition, cued recall, and comprehension questions. That is, this study employed only explicit measures of retention. Participants knew that they will be tested on the news they watched, read, or heard and therefore were more likely to engage in conceptually-driven processing. Reversal of picture superiority effect was noted when modality was shifted in cases of perceptual (data-driven) processing. Therefore, it was concluded that modality shift between encoding in the "spoken words + pictures"

condition and retrieval during test will not affect performance on retention measures.

Data Analysis

Multiple regression analysis was used to examine how well modality, length of stay in the U.S., and perceived English language proficiency explained participants' performance on memory and comprehension measures.

To tests the main effects of predictor variables with hierarchical multiple regression, dummy coding was used to create two variables for the "spoken words + pictures" (representing television news) and for "written words" (newspaper news) conditions. The "spoken words" (radio news) condition was coded as a reference group. The order of variables entered into the regression model in SPSS (Version 23.0.0.0) was informed by theory: Gender, years of education in the U.S., and having children who attend K-12 institution in the U.S. were entered on the first block and served as demographical controls; intention to stay in the U.S., acculturation to American mainstream culture, and psychological wellbeing were entered in the second block and served as controls specific to immigrant population; following different kinds of news was entered in the third block; source of recruitment was entered in the fourth block. Independent variables of language proficiency and length of stay were entered in the fifth block. Finally, dummy-coded modality of "spoken words + pictures" and "written words" were entered in the sixth block of hierarchical regression model.

When it was confirmed that *F*-value for the model including modality obtained statistical significance, the regression test was re-run with confidence

intervals set at 90% instead of 95% and *p*-values for individual predictors were manually divided by 2. This was done because SPSS automatically runs 2-tailed *t*-tests, while 1-tailed *t*-tests are needed when directional hypotheses-testing is performed.

To test the two-way interaction effects between a discrete variable of language proficiency and a continuous variable of length of stay, Andrew Hayes' Model 1 in PROCESS macro for SPSS (Version 2.16.3) was used. Model 1 was run twice for every hypothesis: The model was first run with language proficiency entered as independent variable and length of stay as moderator *M*, and it was then duplicated with length of stay entered as independent variable and language proficiency as moderator *M*. This allowed me to carry out omnibus tests of interaction effects and to probe for interactions with pick-a-point procedure and Johnson-Neyman technique. These two techniques for probing for interactions of continuous variables were suggested by Hayes and Matthes (2009) as alternatives to dichotomizing continuous variables and running analysis of variance tests.

To test the two-way interaction effects between a categorical variable of modality and language proficiency and between modality and length of stay, two different tests in Hayes' PROCESS for SPSS were used. Both tests perform multiple regression analysis and both require a specific coding method for the multicategorical, three-level variable of modality, but the two tests differ in how variables representing modality are entered.

First, Hayes' Model 1 in PROCESS macro for SPSS was also used for an omnibus test of two-way interactions between modality and language proficiency,

and between modality and length of stay. Modality as a categorical variable was coded using indicator coding system of groups, which assigns Arabic numbers to groups to distinguish among levels of a multicategorical variable: "spoken words" condition was coded as 1, "written words" was coded as 2, and "spoken words + pictures" was coded as 3. Multicategorical coding was indicated in the dialogue window with Helmert coding requested as a coding method. Due to this, Hayes' PROCESS automatically recoded modality with "spoken words" as D1 = -.67, D2 = .00; "written words" as D1 = .33, D2 = -.50; and "spoken words + pictures" as D1 = .33, D2 = .50 without creating separate variables in the data file. Technically, coding "spoken words + pictures" or "written words" as "D1 = -.67, D2 = .00" would have returned the same results because an omnibus test does not provide information about the differences between groups (Hayes & Montoya, 2017, p. 13), but consistency in the outputs for all the tests was more convenient for interpretation of results and creation of tables. For the record, initial coding for modality had "spoken words + pictures" represented as 1 and "spoken words" represented as 3. To keep "spoken words" as a reference group for the omnibus test of interaction effects, this condition was recoded into 1 and "spoken words + pictures" was recoded into 3 before the test.

Second, to probe for two-way interaction effects of language proficiency or length of stay at different levels of modality, Hayes' trick for PROCESS macro was used because it allows to probe for interaction in a regression model with an independent variable that has more than two levels (Hayes & Montoya, 2017). The procedure required recoding modality with a coding system Hayes & Montoya refer

to as “Helmert coding of groups” (p. 13). If I were to use indicator coding system, with the three levels of modality dummy-coded in a way where “spoken words” would have been the reference condition, the effects would express the differences in mean outcome variables—encoding, storage, and comprehension—between the “spoken words” and “written words” conditions and the differences in mean outcome variables between the “spoken words” and “spoken words + pictures” conditions. While this is a useful information to have, my study aimed to compare all possible combinations of three modality levels. Specifically, the primary goal of this study was to compare the differences in mean scores on outcome variables between the “written words” and “spoken words + pictures” conditions to verify the findings of Chaffee’s et al. (1990) survey about the benefits of exposure to television news about politics for immigrants with weaker language skills and shorter residential tenure. The secondary goal of this study was to compare the differences in mean outcome variables between the “spoken words” and “spoken words + pictures” conditions to test whether or not the differences, if any, were due to the presence of pictures in the condition representing television news. Finally, comparison of differences in mean outcome variables between “spoken words” and “written words” condition, which represent the same symbol system of words but differ in degrees of transience of words, was needed due to a possibility that some groups of foreign-born population might be used to listening to radio news, for example individuals who learned to speak and understand spoken English but had not had an opportunity to learn reading in English, or individuals who might have lived in refugee camps.

The omnibus test of interaction effects in PROCESS provides values for R^2, F, and p for the overall model with all the variables included. The omnibus test's output also includes data on conditional effects of modality on outcome variables at distinct values of the moderator. While it is possible to request the values as percentiles, in a sample with highly skewed scores of language proficiency where three-fourths of all participants evaluated their language skills at a maximum possible value of 20 points several percentile levels would have result in the same value of 20 points. Therefore, three points on the distribution of the quantitative independent variable (or Variable M in Model 1) were chosen: at the mean ($\overline{X}$), at one standard deviation below the mean ($\overline{X} - 1SD$), and one standard deviation above the mean ($\overline{X} + 1SD$). Once again, the scores of language proficiency in this study were negatively skewed with the mean of $\overline{X}$ = 19.10 (N = 143). Therefore, for the results at one standard deviation (SD = 1.96) above the mean was outside of the maximum possible score (X = 20.00) of language proficiency: $\overline{X}$ + 1SD = 19.1049 + 1.9599 = 21.06. For this reason, PROCESS substituted one standard deviation above the mean with the maximum score on the language proficiency scale, 20 points. The values of outcome variables at three levels of the moderator for all three levels of modality were included in the PROCESS output for the omnibus test.

In the PROCESS output, the effect of variable D1 quantified the difference between the average outcome variable, e.g. encoding, of participants in the "spoken words" condition and the unweighted average encoding for participants who were in the two conditions of primary interest in this study, "written words" and "spoken words + pictures." The effect of variable D2 quantified the difference between the

average encoding of participants in the "written words" condition and participants in the "spoken words + pictures" condition. In essence, the effects of variable D1 represented the difference between the average encoding of those who were in the control group of "spoken words," which offered information in transient words, and the unweighted average encoding for those who were theorized to be in more favorable toward learning conditions of "written words," which offered words permanently fixed on screen, and the "spoken words + pictures" condition, which while offering transient words supplemented them with pictures. At the same time, the effects of variable D2 essentially represented the difference between the average encoding of those who were in the "written words" condition, which offered a more stable form of words (relative to "spoken words"), and those who were in the "spoken words + pictures" condition, which offered a unique symbol system of pictures.

Importantly, measuring conditional effects with a pick-a-point procedure at the mean level and at one standard deviation below and above the mean or at percentiles within the distribution of the moderator is an arbitrary choice of values that do not always reflect the actual values in the sample (Hayes & Montoya, 2017). A good alternative is Johnson-Heyman technique, which identifies regions of the moderator variable at which the effects of the focal predictor on the outcome variable obtain statistical significance. Hayes & Montoya (2017) call Johnson-Neyman technique "the pick-a-point technique in reverse" (p. 15) because instead of "telling" PROCESS the values of the moderator at which it should calculate the interaction effects, the technique identifies the values on the range of the moderator

at which the effects of the independent variable are statistically significant. This advantage of the technique is consistent with the interest of social scientific research "in the boundary conditions of such effects, meaning when, or for whom, or in what context communication in its many forms has an effect and when it does not, or when its effect is strong or weak, positive or negative" (Hayes & Montoya, 2017, p. 1). Doctoral student Amanda Montoya programmed the original syntax Omnibus Groups Regions of Significance (OGRS) for SPSS, and her advisor Dr. Andrew Hayes incorporated it into PROCESS. As a result, with the use of the trick of Helmert coding, the Johnson-Neyman technique became available for our two-way interaction tests involving multicategorical independent variable of modality.

To perform Johnson-Neyman technique in PROCESS, a manual conversion of indicator coding of levels of modality into Helmert coding system is needed with Hayes' "trick". Essentially, the "trick" is an SPSS syntax for recoding a multicategorical independent variable from indicator coding system (with "spoken words" represented as 3 in the initial coding system) to Helmert coding system, see Figure 2.

```
if (mod = 3) d1 = −2/3.
if (mod = 3) d2 = 0.
if (mod = 2) d1 = 1/3.
if (mod = 2) d2 = −1/2.
if (mod = 1) d1 = 1/3.
if (mod = 1) d2 = 1/2.
```

Figure 2. Syntax for converting indicator coding system for modality to Helmert coding system. Adapted from Hayes & Montoya (2017, p. 27).

As a result, two new variables appeared in the SPSS data file: d1 and d2. Each of the two resulting variables were then entered one at a time into PROCESS Model 1 as independent variable. Encoding, storage or comprehension were entered as a dependent variable. Language proficiency or length of stay were entered as variable *M*, and all the control variables were entered as covariates because they were not a part of the conceptual model, Model 1 (SPSS PROCESS documentation, Jan. 2, 2013, p. 5). When variable d1 served as a focal predictor, variable d2 was added to the list of covariates. Similarly, when variable d2 served as a focal predictor, variable d1 was added to the list of covariates. In addition, the interaction between d1 and a moderator or d2 and a moderator was included as a control, when an interaction term included, respectively, d2 or d1 as a focal predictor (Hayes & Montoya, 2017). The effects of d1 and d2 in the PROCESS output reflected the differences among the same groups as did variables D1 and D2 in the omnibus test output.

Overall, dummy-coding and Helmert coding systems were used for modality depending on a kind of test, see Table 3.

Table 3. Coding systems used for modality depending on a test performed to tests hypotheses.

	Test					
	Main effects		Interaction effects			
	Dummy-coding		Omnibus[a]		Johnson-Neyman[b]	
Modality	Is it print?	Is it TV?	D1	D2	d1	d2
"spoken words"	0	0	$-2/3$	0	$-2/3$	0
"written words"	1	0	$1/3$	$-1/2$	$1/3$	$-1/2$
"spoken words + pictures"	0	1	$1/3$	$1/2$	$1/3$	$1/2$

[a]Coding performed automatically during the test in PROCESS.
[b]Coding performed manually by executing a syntax prior to the test in PROCESS.

It is important to note that not only this study included one factor that was multicategorical, but it also employed a complex factorial design—a design with three independent variables—both circumstances increasing the possibility of Type I error, among other issues (Smith, Levine, Lachlan, & Fediuk, 2002). In addition, SPSS runs only 2-tailed *t*-tests of null hypothesis for each regression coefficient, which is suitable for answering research questions but is not suitable for directional hypotheses-testing, which involves predictions about direction of effects. This fact increased the possibility of Type II error in identifying the contribution of individual predictors in the model. As a solution, for hypotheses-testing about two-way interactions, when the omnibus test for interaction effects obtained statistical significance for the model's fit and when low-proficiency or high-tenure participants performed as predicted, these tests were re-run with confidence intervals set at 90% instead of 95% and *p*-values for individual predictors—but not interaction terms—were manually divided by 2. This was how this study followed the advice of Smith et al. (2002) who suggested that in complex factorial designs the omnibus *F*-test should be used as a gatekeeper test: Once the *F* estimate, which calculates the proportion of the variance explained by all the variables in the model to the variance that the model fails to explain, failed to obtain statistical significance, the individual predictors of variance should not be tested. It should be noted, however, that individual predictors were tested with 2-tailed tests and reported in this study even when the omnibus *F*-test failed to reach statistical significance because predictions about the interaction effects of focal predictors could be tested directly. In addition,

the omnibus test was not always available throughout the entire study, as was the case with three-way interaction tests.

To test the effects of three-way interaction terms among the modality, language proficiency and length of stay, Model 3 in process was used. Variable d1 was entered into the independent variable box in the first test, and variable d2 was entered into the independent variable box in the second test. Language proficiency was entered as variable *M*, and length of stay was entered as "Proposed Moderator *W*." Control variables were entered into covariates' box. Covariates included an interaction term of d1 or d2 with language proficiency, length of stay, and with both language proficiency and length of stay.

Three-way interaction tests were not re-run with confidence intervals at 90% even when the model fit obtained statistical significance and performance of low-proficiency participants followed the predicted direction of effects. This decision was based on concerns, among others, about the increased likelihood of Type I error due to the increased number of *F*-tests in complex factorial designs coupled with a multicategorical factor. The different treatment of two-way and three-way interaction tests was meant to balance concerns about increased Type I and Type II errors. It was also an attempt to at least in part follow Hayes & Montoya (2017) in their favoring of replication of findings over adjustments of *p*-values or confidence intervals.

IV. RESULTS

Sample's Characteristics

In the subsample recruited by the researcher, 179 individuals took at least a part of the study. Qualtrics Panels sample included 200 individuals who at least attempted to take the study. It is worth noting that Qualtrics Panels included attention checks in their data and filtered out respondents who spent too little time to complete the study. Seventy-seven Qualtrics Panels participants completed the study.

Among the 258 cases in the combined data file with all responses from the researcher's subsample – including individuals who did not qualify for participation and individuals who didn't complete the study – and completed responses from Qualtrics Panels, 182 cases (70.5%) were automatically marked as completed, and 76 cases (29.5%) were marked as not completed. A closer scrutiny of the sample was conducted once again, and 147 online surveys (57.0%) were confirmed as completed entirely, and 146 cases (56.6%) were identified as having a complete multiple-choice section of questions, which provided data on encoding and comprehension. Among those, 69 subjects were recruited by the researcher, and 77 subjects were recruited by Qualtrics Panels.

In the overall sample of 146, 54 participants were randomly assigned into the "spoken words + pictures" condition, 49 were assigned into the "written words" condition, and 43 participants were assigned to the "spoken words" condition. Group sizes differed across conditions because participants tended to be less likely

to complete the "spoken words" condition, so the numbers of completed surveys in each group indicate that participants somehow preferred "spoken words + pictures" to the two other conditions.

Participants in the overall sample were on average 44.73 years old, among which the youngest participant was 19 years old and the eldest participant was 86. Sixty-one percent of the sample was female (61.38%, *n* = 89), and 39% of the sample was male (38.62%, *n* = 56). Participants had on average 6.45 years of education in the U.S. At the time of the study, 28.77% of participants had children attending K-12 educational system, while 71.23% did not have children of K-12 age.

The majority of the participants resided in California (*n* = 23), while 18 resided in Missouri; 14 each in New York and in Texas; 9 in Florida, 8 in New Jersey, 6 in Maryland; 5 each in Illinois, Nebraska, and Pennsylvania; 4 each in Alabama and Indiana; 3 each in Michigan, Minnesota, and North Carolina; 2 each in Arizona, Massachusetts, Tennessee, Virginia, and Wisconsin; and 1 each in Colorado, Connecticut, Georgia, Kansas, Louisiana, Montana, New Hampshire, Ohio, Oregon, South Carolina, Washington, and Hawaii.

The majority of participants were born in Russia (19.9%, *n* = 29), while 8 participants were born each in Canada and in South Korea, 7 each in Germany and the United Kingdom; 6 each in China, India, and Mexico; 5 in Ukraine; 3 each in Colombia, Hong Kong, Netherlands, Poland, Romania, and Turkey; 2 each from Austria, Bangladesh, Guyana, Japan, Pakistan, Philippines, Saudi Arabia, South Africa, and Vietnam; and 1 each from Albania, Australia, Belarus, Belgium, Brazil, Bulgaria, Cameroon, Chile, Cuba, France, Georgia, Guatemala, Haiti, Hungary, Jamaica, Latvia,

Lebanon, Malta, Moldova, Nepal, New Zealand, Peru, Serbia, Sierra Leone, Singapore, Spain, Taiwan, and Venezuela.

On measures specific to immigrant population, 17.81% (n = 26) of participants had plans to go back to their home country, while 82.19% (n = 120) did not have such plans. Participants scored on average 6.95 on a 9-point subscale measuring acculturation to American mainstream culture ($\overline{X}$ = 6.95, SD = 1.10). While acculturation to heritage culture was not used in statistical analysis, it is reported here to provide context to the degree of acculturation to American mainstream culture. On the 9-point subscale of acculturation to their heritage culture, participants scored on average 6.66 points ($\overline{X}$ = 6.66, SD = 1.27). These numbers suggest that participants perceived to be at the relatively same levels of acculturation both to the mainstream American and their heritage cultures. Finally, participants scored on average 34.46 points out of maximum possible 44 points on the measure of psychological wellbeing.

Participants in the sample scored on average 2.80 points out of 4 possible on the measure of how closely they follow different kinds of news.

Participants resided in the U.S. on average for 22.12 years ($\overline{X}$ = 22.12, SD = 16.64), with the shortest length of stay lasting for 1 year and the longest length of stay lasting for 69 years. Participants evaluated their language proficiency on average at 19.08 points out of 20 points possible. Language proficiency scores were negatively skewed, see Table 4; however, data for low-proficiency participants at the score of 16 points were normally distributed, see Appendix E.

Table 4. Skewness and kurtosis for language proficiency and length of stay.

Variable	*N*	Mean	*SD*	Skewness		Kurtosis	
				Statistic	*SE*	Statistic	*SE*
Language proficiency	145	19.076	1.993	-2.773	.201	9.962	.400
Length of stay	146	22.120	16.640	1.115	.201	.543	.399

Differences Between the Two Subsamples

Because subjects were recruited through the researcher's own efforts and through a marketing research company Qualtrics Panels, independent samples *t*-test was run in SPSS to evaluate the differences between the two subsamples on continuous variables of interest. Among the subjects who completed the multiple-choice questions of the online experiment (N = 146), there were statistically significant differences in age, length of stay in the U.S., acculturation to mainstream culture, psychological wellbeing, and on the measure of news consumption between the subsample recruited by the researcher (n = 69) and the subsample obtained by Qualtrics Panels (n = 77). Participants recruited by the researcher were younger ($\overline{X}$ = 40.43, SD = 12.42) than were participants in the Qualtrics' subsample ($\overline{X}$ = 48.58, SD = 17.36), $t(146) = -3.287$, $p = .001$, $CI_{.95}$-13.053, -3.247. Participants recruited by the researcher spent less time in the U.S. ($\overline{X}$ = 15.14, SD = 9.27) than did participants recruited by Qualtrics ($\overline{X}$ = 28.38, SD = 19.17), $t(146) = -5.397$, $p < .001$, $CI_{.95}$-18.0994, -8.3785. This last difference is important because length of stay in the U.S. is one of the three independent variables in this study.

On the measure of the degree of acculturation to mainstream American culture, participants recruited by the researcher scored slightly lower ($\overline{X}$ = 6.60, SD = .97) than did participants recruited by Qualtrics ($\overline{X}$ = 7.28, SD = 1.11), $t(143) = -$

3.866, $p < .001$, $CI_{.95}$ -1.02656, -.33188. In addition, participants from the researcher's subsample also scored slightly lower on the measure of psychological wellbeing ($\overline{X} = 33.12$, $SD = 6.62$) than did participants from the Qualtrics' subsample ($\overline{X} = 35.65$, $SD = 5.35$), $t(145) = -2.546$, $p = .012$, $CI_{.95}$-4.49742, -.56599.

On the measure of news consumption, participants in the researcher's subsample reported following different kinds of news less close ($\overline{X} = 2.54$, $SD =$ .586) than did participants in Qualtrics' subsample ($\overline{X} = 3.04$, $SD = .69$), $t(146) =$ -4.687, $p < .001$, $CI_{.95}$-.70652, -.28735.

Finally, Chi-square test of independence was run to verify whether or not the two subsamples were similar on the nominal variables of gender, having K-12 children, and intention to stay in the U.S. Among these measures, the relationship between the source of recruitment and gender was significant, $X^2(1, N = 145) =$ 6.161, $p = .013$. Participants in the subsample recruited by the researcher was more likely to be female than were participants in the subsample recruited by Qualtrics Panels.

Table 5. Statistics of subsamples' and the overall samples' characteristics.

	Researcher's subsample, *n* = 69			Qualtrics Panels subsample, *n* = 77			Overall sample *N* = 146		
Characteristic	*n*	$\overline{X}$	*SD*	*N*	$\overline{X}$	*SD*	*N*	$\overline{X}$	*SD*
Age	69	40.43	12.42	77	48.58	17.36	146	44.73	15.71
Gender	68	—	—	77	—	—	145	—	—
Female	49	—	—	40	—	—	89	—	—
Male	19	—	—	37	—	—	56	—	—
Years of education in the U.S.	69	5.54	5.39	77	7.26	6.66	146	6.45	6.13
Having K-12 kids	69	—	—	77	—	—	146	—	—
Yes	23	—	—	19	—	—	42	—	—
No	46	—	—	58	—	—	104	—	—
Plans to go back to home country	69	—	—	77	—	—	146	—	—
Yes	15	—	—	11	—	—	26	—	—
No	54	—	—	66	—	—	120	—	—
Acculturation to mainstream American culture	66	8.60	.97	77	7.28	1.11	143	6.97	1.10
Psychological wellbeing	68	33.12	6.62	77	35.65	5.35	145	34.46	6.09
News consumption	69	2.54	.59	77	3.04	.68	146	2.80	.68
Language proficiency	68	19.01	2.13	77	19.13	1.87	145	19.08	1.99
Length of stay	69	15.14	9.27	77	28.38	19.17	146	22.12	16.64

Notes. Valid *N* = 140.

Treatment of Outliers

To check the data set for outliers, each of the two dependent variables were regressed on each of the three focal predictors. Saved Standardized DFFIT values were plotted against Participants' ID number in SPSS. The plots were screened for cases with Standardized DFFIT values greater than ±1, which equaled to the number of standard deviations the predicted value of the outcome variable for each specific

case would change if the case were deleted from the data set. None of the cases reached ±1, the cutoff value of Standardized DFFIT.

Assumptions Check

Assumption 1. Data was checked for the existence of linear relationship between independent variables and dependent variables. Residuals saved from the multiple regression analysis that regressed encoding on modality, language proficiency, and length of stay were plotted against the two predictor variables of language proficiency and length of stay and against the predicted values of *Y'*. Residuals were not plotted against modality because modality was a nominal variable.

Plots for encoding demonstrated that assumption of a linear relationship between language proficiency or length of stay and encoding were met, see Figures 3 and 4.

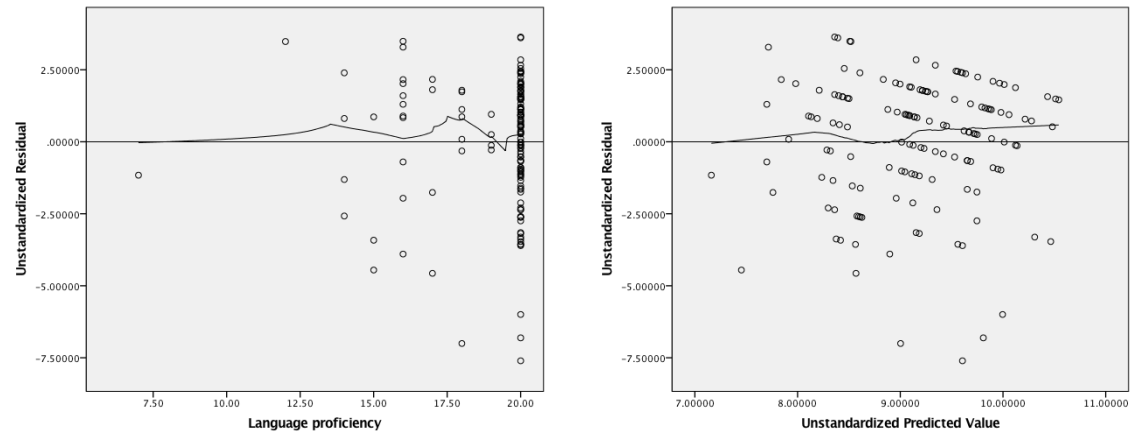


Figure 3. Assumption check for the linear relationship between language proficiency and encoding.

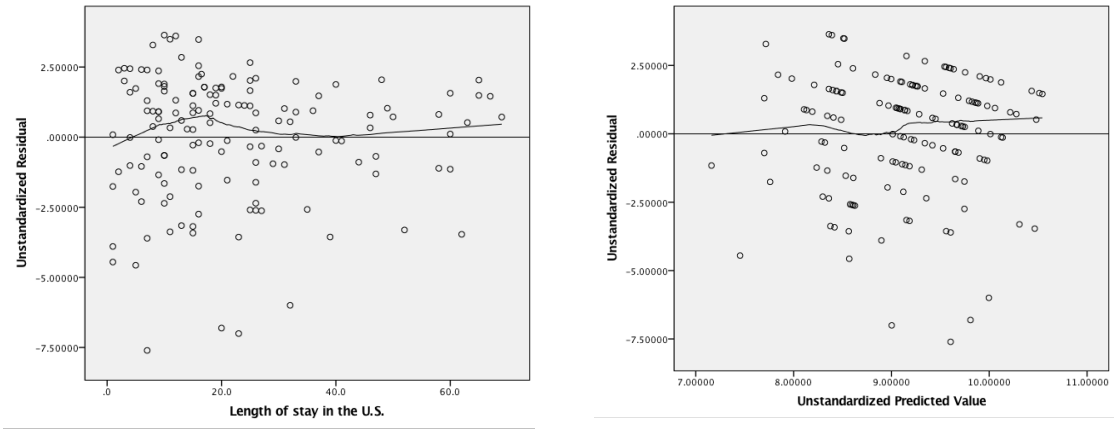


Figure 4. Assumption check for the linear relationship between length of stay and encoding.

Plots for comprehension demonstrated that assumption of a linear relationship between length of stay and comprehension were met, see Figure 6, while assumption of a linear relationship between language proficiency and comprehension was less certain, see Figure 5.

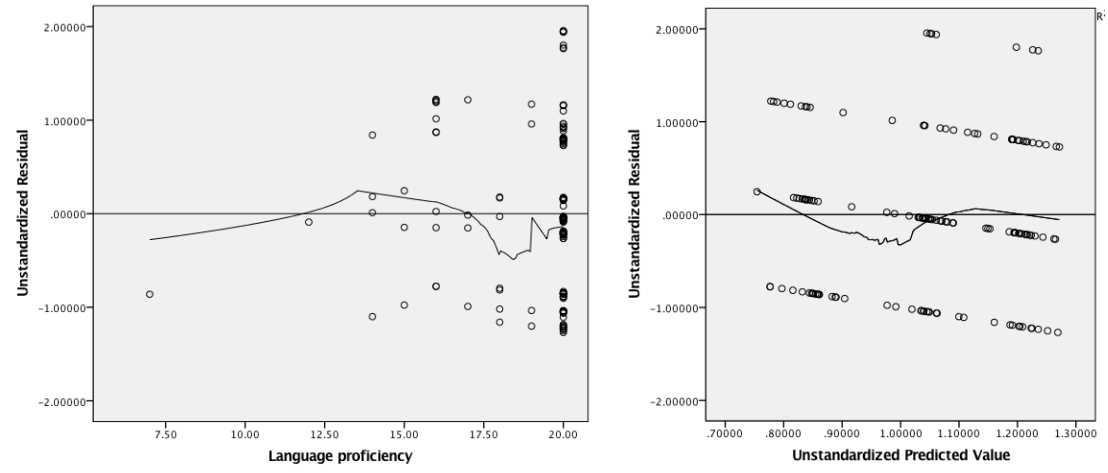


Figure 5. Assumption check for the linear relationship between language proficiency and comprehension.

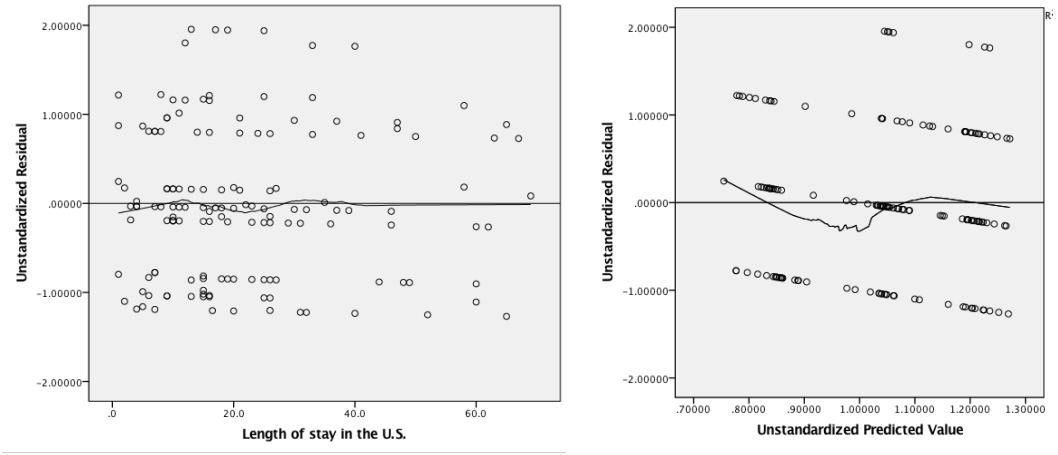


Figure 6. Assumption check for the linear relationship between length of stay and comprehension.

Assumption 2. Because data were collected from two different pools of people—one being researcher's own efforts and another being Qualtrics Panel—the independence of residuals assumption was checked. Residuals saved from regressing encoding on modality, language proficiency and length of stay were plotted against the source of recruitment, which was suspected to be a cluster variable. Boxplots of the two sources of recruitment indicated some variability in the mean value of the residuals in each group. This means that the residuals might be more similar within the two clusters of data than between the clusters, which might lead to too small standard errors resulting in incorrect significance tests and confidence intervals.

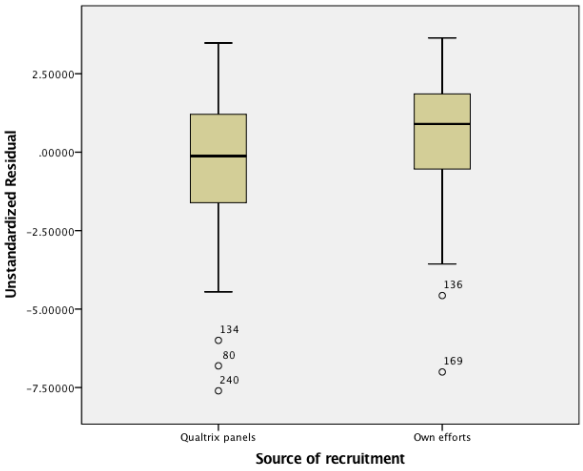


Figure 7. Boxplot with median values of unstandardized residuals of two sources of recruitment for encoding.

For this reason, a dummy coded variable was used to indicate group membership to remove the effects of mean differences among the groups on the results of the regression analysis. When source of recruitment was added to the regression model testing the effects of modality, language proficiency and length of stay in the U.S. on encoding, R^2 significantly increased from .095 to .144, $F_{\text{change}}(1, 139)$, = 7.927, p = .006. Therefore, source of recruitment was deemed to be an important predictor of encoding and was included into the model as a covariate.

In the case of encoding of action, boxplots of the two sources of recruitment seemed to suggest that the difference in means between the two groups was relatively small, see Figure 8.

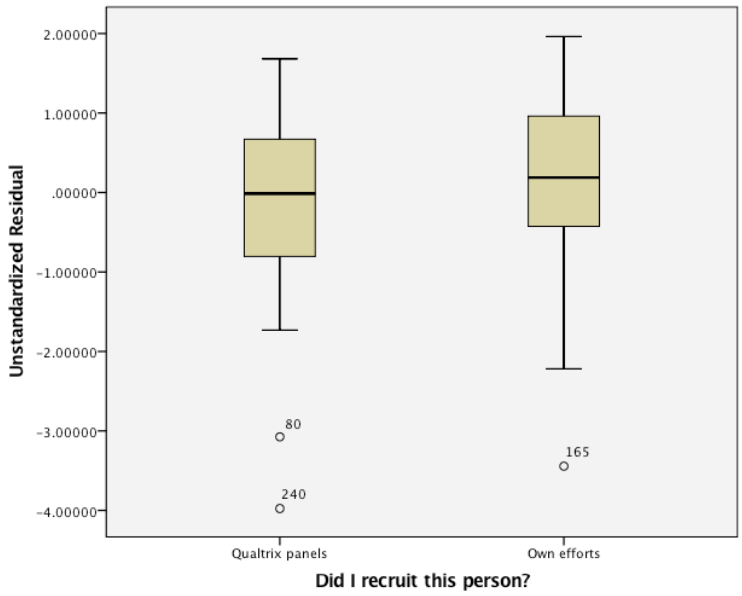


Figure 8. Boxplot with median values of unstandardized residuals of two sources of recruitment for encoding of action.

When source of recruitment was added to the regression model testing the effects of modality, language proficiency and length of stay in the U.S. on encoding of action, R^2_{change} of .017 failed to reach statistical significance, $F_{change}(1, 139)$, = 2.917, p = .090. Despite this, source of recruitment was kept among the predictors of encoding of action because Qualtrics Panels subsample's length of stay differed from that of in the researcher's own subsample.

The same precaution was made in the case of comprehension, which demonstrated to be unaffected by the inclusion of source of recruitment as a control variable, R^2_{change} = .000, $F_{change}(1, 139)$, = .097, p = .931.

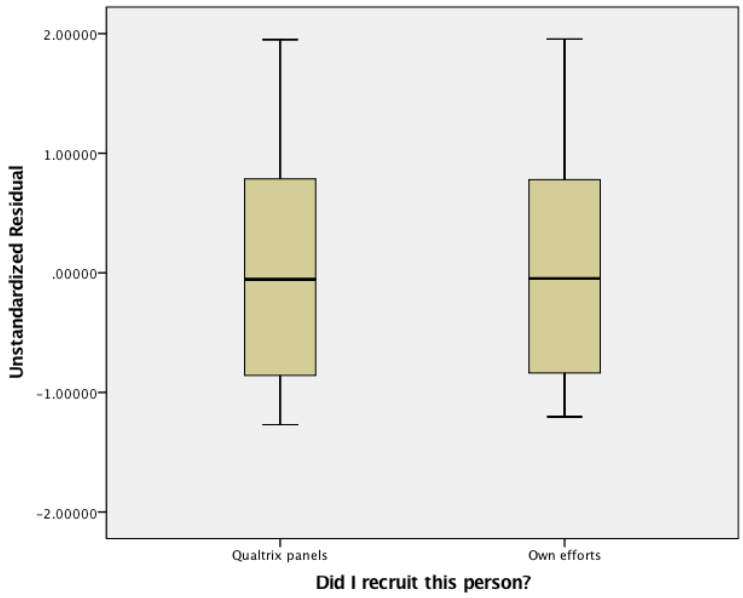


Figure 9. Boxplot with median values of unstandardized residuals of two sources of recruitment for comprehension.

Assumption 3. It was assumed that the regression model was correctly specified because it followed Chaffee et al. (1990) in the choice of focal predictors of modality, language skills and length of stay. The model also included control variables that accounted for general demographic characteristics as well as characteristics specific to the immigrant population. News consumption also served as a control variable in this study about immigrant learning from American news in politics.

However, Pearson's correlation coefficients demonstrated that one of the independent variables, length of stay in the U.S., was strongly correlated to one of the demographic control variables, age, $r = .696$, $p < .001$, (see Appendix D for the table with bivariate correlations between the two outcome variables and independent and control variables). For this reason, age was excluded from further analyses as a control variable to avoid multicollinearity, high correlations among

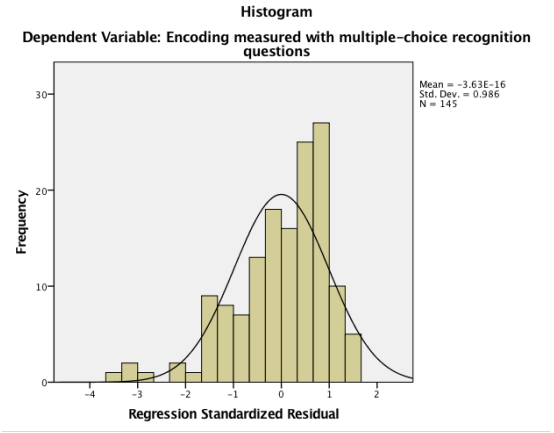
predictor variables, which causes large standard errors and difficulty in interpreting regression coefficients.

Therefore, the final regression model excluded control variable of age to avoid multicollinearity with length of stay and source of recruitment was controlled for because differences in descriptive statistics for several variables were found between the two sub-samples.

Assumption 4. Accuracy of measurement of the independent variables was ensured by using a four-item measure of language proficiency that obtained Cronbach's *alpha* = .916 (*N* = 145). Intercoder reliability for the correspondence between words and pictures in the condition representing television news achieved Krippendorff's *alpha* = .645 with disagreements among coders that were not crucial.

Assumption 5. Homoscedasticity of residuals was assumed after examining plots and observing no relationship were detected between variability of the residuals and either the dependent variables or predicted values. See Figure 3 for the plot for language proficiency and encoding, Figure 4 for the plot for length of stay and encoding.

Assumption 6. Distribution of standardized regression residuals for encoding was skewed in comparison to the normal curve and stayed somewhat close to the straight line, see Figure 10.



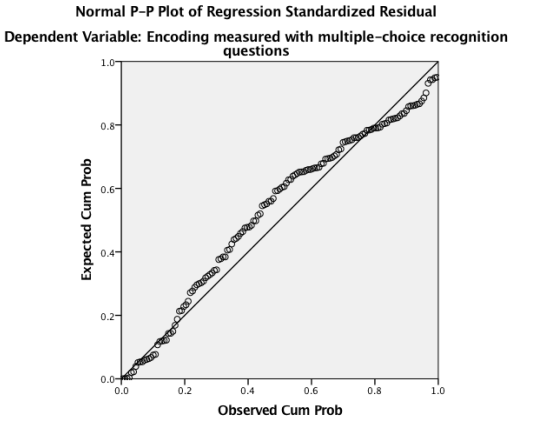
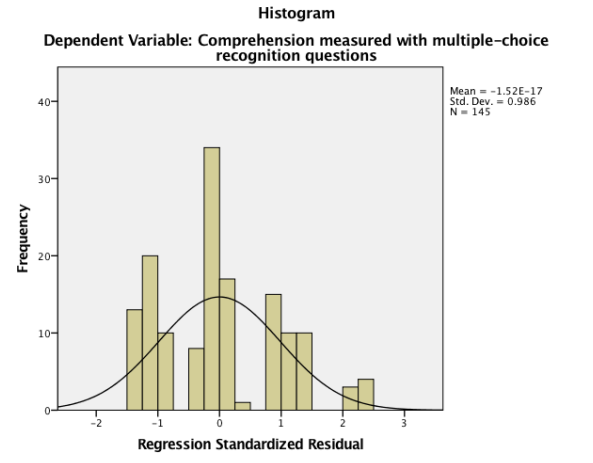


Figure 10. Distribution of residuals for encoding.

Distribution of standardized regression residuals for comprehension did not resemble the normal curve and diverted from the straight line, see Figure 11.

.



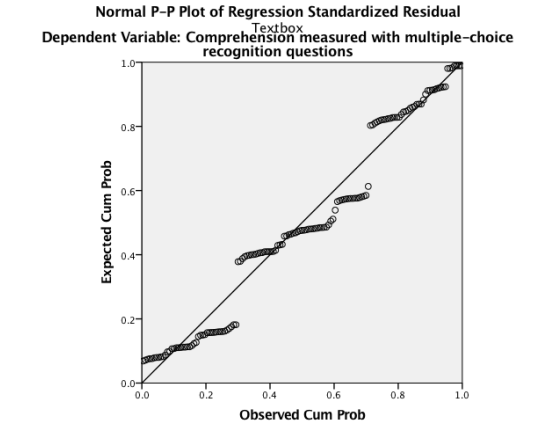


Figure 11. Distribution of residuals for comprehension.

Main Effects of Language Proficiency and Length of Stay

Hypotheses 1a-b about the effects of language proficiency on participants' performance were based on understanding that decoding of words depends on the level of language skills. Thus, H1 predicted that as language proficiency increases, scores for (a) encoding, and (b) comprehension will also increase. H1a-b were tested

with hierarchical multiple regression analysis where language proficiency was entered together with length of stay as the last block.

Hypotheses 2a-b about the effects of length of stay on participants' performance were based on understanding that length of stay serves as a proxy for prior knowledge and for well-developed schemas that assist in incorporating new information. Thus, H2 predicted that as length of stay increases, scores for (a) encoding, measured with 12 multiple-choice questions, and (b) comprehension, measured with 3 multiple-choice questions, will also increase. H2a-b were tested with hierarchical multiple regression analysis where length of stay together with language proficiency was entered as the last block.

Overall, as a block, language proficiency and length of stay explained additional 5.4% of variance in encoding scores, and each additional year in the U.S. increased encoding scores by .03 points. This small but statistically significant effect supported H2a about the effects of length of stay on encoding. Therefore, H1a about effects of language proficiency on encoding was not supported, H2a about effects of length of stay on encoding was supported, H1b about main effects of language proficiency on comprehension and H2b about main effects of length of stay on comprehension were not supported. A detailed report follows below.

Main effects of language proficiency and length of stay on encoding. Results of hierarchical multiple regression analysis showed that as a block, language proficiency and length of stay in the U.S. explained additional 5.4% of participants' encoding scores after controlling for general demographic traits, characteristics reflective of immigrant status, news consumption and source of recruitment. More

specifically, R^2 significantly increased from .054 to .109, $F_{change}(2, 129) = 3.935$, $p = .022$. The overall regression model failed to reach statistical significance, $R^2 = .109$, $F(10, 127) = 1.572$, $p = .122$, see Table 6.

Table 6. Unstandardized regression coefficients and standard errors (SE) for the overall hierarchical regression model predicting effects of length of stay and language proficiency on encoding.

Variable	Unstandardized coefficient		Standardized coefficient β	t	p	Tole-ran-ce†
	B	*SE*				
(Constant)	5.272	2.413	n/a	2.185	.031	
Gender (being a woman)	-.443	.428	-.094	-1.035	.302	.845
Education in the U.S.	-.023	.037	-.062	-.624	.534	.711
Having K-12 children	-.090	.434	-.018	-.207	.836	.959
Plans to go back	-.426	.535	-.070	-.798	.426	.910
Acculturation	.143	.215	.068	.665	.507	.665
Psychological wellbeing	-.026	.035	-.067	-.728	.468	.809
News consumption	-.166	.336	-.049	-.494	.622	.711
Source of recruitment (being in the researcher's subsample)	1.047	.468	.225	2.238	.027	.683
R^2	.054				.487	
Language proficiency	.185	.106	.158	1.747	.083	.849
Length of stay	.031	.015	.223	2.124	.036	.625
R^2_{change}	.054				.022	
Total R^2	.109				.122	

†Tolerance less than .10 signals severe multicollinearity for the variables with the same value.

Length of stay in the U.S. reached statistical significance in explaining encoding scores, $t(139) = 2.124$, $p = .036$. Holding other variables constant, each additional year in the U.S. was estimated to increase encoding scores by .031 points [95% *CI*: .002, .060] in comparison to the constant of 5.272 points, $t(139) = 2.185$, $p = .031$. Language proficiency failed to reach statistical significance in explaining encoding scores, $t(139) = 1.747$, $p = .083$. Unstandardized coefficient indicated that holding other variables constant, each additional point on language proficiency scale was estimated to increase encoding scores by .185 points [95% *CI*: -.024, .394].

Among the control variables, source of recruitment was a significant predictor of encoding scores, $t(139) = 2.238$, $p = .027$. Participants recruited by the researcher correctly recognized on average 1.05 more answers [95% *CI*: .121, 1.972] than did participants recruited by Qualtrics.

Overall, H1a about main effects of language proficiency on encoding was not supported, and H2a about main effects of length of stay on encoding was supported.

Main effects of language proficiency and length of stay on encoding of news schema elements. Research Question 1 inquired which of the elements of the news schema—things, action, places, and causes and effects—was affected the most by language proficiency and by length of stay. Except for the case of encoding of places, RQ1 was tested with hierarchical regression analysis, where language proficiency and length of stay entered in one block, and the total encoding score on questions testing elements of news schema was entered as a dependent variable. In the case of encoding of places, hierarchical logistic regression was used because only one question was based on information communicating a place—the Wisconsin State Senate—in the "Senators Flee" stimuli. Answers were coded as correct or incorrect, therefore the outcome variable in encoding of places was binary, scored as a zero in the case of incorrect answer and as "1" when correct answer was given. Overall, language proficiency emerged as a significant predictor of encoding of action, with each additional point on language proficiency score contributing additional .11 points to the score on encoding of action. A detailed report of the results follows below.

Encoding of action. Please recall that encoding of action stands for encoding of information that was described through action or process. Its score was derived by summing responses to 5 questions that were based on parts of the video that showed a process such as a protest, debate, and panhandling.

Results of hierarchical multiple regression analysis showed that as a block, language proficiency and length of stay in the U.S. explained additional 4.4% of the variance in participants' scores on questions testing encoding of action: R^2 significantly increased from .055 to .099, R^2_{change} = .044, $F_{change}(2, 129)$, = 3.149, p = .046. The overall regression model with language proficiency and length of stay entered in the last block failed to reach statistical significance, R^2 = .099, $F(10, 129)$ = 1.414, p = .181.

Table 7. Unstandardized regression coefficients and standard errors (SE) for the overall hierarchical regression model predicting effects of length of stay and language proficiency on encoding of action.

Variable	Unstandardized coefficient		Standardized coefficient β	t	p	Tole-ran-ce†
	B	*SE*				
(Constant)	1.243	1.218	n/a	1.021	.309	
Gender (being a woman)	-.274	.216	-.115	-1.266	.209	.845
Education in the U.S.	.016	.019	.085	.856	.394	.711
Having K-12 children	.030	.219	.011	.135	.893	.959
Plans to go back	-.027	.270	-.009	-.099	.921	.910
Acculturation	-.013	.109	-.012	-.115	.908	.665
Psychological wellbeing	-.001	.018	-.007	-.071	.944	.809
News consumption	.006	.170	.004	.036	.971	.711
Source of recruitment (being in the researcher's subsample)	.300	.236	.128	1.270	.207	.683
R^2	.055				.478	
Language proficiency	.111	.053	.189	2.081	.039	.849
Length of stay	.010	.007	.140	1.320	.189	.625
R^2_{change}	.044				.046	
Total R^2	.099				.181	

†Tolerance less than .10 signals severe multicollinearity for the variables with the same value.

Language proficiency reached statistical significance in explaining encoding of action scores, $t(139)$ = 2.081, p = .039. Holding other variables constant, each

additional point on the language proficiency scale was estimated to increase encoding of action scores by .111 points [95% *CI*: .005, .217] in comparison to the constant of 1.243 points, $t(139) = 1.021$, $p = .309$. Length of stay failed to reach statistical significance in explaining encoding scores, $t(139) = 1.320$, $p = .189$. None of the control variables were among statistically significant predictors of encoding of action scores.

Encoding of things. Please recall that encoding of things stands for encoding of information that was described through images and words denoting objects. Its score was derived by summing responses to 3 questions that were based on parts of the video that showed a panhandling permit, a list of resources on the permit's back, and a road with road-repairing machinery on it.

As a block, language proficiency and length of stay in the U.S. failed to reach statistical significance in explaining additional variance in participants' scores on questions testing encoding of things: $R^2_{\text{change}} = .032$, $F_{\text{change}}(2, 129), = 2.394$, $p = .095$. The overall regression model with language proficiency and length of stay entered in the last block did reach statistical significance and explained 13.1% in the variance of encoding of things, $R^2 = .131$, $F(10, 129) = 1.948$, $p = .044$.

Among independent variables, length of stay was a significant predictor of encoding of things, $t(139) = 2.152$, $p = .033$. Holding other variables constant, each additional year in the U.S. was estimated to increase encoding of things scores by .01 points [95% *CI*: .001, .019] in comparison to the constant of 2.328 points, $t(139) = 3.114$, $p = .002$. Among control variables, source of recruitment was a significant predictor of encoding of things, $t(139) = 3.040$, $p = .003$. Holding other variables

constant, participants recruited by the researcher were estimated to score on encoding of things .440 points higher [95% *CI*: .164, .727] than did participants who were recruited by Qualtrics Panels, see Table 8.

Table 8. Unstandardized regression coefficients and standard errors (*SE*) for the overall hierarchical regression model predicting effects of length of stay and language proficiency on encoding of things.

Variable	Unstandardized coefficient		Standardized coefficient β	t	p	Tole-ran-ce†
	B	*SE*				
(Constant)	2.228	.748	n/a	3.114	.002	
Gender (being a woman)	-.112	.133	-.075	-.843	.401	.845
Education in the U.S.	-.012	.012	-.102	-1.044	.298	.711
Having K-12 kids	-.108	.135	-.067	-.800	.425	.959
Plans to go back	-.098	.166	-.051	-.590	.556	.910
Acculturation	.044	.067	.067	.663	.508	.665
Psychological wellbeing	-.011	.011	-.096	-1.055	.293	.809
News consumption	-.147	.104	-.137	-1.411	.161	.711
Source of recruitment (being in the researcher's subsample)	.440	.145	.302	3.040	.003	.683
R^2	.099				.083	
Language proficiency	.010	.033	.028	.310	.757	.849
Length of stay	.010	.005	.223	2.152	.033	.625
R^2_{change}	.032				.095	
Total R^2	.131				.044	

†Tolerance less than .10 signals severe multicollinearity for the variables with the same value.

Encoding of places. Please recall that encoding of places stands for encoding of information that was described through naming or showing where events were happening. Its score included responses to only 1 question in "Senators Flee" news story, in which events were taking place in Wisconsin State Senate.

Results of hierarchical logistic regression analysis showed that as a block language proficiency and length of stay in the U.S. reached statistical significance, $\chi^2(2) = 8.436$, $p = .015$. The model with all variables failed to reach statistical significance in explaining the likelihood that participants remember the place of events correctly, $\chi^2(10) = 15.638$, $p = .110$. The overall model explained 32.3% (Nagelkerke R^2) of the variance in encoding of places and correctly classified 95.7%

of cases. Language proficiency was a statistically significant predictor (p = .014) of encoding of places scores, with high-proficiency participants 1.656 times more likely to correctly recognize the place of the news event, adjusted for length of stay and control variables. Length of stay was not a statistically significant predictor of encoding of places, p = .348, see Table 9.

Table 9. Unstandardized regression coefficients and standard errors (*SE*) for the overall multiple logistic regression model predicting accuracy of encoding of places with length of stay and language proficiency.

	Unstandardized coefficient		Odds ratio	95% *CI* for odds ratio		*p*
Variable	*B*	*SE*		Lower	Upper	
(Constant)	-1.063	5.454	n/a	n/a	n/a	.846
Gender (being a woman)	1.020	1.146	2.772	.293	26.181	.374
Education in the U.S.	-.142	.107	.868	.704	1.069	.183
Having K-12 children	-1.147	.890	.318	.056	1.816	.197
Plans to go back	-1.686	1.044	.185	.024	1.433	.106
Acculturation	-.241	.525	.786	.281	2.198	.646
Psychological wellbeing	-.142	.108	.868	.702	1.073	.190
News consumption	.668	.837	1.951	.379	10.052	.424
Source of recruitment (being in the researcher's subsample)	.488	1.281	1.629	.132	20.075	.703
Nagelkerke R^2	.153					
χ^2	7.201					.515
Language proficiency	.504	.206	1.656	1.107	2.477	.014
Length of stay	.047	.050	1.048	.950	1.155	.348
Nagelkerke R^2_{change}	.170†					
Total Nagelkerke R^2	.323					
χ^2	15.638					.110

†Handcalculated.

Encoding of causes and effects. Please recall that encoding of causes and effects stands for encoding of information that was described through a sequence of two facts that contained an outcome and a cause – in that order in all 3 cases. Its score was derived by adding responses to 3 questions that in "spoken words + pictures" condition were accompanied by the video that showed a rolled up printout of a law as a reason for panhandlers to wear a neon vest and a permit, a gas pump

that was verbally explained to be a source of tax revenue that was invested into road repairs, and a $100 paycheck that became a $93 paycheck because of actions of state senators in Wisconsin.

As a block, language proficiency and length of stay in the U.S. failed to reach statistical significance in explaining additional variance in participants' scores on questions testing encoding of causes and effects: $R^2_{change} = .032$, $F_{change}(2, 129), = 2.261$, $p = .108$. Likewise, the overall regression model with language proficiency and length of stay entered in the last block also failed to reach statistical significance, $R^2 = .076$, $F(10, 129) = 1.058$, $p = .400$, see Table 10.

Table 10. Unstandardized regression coefficients and standard errors (*SE*) for the overall hierarchical regression model predicting effects of length of stay and language proficiency on encoding of causes and consequences.

Variable	Unstandardized coefficient		Standardized coefficient β	t	p	Tole-ran-ce†
	B	*SE*				
(Constant)	1.146	.908	n/a	1.263	.209	
Gender (being a woman)	-.062	.161	-.035	-.384	.701	.845
Education in the U.S.	-.022	.014	-.160	-1.595	.113	.711
Having K-12 children	.049	.163	-.026	-.298	.766	.959
Plans to go back	-.217	.201	-.096	-1.078	.283	.910
Acculturation	.119	.081	.153	1.471	.144	.665
Psychological wellbeing	-.009	.013	-.064	-.685	.494	.809
News consumption	-.042	.126	-.033	-.334	.739	.711
Source of recruitment (being in the researcher's subsample)	.291	.176	.169	1.652	.101	.683
R^2	.043				.654	
Language proficiency	.034	.040	.079	.857	.393	.849
Length of stay	.010	.005	.205	1.911	.058	.625
R^2_{change}	.032				.108	
Total R^2	.076				.400	

†Tolerance less than .10 signals severe multicollinearity for the variables with the same value.

Main effects of language proficiency and length of stay on comprehension. Results of hierarchical multiple regression analysis showed that as a block, language proficiency and length of stay in the U.S. failed to reach

statistical significance in explaining the variance in participants' scores on questions testing comprehension, R^2_{change} = .006, $F_{change}(2, 129)$, = .422, p = .657. Likewise, the overall regression model with language proficiency and length of stay entered in the last block failed to reach statistical significance, R^2 = .065, $F(10, 129)$ = .903, p = .533, see Table 11. Therefore, H1b about the main effects of language proficiency on comprehension and H2b about the effects of length of stay on comprehension were not supported.

Table 11. Unstandardized regression coefficients and standard errors (*SE*) for the overall hierarchical regression model predicting effects of length of stay and language proficiency on comprehension.

Variable	Unstandardized coefficient		Standardized coefficient β	t	p	Tole-ran-ce†
	B	*SE*				
(Constant)	.595	.914	n/a	.651	.516	
Gender (being a woman)	-.019	.162	-.011	-.119	.905	.845
Education in the U.S.	-.039	.014	.274	2.718	.007	.711
Having K-12 children	.032	.165	.017	.196	.845	.959
Plans to go back	-.070	.202	-.031	-.346	.730	.910
Acculturation	-.017	.082	-.022	-.214	.831	.665
Psychological wellbeing	.012	.013	.083	.878	.381	.809
News consumption	.121	.127	.096	.954	.342	.711
Source of recruitment (being in the researcher's subsample)	.111	.177	.064	.626	.533	.683
R^2	.059				.415	
Language proficiency	.-.018	.040	-.042	-.452	.652	.849
Length of stay	-.004	.006	-.084	-.781	.436	.625
R^2_{change}	.006				.657	
Total R^2	.065				.533	

†Tolerance less than .10 signals severe multicollinearity for the variables with the same value.

Main Effects of Modality

Based on existing literature, **H3a** predicted that participants in the "spoken words + pictures" condition will score on encoding higher than will participants in the "written words" condition; participants in the "spoken words" condition will have the lowest scores among the three modality conditions. At the same time, **H3b**

predicted that participants in the "written words" and "spoken words + pictures" conditions will not differ in their scores in comprehension, but participants in the "spoken words" condition will score on comprehension lower in comparison to the other two conditions.

H3a-b were tested with hierarchical multiple regression analysis in SPSS. For the purposes of analysis, modality was dummy-coded with "spoken words" serving as a reference group and entered into the model as the last block. Overall, H3a was supported; H3b was not supported.

Main effects of modality on encoding. A 2-tailed test of hierarchical multiple regression analysis revealed that when entered into the regression model as the last block, modality explained additional 6.1% in encoding scores: R^2 significantly increased from .109 to .170, $F_{\text{change}}(2, 127) = 4.674$, $p = .011$. Moreover, results indicated that regression model with all variables entered accounted for approximately 17.0% of the variance in encoding scores, $R^2 = .170$, $F(12, 127) = 2.164$, $p = .017$.

Among the levels of modality, the "written words"condition representing print news was not a significant predictor in the model, $t(139) = 1.752$, $p = .082$. However, the "spoken words" condition representing radio news, was a significant predictor of encoding, $t(139) = 2.141$, $p = .034$. Expressed as a constant in the regression equation due to its coding as a reference group, the "spoken words" condition returned encoding score of 5.028 points [95% *CI*: .380, 9.675] out of 12 points possible. The "spoken words + pictures" condition representing television news also was a significant predictor of encoding, $t(139) = 3.053$, $p = .003$. Holding

other variables constant, “spoken words + pictures” was estimated to increase encoding scores by 1.471 points [95% *CI*: .518, 2.424] in comparison to the score in the reference condition, “spoken words.”

Among the variables in the overall regression model, length of stay in the U.S. was a significant predictor of encoding scores, $t(139) = 2.151$, $p = .033$. Holding other variables constant, as length of stay in the U.S. increased by one year, encoding was estimated to increase by .03 points [95% *CI*: .002, .058]. Language proficiency approached statistical significance in predicting encoding scores, $t(139) = 1.762$, $p = .081$. Holding other variables constant, as language proficiency increased by one point, encoding was estimated to increase by .181 points [95% *CI*: -.022, .385].

Among the control variables, only source of recruitment reached statistical significance in explaining encoding scores, $t(139) = 2.373$, $p = .019$. Participants recruited from the researcher’s network were projected to score 1.082 points [95% *CI*: .180, 1.983] higher on encoding than did participants recruited by Qualtrics Panels.

Table 12. Unstandardized regression coefficients and standard errors (*SE*) for the overall hierarchical regression model predicting effects of modality on encoding, 2-tailed test.

Variable	Unstandardized coefficient		Standardized coefficient β	t	p
	B	*SE*			
(Constant, ["spoken words"])	5.028	2.349		2.141	.034
Block 1: General demographic characteristics					
Gender (being a woman)	-.619	.410	-.131	-1.472	.144
Education in the U.S.	-.042	.037	-.110	-1.119	.265
Having K-12 children	-.054	.423	-.010	-.127	.899
R^2_{change}	.010				.718
Block 2: Immigrant-specific characteristics					
Plans to go back	-.441	.520	-.072	-.849	.398
Acculturation	.141	.210	.067	.671	.503
Psychological wellbeing	-.019	.034	-.050	-.553	.581
R^2_{change}	.015				.559
Block 3: News consumption	-.340	.333	-.100	-1.019	.310
R^2_{change}	.007				.338
Block 4: Source of recruitment (being in the researcher's subsample)	1.082	.456	.233	2.373	.019
R^2_{change}	.022				.080
Block 5: Language and length of stay					
Language proficiency	.181	.103	.155	1.762	.081
Length of stay	.030	.014	.220	2.51	.033
R^2_{change}	.054				.022
Block 6: Modality					
"written words"	.837	.478	.171	1.752	.082
"spoken words + pictures"	1.471	.482	.305	3.053	.003
R^2_{change}	.061				.011
Total R^2	.170				.017

Because the results of a 2-tailed *t*-test supported H3a predictions about the direction of the effects of modality on encoding, multiple regression model was re-run once again with confidence intervals set at 90% instead of 95% to arrive to more precise estimations, and *p*-values for *t*-tests for each variable provided by SPSS were manually divided by 2.

Results of 1-tailed tests revealed that among the levels of modality, "written words" representing print news became a significant predictor of encoding, $t(139) = 1.752$, $p = .041$. Holding other variables constant, "written words" was estimated to

increase encoding scores by .837 points [90% *CI*: .046, 1.628] in comparison to the score in the reference condition, "spoken words." The "spoken words" condition representing radio news, also was a significant predictor of encoding, $t(139) = 2.141$, $p = .017$. Expressed as a constant in the regression equation due to its coding as a reference group, the "spoken words" condition returned encoding score of 5.028 points [90% *CI*: 1.136, 8.919] out of 12 points possible. Finally, the "spoken words + pictures" condition representing television news also was a significant predictor of encoding, $t(139) = 3.053$, $p = .002$. Holding other variables constant, "spoken words + pictures" was estimated to increase encoding scores by 1.471 points [90% *CI*: .673, 2.269] in comparison to the score in the reference condition, "spoken words."

Among the variables in the overall regression model, length of stay in the U.S. was a significant predictor of encoding scores, $t(139) = 2.151$, $p = .017$. Holding other variables constant, as length of stay in the U.S. increased by one year, encoding was estimated to increase by .03 points [90% *CI*: .007, .054]. Language proficiency became a statistically significant predictor of encoding scores, $t(139) = 1.762$, $p = .041$. Holding other variables constant, as language proficiency increased by one point, encoding was estimated to increase by .181 points [90% *CI*: .011, .352].

Among the control variables, source of recruitment remained the only statistically significant predictor of encoding scores, $t(139) = 2.373$, $p = .010$. Participants recruited from the researcher's network were projected to score 1.082 points [90% *CI*: .327, 1.837] higher on encoding than did participants recruited by Qualtrics Panels.

Table 13. Unstandardized regression coefficients and standard errors (*SE*) for the overall hierarchical regression model predicting effects of modality on encoding, 1-tailed test.

Variable	Unstandardized coefficient		Standardized coefficient β	t	p
	B	*SE*			
(Constant, ["spoken words"])	5.028	2.349		2.141	.017
Block 1: General demographic characteristics					
Gender (being a woman)	-.619	.410	-.131	-1.472	.072
Education in the U.S.	-.042	.037	-.110	-1.119	.133
Having K-12 children	-.054	.423	-.010	-.127	.450
R^2_{change}	.010				.718
Block 2: Immigrant-specific characteristics					
Plans to go back	-.441	.520	-.072	-.849	.199
Acculturation	.141	.210	.067	.671	.252
Psychological wellbeing	-.019	.034	-.050	-.553	.291
R^2_{change}	.015				.559
Block 3: News consumption	-.340	.333	-.100	-1.019	.155
R^2_{change}	.007				.338
Block 4: Source of recruitment (being in the researcher's subsample)	1.082	.456	.233	2.373	.010
R^2_{change}	.022				.080
Block 5: Language and length of stay					
Language proficiency	.181	.103	.155	1.762	.041
Length of stay	.030	.014	.220	2.51	.017
R^2_{change}	.054				.022
Block 6: Modality					
"written words"	.837	.478	.171	1.752	.041
"spoken words + pictures"	1.471	.482	.305	3.053	.002
R^2_{change}	.061				.011
Total R^2	.170				.017

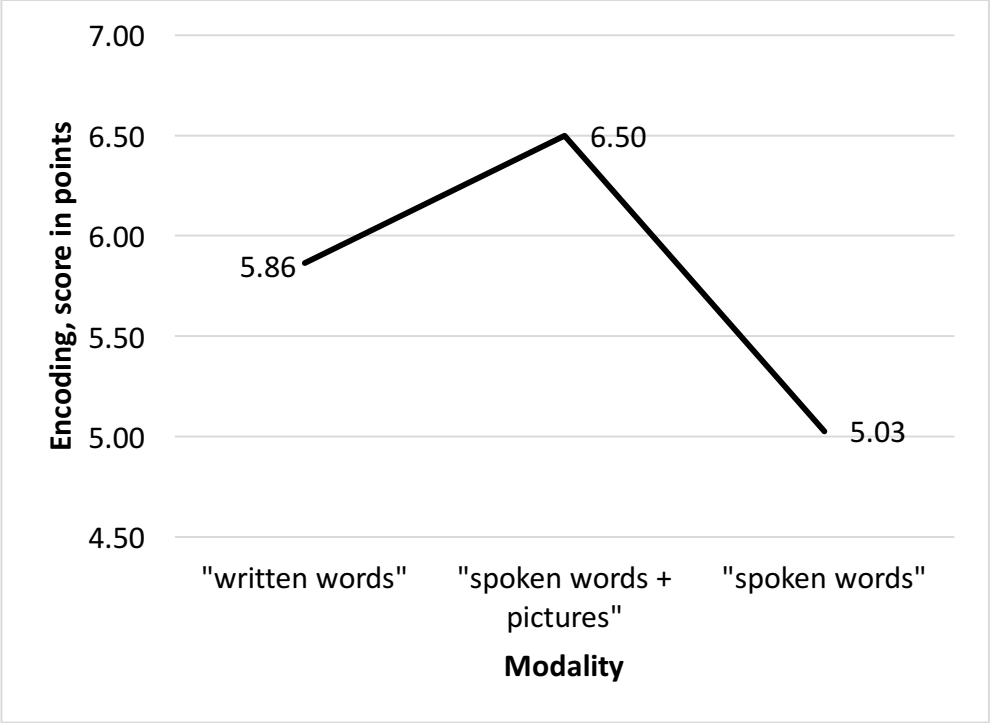


Figure 12. Main effects of modality on encoding.

Recall that H3a predicted that participants in the "spoken words + pictures" condition will score highest on encoding, followed by participants in the "written words" condition, followed by participants in the "spoken words" condition. Hierarchical multiple regression showed that participants in the "spoken words + pictures" condition correctly recognized .64 answers more than did participants in the "written words" condition. Participants in the "spoken words" condition correctly recognized almost 1.5 (Δ = .1.47) fewer answers than did participants in "spoken words + pictures." Therefore, H3a was supported.

Main effects of modality on encoding of news schema elements.

Research Question 2 inquired encoding of which elements of the news schema—things, action, places, and causes and effects—was affected the most by modality. Except for the case of encoding of places, RQ2 was tested with hierarchical

regression analysis. In the case of encoding of places, hierarchical logistic regression was used because only one question was based on information communicating a place—the Wisconsin State Senate—in the "Senators Flee" stimulus story. Answers were coded as correct or incorrect, therefore the outcome variable in encoding of places was binary, scored as a zero in the case of incorrect answer and as "1" when correct answer was given.

Overall, data demonstrated that modality significantly added to the explanation of the variance in encoding of action, with "spoken words + pictures" contributing to encoding twice as much points as "written words" did. A detailed account of results follows below.

Encoding of action. When entered into the regression model as a last block, modality explained additional 11.7% in scores on questions testing encoding of action: R^2 significantly increased from .099 to .216, $F_{\text{change}}(2, 127), = 9.467$, $p < .001$. Regression model with all variables entered accounted for approximately 21.6% of the variance of scores in encoding action, $R^2 = .216$, $F(12, 127) = 3.391$, $p = .001$.

With regard to modality, presentation of news in the "spoken words" condition, which was coded as a reference group and thus was expressed as a constant in the regression equation, failed to reach statistical significance, $t(139) = .940$, $p = .349$. However, the "written words" condition was a significant predictor of encoding of action scores, $t(139) = 2.378$, $p = .019$, as was the "spoken words + pictures" condition, $t(139) = 4.350$, $p < .001$. Holding other variables constant, the "written words" condition was estimated to increase encoding of action scores by .554 points [95% *CI*: .093, 1.015] in comparison to the score of 1.077 in the

reference condition, “spoken words.” In the case of the “spoken words + pictures” condition, with other variables held constant, participants were estimated to increase encoding of action scores by 1.022 points [95% *CI*: .557, 1.487] in comparison to the score of 1.077 in the “spoken words” condition.

Among other independent variables, language proficiency was a significant predictor of encoding of action scores, $t(139) = 2.168$, $p = .032$. Holding other variables constant, as language proficiency increased by one point, encoding of action was estimated to increase by .109 points [95% *CI*: .009, .208]. Length of stay in the U.S. was not a significant predictor of encoding of action, $t(139) = 1.367$, $p = .177$.

Among control variables, gender approached statistical significance in predicting encoding of action scores, $t(139) = -1.927$, $p = .056$. Female participants were projected to score .395 points [95% *CI*: -.801, .011] lower on encoding of action than did male participants.

Table 14. Unstandardized regression coefficients and standard errors (*SE*) for the overall hierarchical regression model predicting effects of modality on encoding of action.

Variable	Unstandardized coefficient		Standardized coefficient β	t	p
	B	*SE*			
(Constant, ["spoken words"])	1.077	1.146		.940	.349
Block 1: General demographic characteristics block					
Gender (being a woman)	-.395	.205	-.166	-1.927	.056
Education in the U.S.	.003	.018	.016	.172	.864
Having K-12 children	.056	.206	.022	.271	.787
R^2_{change}	.045				.101
Block 2: Immigrant-specific characteristics block					
Plans to go back	-.037	.254	-.012	-.146	.885
Acculturation	-.014	.102	-.014	-.142	.888
Psychological wellbeing	.003	.017	.017	.195	.845
R^2_{change}	.001				.979
Block 3: News consumption	-.112	.163	-.066	-.690	.491
R^2_{change}	.000				.847
Block 4: Source of recruitment (being in the researcher's subsample)	.326	.222	.140	1.465	.145
R^2_{change}	.009				.280
Block 5: Language and length of stay					
Language proficiency	.109	.050	.185	2.168	.032
Length of stay	.009	.007	.135	1.357	.177
R^2_{change}	.044				.046
Block 6: Modality					
"written words"	.554	.233	.225	2.378	.019
"spoken words + pictures"	1.022	.235	.422	4.350	.001
R^2_{change}	.117				.001
Total R^2	.216				.001

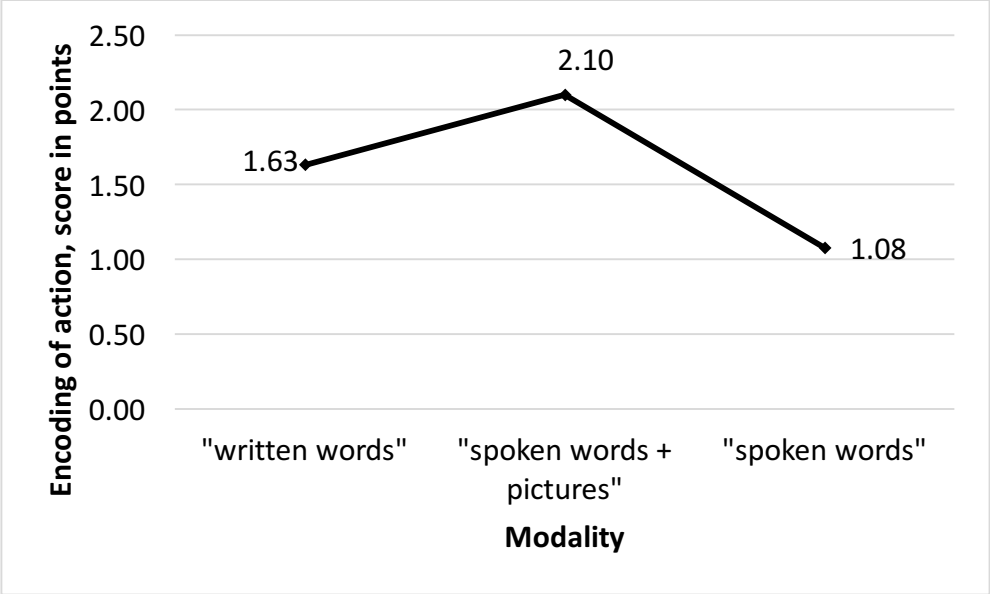


Figure 13. Main effects of modality on encoding of action.

Overall, participants in the "spoken words + pictures" condition correctly recognized on average .5 (Δ = .47) more answers about action than did participants in the "written words" condition.

Encoding of things. As a block, modality failed to reach statistical significance in explaining additional variance in participants' scores on questions testing encoding of things, $R^2_{change} = .012$, $F_{change}(2, 127), = .898$, $p = .410$. The overall regression model with modality entered in the last block approached statistical significance, $R^2 = .143$, $F(12, 127) = 1.771$, $p = .060$, see Table 15.

Table 15. Unstandardized regression coefficients and standard errors (*SE*) for the overall hierarchical regression model predicting effects of modality on encoding of things.

Variable	Unstandardized coefficient		Standardized coefficient β	t	p
	B	*SE*			
(Constant, ["spoken words"])	2.290	.749		3.059	.003
Block 1: General demographic characteristics block					
Gender (being a woman)	-.135	.134	-.091	-1.010	.314
Education in the U.S.	-.014	.012	-.117	-1.178	.241
Having K-12 children	-.105	.135	-.065	-.778	.438
R^2_{change}	.001				.979
Block 2: Immigrant-specific characteristics block					
Plans to go back	-.100	.166	-.052	-.603	.548
Acculturation	.044	.067	.067	.661	.510
Psychological wellbeing	-.010	.011	-.088	-.958	.340
R^2_{change}	.023				.381
Block 3: News consumption	-.174	.106	-.163	-1.638	.104
R^2_{change}	.033				.033
Block 4: Source of recruitment (being in the researcher's subsample)	.442	.145	.303	3.043	.003
R^2_{change}	.042				.015
Block 5: Language and length of stay					
Language proficiency	.009	.033	.025	.285	.776
Length of stay	.010	.005	.222	2.135	.035
R^2_{change}	.032				.095
Block 6: Modality					
"written words"	.158	.152	.103	1.040	.300
"spoken words + pictures"	.195	.154	.128	1.267	.207
R^2_{change}	.012				.410
Total R^2	.143				.060

Encoding of places. Please recall that hierarchical logistic regression analysis was used to test the effects of modality on encoding of places because the score for this independent variable was derived from responses to only one multiple-choice question in "Senators Flee" news story.

Results of hierarchical logistic regression analysis showed that modality as a block failed to reach statistical significance in explaining the likelihood of participants recognizing the place of events correctly, χ^2 (2) = .475, p = .789.

Likewise, the model with all variables included also failed to reach statistical significance χ^2 (12) = 16.113, p = .186, see Table 16.

Table 16. Unstandardized regression coefficients and standard errors (*SE*) for the overall multiple logistic regression model predicting accuracy of encoding of places with modality.

	Unstandardized coefficient		Odds ratio	95% *CI* for odds ratio		*p*
Variable	*B*	*SE*		Lower	Upper	
(Constant)	-1.048	5.482				.848
Gender (being a woman)	.768	1.189	2.156	.210	22.152	.518
Education in the U.S.	-.158	.111	.854	.686	1.062	.156
Having K-12 children	-1.247	.922	.287	.047	1.751	.176
Plans to go back	-1.681	1.055	.187	.024	1.473	.111
Acculturation	-.201	.537	.812	.284	2.325	.698
Psychological wellbeing	-.135	.109	.873	.705	1.082	.215
News consumption	.494	.909	1.638	.276	9.733	.587
Being in the researcher's subsample	.489	1.274	1.630	.134	19.786	.701
Language proficiency	.500	.203	1.648	1.106	2.455	.014
Length of stay	.045	.049	1.046	.950	1.152	.348
Nagelkerke R^2	.323					
χ^2	15.638					.110
"written words"	.527	1.192	1.693	.164	17.510	.659
"spoken words + pictures"	.797	1.200	2.218	.211	23.318	.507
Nagelkerke R^2_{change}	.009†					
Total Nagelkerke R^2	.332					
χ^2	16.133					.186

†Handcalculated.

Encoding of causes and effects. As a block, modality failed to reach statistical significance in explaining additional variance in participants' scores on questions testing encoding of causes and effects: R^2_{change} = .011, $F_{change}(2, 127)$, = 2.261, p = .108. Likewise, the overall regression model with modality entered in the last block failed to reach statistical significance, R^2 = .087, $F(12, 127)$ = 1.007, p = .447, see Table 17.

Table 17. Unstandardized regression coefficients and standard errors (*SE*) for the overall hierarchical regression model predicting effects of modality on encoding of causes and consequences.

Variable	Unstandardized coefficient		Standardized coefficient β	t	p
	B	*SE*			
(Constant, ["spoken words"])	1.111	.910		1.221	.224
Block 1: General demographic characteristics					
Gender (being a woman)	-.089	.163	-.051	-.548	.585
Education in the U.S.	-.026	.014	-.183	-1.775	.078
Having K-12 children	.055	.164	.029	.338	.736
R^2_{change}	.002				.961
Block 2: Immigrant-specific characteristics					
Plans to go back	-.219	.201	-.097	-1.087	.279
Acculturation	.119	.081	.152	1.462	.146
Psychological wellbeing	-.008	.013	-.058	-.610	.543
R^2_{change}	.028				.279
Block 3: News consumption	-.067	.129	-.054	-.522	.603
R^2_{change}	.003				.496
Block 4: Source of recruitment (being in the researcher's subsample)	.298	.177	.173	1.685	.094
R^2_{change}	.009				.256
Block 5: Language proficiency and length of stay					
Language proficiency	.034	.040	.078	.846	.399
Length of stay	.010	.005	.203	1.894	.060
R^2_{change}	.032				.108
Block 6: Modality					
"written words"	.107	.185	.059	.581	.562
"spoken words + pictures"	.231	.187	.130	1.238	.218
R^2_{change}	.011				.465
Total R^2	.087				.447

Main effects of modality on comprehension. Results of hierarchical multiple regression analysis showed that as a block, modality failed to reach statistical significance in explaining the variance in participants' scores on questions testing comprehension, $R^2_{change} = .028$, $F_{change}(2, 127), = 1.990$, $p = .141$. Likewise, the overall regression model with modality entered in the last block failed to reach statistical significance, $R^2 = .094$, $F(12, 127) = 1.095$, $p = .370$, see Table 18. Therefore, H3b was not supported.

Table 18. Unstandardized regression coefficients and standard errors (*SE*) for the overall hierarchical regression model predicting effects of modality on comprehension.

Variable	Unstandardized coefficient		Standardized coefficient β	t	p
	B	*SE*			
(Constant, ["spoken words"])	.530	.908		.584	.560
Block 1: General demographic characteristics					
Gender (being a woman)	-.063	.162	-.036	-.390	.697
Education in the U.S.	.034	.014	-.245	2.387	.018
Having K-12 children	.040	.164	.021	.243	.808
R^2_{change}	.045				.097
Block 2: Immigrant-specific characteristics					
Plans to go back	-.074	.201	-.033	-.368	.714
Acculturation	-.018	.081	-.023	-.222	.825
Psychological wellbeing	.013	.013	.096	1.015	.312
R^2_{change}	.004				.912
Block 3: News consumption	.075	.129	.060	.584	.561
R^2_{change}	.004				.454
Block 4: Source of recruitment (being in the researcher's subsample)	.117	.176	.068	.667	.506
R^2_{change}	.006				.357
Block 5: Language proficiency and length of stay					
Language proficiency	-.019	.040	-.044	-.483	.630
Length of stay	-.004	.005	-.086	-.809	.420
R^2_{change}	.006				.657
Block 6: Modality					
"written words"	.242	.185	.134	1.312	.192
"spoken words + pictures"	.367	.186	.205	1.970	.051
R^2_{change}	.028				.141
Total R^2	.094				.370

Two-way Interaction Effects of Length of Stay and Language Proficiency

Hypothesis 4a about the interaction effects of length of stay and language proficiency was based on prediction that language proficiency widens the gap in performance on a memory measure of encoding between participants with shorter length of stay and participants with longer length of stay. At the same time, H4b was based on understanding that length of stay narrows the gap in comprehension

scores between participants with low language proficiency and high language proficiency. Overall, H4a-b were not supported. A detailed report follows below.

Interaction effects of length of stay and language proficiency on encoding. Hypothesis 4a predicted that as language proficiency increases, participants with long length of stay would increase their encoding scores at a faster pace than would participants with low length of stay. To test H4a, multiple regression analysis was run in PROCESS Model 1 with language proficiency entered as an independent variable and length of stay entered as a moderator. Overall, H4a was not supported.

Omnibus test of interaction effects of length of stay and language proficiency on encoding. The omnibus test of two-way interaction effects between length of stay and language proficiency on encoding suggested that regression model with all variables entered—including the interaction term between length of stay and language proficiency—failed to reach statistical significance, $R^2 = .109$, $F(11, 128) = 1.4182$, $p = .172$. Likewise, inclusion of the interaction failed to explain additional variance in encoding scores, $R^2 = .000$, $F_{\text{change}}(1, 128) = .0005$, $p = .982$.

Table 19. Unstandardized regression coefficients and standard errors (*SE*) for the two-way interaction effects of language proficiency and length of stay on encoding.

Variable	Coefficient	*SE*	*t*	*p*
(Constant)	5.213	3.561	1.464	.146
Gender (being a woman)	-.442	.434	-1.019	.310
Education in the U.S.	-.023	.038	-.621	.536
Having K-12 children	-.089	.437	-.204	.838
Plans to go back to home country	-.426	.537	-.794	.429
Acculturation	.143	.216	.663	.509
Psychological wellbeing	-.026	.035	-.722	.472
News consumption	-.166	.338	-.492	.624
Source of recruitment (being in the researcher's subsample)	1.046	.471	2.220	.028
Language proficiency	.188	.168	1.121	.264
Length of stay	.034	.130	.261	.795
R^2	.109†	n/a	n/a	n/a
Length of stay x Language proficiency				
R^2_{change}	.000	n/a	n/a	.982
Conditional effects of length of stay at levels of language proficiency				
Length of stay x One standard deviation below mean language proficiency ($\overline{X} - 1SD = 17.11$)	.0312	.0204	1.531	.128
Length of stay x Mean language proficiency ($\overline{X} = 19.09$)	.0309	.0146	2.113	.037
Length of stay x Maximum language proficiency ($X = 20.00$)	.0308	.0155	1.991	.049
Total R^2	.109			.172

Note: Standardized coefficients are not available in PROCESS output.
†Handcalculated from the PROCESS output.

Pick-a-point procedure for probing for interaction effects between length of stay and language proficiency on encoding. Pick-a-point procedure identified statistically significant effects of length of stay on encoding at two levels of language proficiency, however, the difference was so small (Δ = .0001), see Table 19 above, that it was concluded that H4a was not supported.

Interaction effects of length of stay and language proficiency on encoding of news schema elements. Research Question 3 inquired encoding of

which elements of news schema—action, things, places, and causes and consequences—was affected the most by the interaction of language proficiency and length of stay. To answer RQ3, multiple regression analysis was run in PROCESS Model 1 with language proficiency entered as an independent variable and length of stay entered as a moderator. The same analysis was then repeated with length of stay entered as an independent variable and language proficiency entered as a moderator.

Overall, results showed that interaction of language proficiency and length of stay was a statistically significant predictor only in the case of encoding of action within an overall model that failed to obtain statistical significance. Specifically, as participants with shorter length of stay correctly recognized .037 more answers on questions measuring encoding of action than did participants with longer length of stay. A detailed report follows below.

Encoding of action. Encoding of action was measured with five multiple-choice questions based on information that featured action or process.

Omnibus test of interaction effects of length of stay and language proficiency on encoding of action. The omnibus test of interaction effects between length of stay and language proficiency on encoding of action suggested that regression model with all variables—including the interaction term of length of stay and language proficiency—failed to reach statistical significance, $R^2 = .101$, $F(11, 128) = 1.3112$, $p = .225$. Likewise, inclusion of the interaction term also failed to reach statistical significance, $R^2_{\text{change}} = .0025$, $F_{\text{change}}(1, 128) = .3508$, $p = .555$.

Pick-a-point procedure for probing for interaction effects between length of stay and language proficiency on encoding of action. Pick-a-point procedure indicated that conditional effects of language proficiency failed to reach statistical significance at all three levels of length of stay, but at two levels of length of stay group differences approached statistical significance. More specifically, at the score of length of stay equal to one standard deviation below the mean ($\overline{X}$ - 1SD = 5.74), interaction between length of stay and language proficiency increased encoding of action scores by .1384 points [95% *CI*: -.0013, .2781], $t(140) = 1.9610$, $p = .052$. In addition, at the mean of the length of stay score ($\overline{X}$ = 22.52), interaction between length of stay and language proficiency increased encoding scores by .1049 points [95% *CI*: -.0032, .2129], $t(140) = 1.9204$, $p = .057$. These results demonstrate that as length of stay increased, the effect of language proficiency on encoding of action decreased, see Table 20.

Pick-a-point procedure also failed to identify statistically significant conditional effects of length of stay at any of the three values of language proficiency.

Table 20. Unstandardized regression coefficients and standard errors (*SE*) for the two-way interaction effects of language proficiency and length of stay on encoding of action.

Variable	Coefficient	*SE*	*t*	*p*
(Constant)	.464	1.795	.259	.796
Gender (being a woman)	-.257	.219	-1.174	.243
Education in the U.S.	-.017	.019	-.874	.384
Having K-12 kids	-.038	.220	-.171	.864
Plans to go back to home country	-.022	.271	-.082	.935
Acculturation	-.012	.109	-.108	.914
Psychological wellbeing	-.001	.018	-.030	.977
News consumption	-.007	.170	-.039	.969
Source of recruitment (being in the researcher's subsample)	.288	.238	1.211	.228
Language proficiency	.150	.085	1.774	.078
Length of stay	.048	.065	.737	.463
R^2	.098†	n/a	n/a	n/a
Length of stay x Language proficiency				
R^2_{change}	.003	n/a	n/a	.555
Conditional effects of language proficiency at levels of length of stay				
Language proficiency x One standard deviation below mean length of stay ($\overline{X} - 1SD = 5.74$)	.138	.071	1.961	.052
Language proficiency x Mean length of stay ($\overline{X} = 22.52$)	.105	.055	1.920	.057
Language proficiency x One standard deviation above the mean length of stay ($\overline{X} + 1SD = 39.30$)	.071	.086	.830	.408
Total R^2	.101			.225

Note. Standardized coefficients are not available in PROCESS output.
†Handcalculated from the PROCESS output.

Johnson-Neyman technique for probing for interaction effects between length of stay and language proficiency on encoding of action. Johnson-Neyman technique identified that the interaction between length of stay and language proficiency was statistically significant at the values of length of stay starting from 6.28 and ending at 21.49 years, which included the length of stay scores of approximately 47.86% of the sample. Specifically, interaction between length of stay and language proficiency was a significant predictor of encoding of action scores at the value of length of stay

of 6.28, $t(140) = 1.9787$, $p = .05$, through the value of 21.49, $t(140) = 1.9787$, $p = .05$. Holding other variables constant, the interaction between length of stay and language proficiency was estimated to increase encoding of action scores by .1373 points [95% *CI*: .0000, .2746] at the value of length of stay equal to 6.28 and by .1069 points [95% *CI*: .0000, .2139] at the value of length of stay equal to 21.49 years, in comparison to intercept with a score of .4642 [95% *CI*: -3.0870, 4.0170], $t(140) = .2586$, $p = .796$. Therefore, participants with shorter length of stay correctly recognized .037 more answers on questions measuring encoding of action than did participants with longer length of stay.

Johnson-Neyman technique failed to identify any significant transition points of the effect of length of stay on encoding of action at any level of language proficiency.

In sum, Johnson-Neyman technique supported the results of pick-a-point procedure, which approached statistical significance: As length of stay increased, the effect of language proficiency on encoding of action scores decreased slightly, see Table 21.

Table 21. Coefficients and standard errors (*SE*) for conditional effects of language proficiency on encoding of action at the range of length of stay.

Length of stay, years	Coefficient	*SE*	*t*	*p*
4.40	.1411	.074	1.917	.058
6.28	.1373	.066	1.979	.050
7.80	.1343	.066	2.027	.045
11.20	.1275	.060	2.118	.036
14.60	.1207	.056	2.158	.033
18.00	.1139	.054	2.119	.036
21.40	.1071	.054	1.983	.050
21.49	.1069	.054	1.979	.050
24.80	.1003	.057	1.772	.079

Note. Only statistically significant results plus one result approaching statistical significance in the range of length of stay are presented here.

Encoding of things. Encoding of things was measured with three multiple-choice questions and analyzed with multiple regression analysis in PROCESS Model 1.

Omnibus test of interaction effects of length of stay and language proficiency on encoding of things. The omnibus test of interaction effects between length of stay and language proficiency on encoding of things suggested that regression model with all variables—including the interaction term of length of stay and language proficiency—failed to reach statistical significance, $R^2 = .083$, $F(11, 128) = 1.0504$, $p = .408$. Likewise, the interaction term between length of stay and language proficiency also failed to reach statistical significance, $R^2_{\text{change}} = .0003$, $F_{\text{change}}(1, 128) = .0438$, $p = .835$.

Table 22. Unstandardized regression coefficients and standard errors (*SE*) for the two-way interaction effects of language proficiency and length of stay on encoding of things.

Variable	Coefficient	*SE*	*t*	*p*
(Constant)	.498	1.873	.266	.791
Gender (being a woman)	.288	.228	1.261	.210
Education in the U.S.	.031	.020	1.548	.124
Having K-12 children	-.224	.230	-.975	.332
Plans to go back to home country	-.064	.282	-.226	.822
Acculturation	.143	.216	.663	.509
Psychological wellbeing	-.026	.035	-.722	.472
News consumption	-.166	.338	-.492	.624
Source of recruitment (being in the researcher's subsample)	1.046	.471	2.220	.028
Language proficiency	-.021	.088	-.237	.813
Length of stay	-.005	.068	-.078	.938
R^2	.083†	n/a	n/a	n/a
Length of stay x Language proficiency R^2_{change}	.0003	n/a	n/a	.835
Conditional effects of length of stay at levels of language proficiency				
Length of stay x One standard deviation below mean language proficiency ($\overline{X} - 1SD = 17.11$)	.007	.011	.679	.498
Length of stay x Mean language proficiency ($\overline{X} = 19.09$)	.009	.008	1.136	.258
Length of stay x Maximum language proficiency ($X = 20.00$)	.009	.008	1.158	.249
Total R^2	.083			.407

Note: Standardized coefficients are not available in PROCESS output.
†Handcalculated from the PROCESS output.

Pick-a-point procedure for probing for interaction effects between length of stay and language proficiency on encoding of things. Pick-a-point procedure indicated that conditional effects of language proficiency on encoding of things at levels of length of stay failed to reach statistical significance. Likewise, the procedure indicated that conditional effects of length of stay on encoding of things at levels of language proficiency failed to reach statistical significance.

Johnson-Neyman technique for probing for interaction effects between length of stay and language proficiency on encoding of things. Johnson-Neyman technique failed to identify statistical significance transition points within the observed range of length of stay and language proficiency.

Encoding of places. Encoding of places was measured with one multiple-choice question about Wisconsin State Senate, answers to which were coded as "1" for the correct answer or "zero" for the incorrect answer. Data were analyzed with multiple logistic regression analysis.

Omnibus test of interaction effects of length of stay and language proficiency on encoding of places. Results of hierarchical logistic regression analysis showed that interaction term of language proficiency and length of stay, entered into the model as the last block, approached statistical significance in explaining the likelihood that participants remember the place of events correctly, $\chi^2(1) = 3.279$, $p = .070$. Likewise, the model with all variables included approached statistical significance, $\chi^2(11) = 18.917$, $p = .063$, see Table 23.

Table 23. Unstandardized regression coefficients and standard errors (*SE*) for the overall multiple logistic regression model predicting accuracy of encoding of places with interaction term of length of stay and language proficiency.

	Unstandardized coefficient		Odds ratio	95% *CI* for odds ratio		*p*
Variable	*B*	*SE*		Lower	Upper	
(Constant)	-16.882	10.672		n/a	n/a	.114
Gender (being a woman)	-.931	1.180	.430	.039	3.979	.430
Education in the U.S.	-.118	.110	.888	.716	1.102	.282
Having K-12 children	1.532	1.065	4.629	.574	37.322	.150
Plans to go back	1.736	1.033	5.675	.616	52.323	.126
Acculturation	-.241	.577	.786	.254	2.436	.677
Psychological wellbeing	-.086	.103	.918	.750	1.123	.404
News consumption	.551	.829	1.736	.342	8.807	.506
Source of recruitment (being in the researcher's subsample)	-.074	1.367	.929	.064	13.535	.957
Language proficiency	1.172	.500	3.228	1.210	8.607	.019
Length of stay	1.055	.743	3.872	.669	1.022	.156
Nagelkerke R^2	.323					
χ^2	15.638					.110
Language proficiency x Length of stay	-.053	.038	.948	.880	1.022	.164
Nagelkerke R^2_{change}	.063†					
Total Nagelkerke R^2	.386					
χ^2	18.917					.063

†Handcalculated.

Encoding of causes and effects. Encoding of causes and effects was measured with three multiple-choice questions and analyzed with multiple regression analysis in PROCESS Model 1.

Omnibus test of interaction effects of length of stay and language proficiency on encoding of causes and effects. The omnibus test of interaction effects between length of stay and language proficiency on encoding of causes and effects suggested that regression model with all variables—including the interaction term of length of stay and language proficiency—failed to reach statistical significance, $R^2 = .076$, $F(11, 128) = .9562$, $p = .490$. Likewise, the interaction term between length of stay

and language proficiency also failed to reach statistical significance, R^2_{change} = .0001, $F_{change}(1, 128)$ = .0204, p = .887.

Table 24. Unstandardized regression coefficients and standard errors (*SE*) for the two-way interaction effects of language proficiency and length of stay on encoding of causes and effects.

Variable	Coefficient	*SE*	*t*	*p*
(Constant)	1.006	1.339	.751	.454
Gender (being a woman)	-.059	.163	-.361	.719
Education in the U.S.	-.022	.014	1.583	.116
Having K-12 children	.050	.164	.305	.761
Plans to go back to home country	-.216	.202	-1.069	.287
Acculturation	.119	.081	1.467	.145
Psychological wellbeing	-.009	.013	-.671	.503
News consumption	-.042	.127	-.332	.741
Source of recruitment (being in the researcher's subsample)	.288	.177	1.627	.106
Language proficiency	.041	.063	.652	.516
Length of stay	.017	.049	.356	.722
R^2	.076†	n/a	n/a	n/a
Length of stay x Language proficiency				
R^2_{change}	.0001	n/a	n/a	.887
Conditional effects of length of stay at levels of language proficiency				
Length of stay x One standard deviation below mean language proficiency ($\overline{X} - 1SD$ = 17.11)	.011	.008	1.463	.146
Length of stay x Mean language proficiency ($\overline{X}$ = 19.09)	.011	.006	1.909	.059
Length of stay x Maximum language proficiency (X = 20.00)	.010	.006	1.751	.082
Total R^2	.076			.490

Note: Standardized coefficients are not available in PROCESS output.
†Handcalculated from the PROCESS output.

Pick-a-point procedure for probing for interaction effects between length of stay and language proficiency on encoding of causes and effects. Pick-a-point procedure failed to identify statistically significant conditional effects of length of stay on encoding of causes and effects at the values of language proficiency as a

moderator. The same was true when length of stay was treated as a moderator of effects of language proficiency on encoding of causes and effects.

Johnson-Neyman technique for probing for interaction effects between length of stay and language proficiency on encoding of causes and effects. Johnson-Neyman technique failed to identify statistical significant transition points within the values of language proficiency and length of stay.

Interaction effects of length of stay and language proficiency on comprehension. Hypothesis 4b regarding the interaction effects of length of stay and language proficiency on comprehension was based on understanding that length of stay would narrow the gap in performance between participants with high language proficiency and participants with low language proficiency on comprehension measure. Therefore, H4b predicted that as length of stay increases, low-proficiency participants will keep up in their scores on comprehension with the high-proficiency participants. Hypothesis 4b was tested with multiple regression analysis in PROCESS Model 1 with length of stay entered as an independent variable and language proficiency entered as a moderator. Overall, H4b was not supported. A detailed report follows below.

Omnibus test of interaction effects of length of stay and language proficiency on comprehension. The omnibus test of interaction effects between length of stay and language proficiency on comprehension showed that the model with all variables entered failed to reach statistical significance, $R^2 = .073$, $F(11, 128) = .9118$, $p = .531$. Likewise, the interaction between length of stay and language

proficiency failed to reach statistical significance, R^2_{change} = .007, $F_{change}(1, 128)$ = 1.0032, p = .318.

Table 25. Unstandardized regression coefficients and standard errors (*SE*) for the two-way interaction effects of language proficiency and length of stay on comprehension.

Variable	Coefficient	*SE*	*t*	*p*
(Constant)	-.392	1.343	-.292	.771
Gender (being a woman)	.002	.164	.014	.989
Education in the U.S.	.039	.014	2.751	.007
Having K-12 children	.043	.165	.259	.796
Plans to go back to home country	-.064	.203	-.317	.752
Acculturation	-.017	.082	-.203	.840
Psychological wellbeing	.013	.013	.945	.346
News consumption	.122	.127	.960	.339
Being in the researcher's subsample	.096	.178	.538	.592
Language proficiency	.031	.063	.488	.626
Length of stay	.044	.049	.907	.366
R^2	.0654†	n/a	n/a	n/a
Length of stay x Language proficiency R^2_{change}	.0073	n/a	n/a	.318
Conditional effects of length of stay at levels of language proficiency				
Length of stay x One standard deviation below mean language proficiency ($\overline{X} - 1SD$ = 17.11)	.001	.007	.140	.889
Length of stay x Mean language proficiency ($\overline{X}$ = 19.09)	-.004	.006	-.711	.478
Length of stay x Maximum language proficiency (X = 20.00)	-.006	.006	-1.067	.288
Total R^2	.0727			.531

Note: Standardized coefficients are not available in PROCESS output.
†Handcalculated from the PROCESS output.

Pick-a-point procedure for probing for interaction effects between length of stay and language proficiency on comprehension. Pick-a-point procedure failed to identify statistically significant conditional effects of length of stay on comprehension at the three levels of language proficiency.

Johnson-Neyman technique for probing for interaction effects between length of stay and language proficiency on comprehension. Johnson-Neyman

technique failed to identify statistical significance transition points in effects of length of stay within the range of language proficiency.

Two-way Interaction Effects of Modality and Language Proficiency

Hypothesis 5 was based on theorizing that on memory measures of encoding, language proficiency assists in decoding the meaning of words. At the same time, while all levels of modality require the ability to understand words, "spoken words + pictures" offers an additional channel with pictorial information that does not require decoding of information but rather recognition of it. Thus, predictions for interaction effects hypothesized immigrants with weaker language proficiency in the "spoken words + pictures" condition will encode information better (resulting in higher recognition scores on multiple-choice test) than in the "written words" condition, followed by the "spoken words" condition. No predictions were made about the interaction effects of modality and language proficiency on comprehension because it was theorized that comprehension will be influenced by longer length of stay. Overall, H5 about the interaction effects of modality and language proficiency on encoding was supported.

Interaction effects of modality and language proficiency on encoding. Hypothesis 5 predicted that participants with low language proficiency would score higher on encoding in the "spoken words + pictures" condition than they would in "written words" condition and even higher than they would in the "spoken words" condition**.** Hypothesis 5 was tested with linear regression analysis in PROCESS Model 1 with modality coded with indicator method entered as an independent variable and with continuous language proficiency entered as a moderator. The

same output also reported pick-a-point procedure for probing for the interaction between modality and language proficiency. The interaction effects were further probed with the Johnson-Neyman technique in PROCESS Model 1 with modality coded with Helmert coding system with resulting variables d1 and d2 entered as an independent variable and with language proficiency entered as a moderator. Overall, H5 was supported. A detailed report follows below.

Omnibus test of interaction effects of modality and language proficiency on encoding. A 2-tailed omnibus test of interaction effects between modality and language proficiency on encoding suggested that regression model with all variables entered—including the interaction term of interest itself—accounted for approximately 18.46% of the variance of scores in encoding, $R^2 = .1846$, $F(14, 125) = 2.1332$, $p = .021$. However, the interaction between modality and length of stay failed to reach statistical significance in explaining the variance in encoding scores, $R^2_{\text{change}} = .0148$, $F_{\text{change}}(2, 125) = 1.1571$, $p = .325$. Hand-calculated goodness of fit of the regression model excluding the interaction reached $R^2 = .1698$.

Among predictors of encoding scores in this model, source of recruitment and length of stay obtained statistical significance. Specifically, participants recruited by the researcher correctly recognized on average 1.08 [95% *CI*: .1653, 1.9705] answers more than did participants recruited by Qualtrics, $t(140) = 2.3415$, $p = .021$. Also, each additional year spent in the U.S. increased the encoding scores on average by .03 [95% *CI*: .0023, .0583] points, $t(140) = 2.1436$, $p = .034$.

As for conditional effects of modality on encoding, pick-a-point procedure included in the same omnibus test indicated that conditional effects of modality at

two levels of language proficiency were statistically significant. At the mean of the language proficiency score ($\overline{X}$ = 19.09), interaction between language proficiency and modality increased R^2 by .0639. Thus, at the mean of the language proficiency score, the interaction accounted for 6.39% of the variance in encoding over and above the main effect of language proficiency and modality (expressed as D1 and D2), $F_{\text{change}}(2, 125) = 4.8993$, $p = .009$. At the maximum of the language proficiency score (X = 20.00), interaction between language proficiency and modality increased R^2 by .0577. Therefore, at the maximum language proficiency score, the interaction accounted for 5.77% of the variance in encoding scores over and above the main effect of language proficiency and modality, $F_{\text{change}}(2, 125) = 4.4255$, $p = .014$, see Table 26.

Table 26. Unstandardized regression coefficients and standard errors (*SE*) for the omnibus tests of the two-way interaction effects of modality and language proficiency on encoding, 2-tailed test.

Variable	Coefficient	*SE*	*t*	*p*
(Constant)	6.694	2.427	2.758	.007
Gender (being a woman)	-.539	.424	-1.269	.207
Education in the U.S.	-.035	.038	-.911	.364
Having K-12 children	-.033	.423	-.079	.938
Plans to go back to home country	-.423	.521	-.813	.418
Acculturation	.141	.210	.671	.504
Psychological wellbeing	-.021	.034	-.605	.546
News consumption	-.384	.337	-1.142	.256
Being in the researcher's subsample	1.068	.456	2.342	.021
Language proficiency	.139	.107	1.305	.194
Length of stay	.030	.014	2.144	.034
$\overline{X}_{\text{"spoken words"}} - \overline{X}_{(\text{"written words"} + \text{"spoken words + pictures"})}$	-2.652	4.269	-.621	.536
$\overline{X}_{\text{"written words"}} - \overline{X}_{\text{"spoken words" + pictures"}}$	5.570	4.538	1.227	.222
R^2	.170†		n/a	n/a
Omnibus test of interaction effects of modality x language proficiency				
R^2_{change}	.015	n/a	n/a	.325
Total R^2	.185	4.884		.021
Conditional effects within the omnibus test				
Modality x One standard deviation below mean Lang ($\overline{X} - 1SD = 17.11$)				
R^2_{change}	.029			.115
Modality x Mean Lang ($\overline{X} = 19.09$)				
R^2_{change}	.064			.009
Modality x Maximum Lang ($X = 20.00$)‡				
R^2_{change}	.058			.014

Note. †Calculated by hand based on "Model summary" section of PROCESS output.
‡At one standard deviation above the mean, the value for language proficiency was replaced with the maximum possible score, $X = 20.00$ points, because one standard deviation above the mean was outside the range of language proficiency data.

More specifically, pick-a-point procedure for probing for interaction effects between modality and language proficiency on encoding identified that at the mean value of language proficiency, significant differences were found between mean encoding score in "spoken words" and the unweighted average encoding scores for participants in the "written words" and "spoken words + pictures" conditions, D1 = 1.1942 [95% *CI*: .3631, 2.0254], $t(140) = 2.8436$, $p = .005$. However, no differences

were found between the average encoding scores of participants in the "written words" and "written words + pictures" conditions, D2 = .6198 [95% *CI*: –.3002, 1.5398], $t(140) = 1.3334$, $p = .185$.

At the maximum value of language proficiency, significant differences were found between mean encoding scores of participants in "spoken words" and the unweighted average encoding scores for participants in the "written words" and "spoken words + pictures" conditions, D1 = 1.3770 [95% *CI*: .4330, 2.3210], $t(140) = 2.8870$, $p = .005$. No differences were found between the average encoding scores of participants in "written words" and "written words + pictures" conditions, D2 = .3846 [95% *CI*: –.6330, 1.4022], $t(140) = .7481$, $p = .456$. However, effect sizes revealed that average encoding scores for participants in "written words" and "spoken words + pictures" decreased as participants' language proficiency increased. See Table 27 for the summary of results.

Table 27. Effect sizes and standard errors (*SE*) for the effects of three levels of modality on encoding at three levels of language proficiency, 2-tailed test.

Language proficiency, score in points	Modality			
	$\overline{X}_{\text{"spoken words"}} - \overline{X}_{\text{("written words" + "spoken words + pictures")}}$		$\overline{X}_{\text{"written words"}} - \overline{X}_{\text{"spoken words" + pictures"}}$	
	Effect size	*SE*	Effect size	*SE*
17.11	.7958	.5922	1.1326†	.6562
19.09	1.1942**	.4200	.6198	.4648
20.00	1.3770**	.4770	.3846	.5141

Note. † p = .087.
**$p < .01$.

Because the *F*-value for the model fit in the omnibus test reached statistical significance and because the low-proficiency participants performed on encoding as predicted, the model was re-run with confidence intervals set at 90% instead of 95% and *p*-values for individual predictors' *t*-tests were manually halved. As a

result, no additional variables reached statistical significance as predictors of encoding scores in addition to the source of recruitment and length of stay, see Table 28.

Table 28. Unstandardized regression coefficients and standard errors (*SE*) for the model predicting conditional effects of modality on encoding at levels of language proficiency, 1-tailed test.

Variable	Coefficient	*SE*	*t*	*p*
(Constant)	6.694	2.427	2.758	.004
Gender (being a woman)	-.539	.424	-1.269	.104
Education in the U.S.	-.035	.038	-.911	.182
Having K-12 children	-.033	.423	-.079	.469
Plans to go back to home country	-.423	.521	-.813	.209
Acculturation	.141	.210	.671	.252
Psychological wellbeing	-.021	.034	-.605	.273
News consumption	-.384	.337	-1.142	.064
Source of recruitment (being in the researcher's subsample)	1.068	.456	2.342	.011
Language proficiency	.139	.107	1.305	.100
Length of stay	.030	.014	2.144	.017
$\overline{X}_{\text{"spoken words"}} - \overline{X}_{(\text{"written words"} + \text{"spoken words + pictures"})}$	-2.652	4.269	-.621	.268
$\overline{X}_{\text{"written words"}} - \overline{X}_{\text{"spoken words" + pictures"}}$	5.570	4.538	1.227	.111
R^2	.170†		n/a	n/a
Omnibus test of interaction effects of modality x language proficiency				
R^2_{change}	.015	n/a	n/a	.325
Total R^2	.185	4.884		.021

Note. †Calculated by hand based on "Model summary" section of PROCESS output.

A 1-tailed test identified that one additional *t*-test for the effect of D2 reached statistical significance in the pick-a-point procedure. Specifically, at one standard deviation below the mean value of language proficiency ($\overline{X} - 1SD = 17.11$), the average encoding scores of participants in the "written words" condition were 1.1326 points [90% *CI*: .0453, 2.2200] lower than were the average scores for participants in the "spoken words + pictures" condition, $t(140) = 1.7261$, $p = .043$, see Table 29 below.

Table 29. Effect sizes and standard errors (*SE*) for the effects of three levels of modality on encoding at three levels of language proficiency, 1-tailed test.

Language proficiency, score in points	Modality			
	$\overline{X}_{\text{"spoken words"}} - \overline{X}_{\text{("written words" + "spoken words + pictures")}}$		$\overline{X}_{\text{"written words"}} - \overline{X}_{\text{"spoken words" + pictures"}}$	
	Effect size	*SE*	Effect size	*SE*
17.11	.7958	.5922	1.1326*	.6562
19.09	1.1942**	.4200	.6198	.4648
20.00	1.3770**	.4770	.3846	.5141

*p < .05. **p < .01.

The omnibus test's output also included estimated means for encoding scores in all three conditions and three levels of language proficiency. Specifically, estimated conditional means for encoding at one standard deviation below the mean value of language proficiency were 8.2547 points in the "spoken words" condition, 8.4841 points in the "written words" condition, and 9.6168 points in the "spoken words + pictures" condition. The differences in encoding scores between the "written words" and "spoken words + pictures" conditions obtained statistical significance in a 1-tailed *t*-test.

Estimated conditional means for encoding at mean value of language proficiency were 8.2643 points in the "spoken words" condition, 9.1487 points in the "written words" condition, and 9.7685 points in the "spoken words + pictures" condition. Once again, the differences in encoding scores between the "written words" and "spoken words + pictures" conditions failed to obtain statistical significance.

Estimated conditional means for encoding at maximum value of language proficiency were 8.2688 points in the "spoken words" condition, 9.4535 points in the "written words" condition, and 9.8381 points in the "spoken words + pictures"

condition. Once again, the differences in encoding scores between the "written words" and "spoken words + pictures" conditions failed to obtain statistical significance, see Table 30.

Table 30. Estimated conditional means for encoding scores at three levels of language proficiency across modality conditions.

Language proficiency, score in points	Modality		
	"Spoken words"	"Written words"	"Spoken words + pictures"
17.11†	8.2547	8.4841	9.6168
19.09‡	8.2643	9.1487	9.7685
20.00‡	8.2688	9.4535	9.8381

†Effect sizes obtained statistical significance (p = .043 for 1-tailed *t*-test) between "spoken words + pictures" and "spoken words" but not between "spoken words" and the other two condition as a group.
‡Effect sizes obtained statistical significance between "spoken words" and the other two condition as a group but not between "spoken words + pictures" and "spoken words."

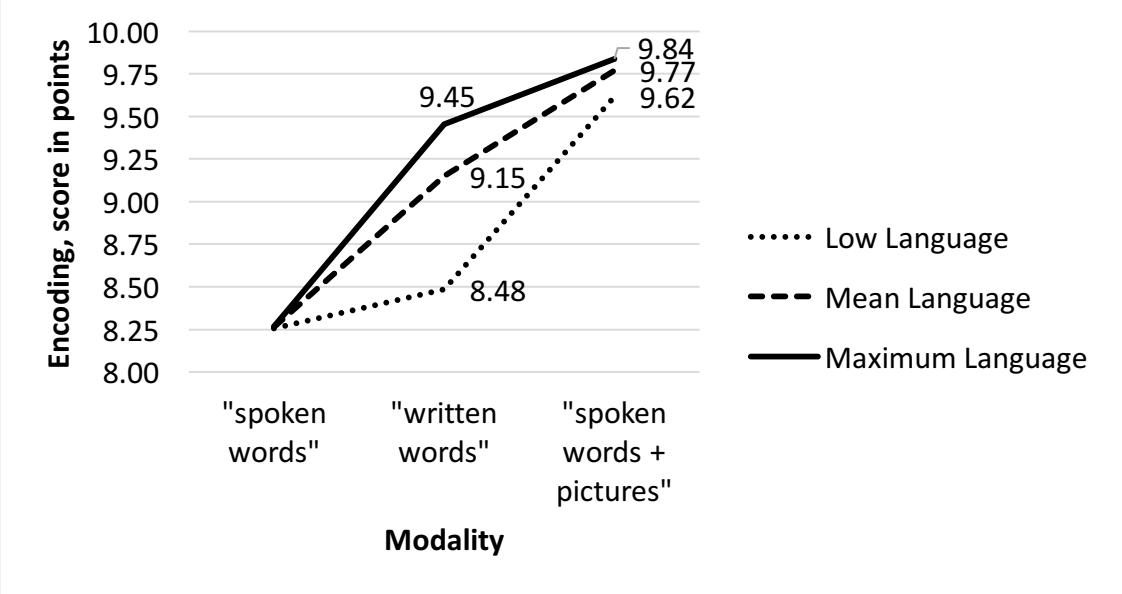


Figure 14. Estimated conditional effects of modality on encoding at levels of language proficiency.

As Figure 14 above shows, participants with low language proficiency in the "spoken words + pictures" condition correctly recognized 1.14 answers more than they did in the "written words" condition, the difference that was statistically

significant. Therefore, H5 about the interaction effects of modality and language proficiency on encoding was supported.

Johnson-Neyman technique for probing for interaction effects between modality and language proficiency on encoding. Because a 1-tailed test for the pick-a-point technique revealed the differences in encoding scores between "written words" and "spoken words + pictures" at one standard deviation below the mean value of language proficiency, a Johnson-Neyman technique was employed to further probe for the interaction effects of modality and language proficiency on encoding.

A 2-tailed test revealed that depending on the level of language proficiency, statistically significant differences existed between the average encoding scores for participants in the "spoken words" condition and the unweighted average encoding scores for those participants who were in the "written words" and "spoken words + pictures" conditions. Specifically, the interaction effects between modality and language proficiency obtained statistical significance at the value of language proficiency of 17.91, which included the language proficiency scores of approximately 83.57% of the sample due to a highly skewed distribution of language proficiency scores. More specifically, the effect of modality was a significant predictor of encoding scores starting at the value of language proficiency of 17.91, $t(140) = 1.9791$, $p = .05$, through the maximum possible value of 20.00, $t(140) = 2.8870$, $p = .005$. Encoding scores of participants in the "spoken words" condition were on average .9562 points [95% *CI*: .0000, 1.9123] lower in comparison to the unweighted average scores of participants in the other two

conditions at the language proficiency's value of 17.91. This difference rose to 1.3770 points [95% *CI*: .4330, 2.3210] at the maximum possible value of language proficiency, 20.00 points. This means that as language proficiency increased, participants in the spoken words" condition decreased their encoding scores relative to the average encoding scores for participants in the other two conditions.

Johnson-Neyman technique identified no statistical significance transition points within the range of language proficiency for the differences in encoding scores between participants in the "written words" and "spoken words + pictures" conditions when a 2-tailed *t*-test was used.

However, a 1-tailed *t*-test within Johnson-Neyman technique did return statistically significant results for the average difference in encoding scores between participants in the "printed words" and in "spoken words + pictures" conditions. Specifically, the interaction between modality and language proficiency became statistically significant at the values of language proficiency starting from 16.12 points and up to the value of 18.28, which included the language proficiency scores of approximately 7.86% (n = 11) of the sample (valid N = 140) due to a highly skewed distribution of language proficiency scores. More specifically, interaction between modality and language proficiency was a significant predictor of encoding scores starting at the value of language proficiency of 16.12, $t(140) = 1.6571$, p = .050, through the value of 18.28, $t(140) = 1.6571$, p = .050. Holding other variables constant, participants in the "spoken words + pictures" condition were estimated to increase encoding scores by 1.3907 points [90% *CI*: .0000, 2.7813] at the language proficiency's value of 16.12 and by .8304 points [90% *CI*: .0000, 1.6608] at the value

of language proficiency of 18.28 points, in comparison to participants in the "written words" condition. This means that in the "spoken words + pictures" condition, participants with lower language proficiency scored higher on encoding than did participants with higher language proficiency, see Table 31.

Table 31. Effect sizes and standard errors (*SE*) for the conditional effects of modality on encoding at the range of language proficiency, 1-tailed test.

Language proficiency, score in points	Modality			
	("Written words" + "Spoken words + pictures")		"Spoken words + pictures"	
	Effect size	*SE*	Effect size	*SE*
16.10	.5913	.7696	1.3958	.8431
16.12	n/a	n/a	1.3907*	.8392
16.75	.7222	.6524	1.2273*	.7198
16.98	n/a	n/a	n/a	n/a
17.40	.8532	.5490	1.0587*	.6104
17.53	.8794*	.5307	n/a	n/a
18.05	.9841*	.4685	.8902*	.5240
18.28	n/a	n/a	.8304*	.5011
18.70	1.1151**	.4241	.7217	.4731
19.35	1.2460**	.4272	.5531	.4695
20.00	1.3770*	.4770	.3846	.5141

Note: Data included represents, where available, common statistical significance points within the range of language proficiency with at least one point outside the range of statistical significance. *$p < .05$. **$p < .01$.

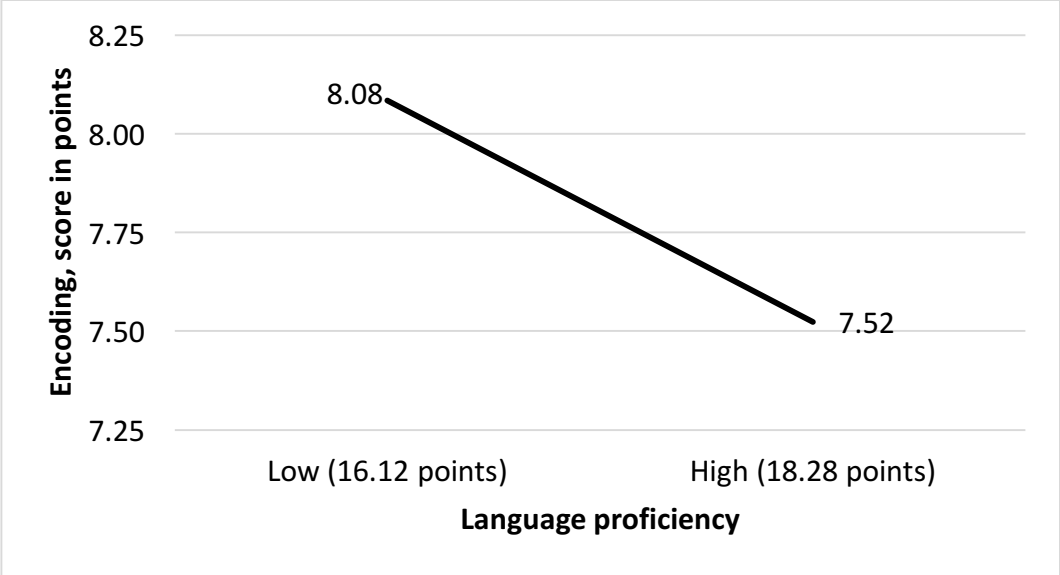


Figure 15. Effects of language proficiency on encoding scores in the "spoken words + pictures" condition.

Figure 15 above demonstrates that in the "spoken words + pictures" condition, participants with relatively low language proficiency correctly recognized approximately half-an-answer more (Δ = .56) than did participants with relatively high language proficiency. Importantly, the results of the Johnson-Neyman technique should be interpreted with caution because 2 tests were run to test the interaction effects of three levels of modality with language proficiency

Interaction effects of modality and language proficiency on encoding of news schema elements. Research Question 4 inquired encoding of which elements of news schema—action, things, places, and causes and effects—was affected the most by the interaction effects of modality and language proficiency. Results revealed that interaction effects of modality and language proficiency explained additional variance in encoding of action scores. A detailed report follows below.

Encoding of action. Encoding of action was measured with five multiple-choice questions and was analyzed in PROCESS Model 1.

Omnibus test of interaction effects of modality and language proficiency on encoding of action. The omnibus test of interaction effects between modality and language proficiency on encoding of action suggested that regression model with all variables entered—including the interaction term of interest—accounted for approximately 22.25% of the variance in in encoding of action scores, $R^2 = .223$, $F(14, 125) = 2.5545$, $p = .003$. However, inclusion of the interaction between modality and language proficiency failed to $R^2_{\text{change}} = .007$, $F_{\text{change}}(2, 125) = .5410$, $p = .584$. Hand-calculated goodness of fit of the regression model excluding the interaction reached $R^2 = .216$.

Among predictors of encoding of action scores in this model, gender and language proficiency approached statistical significance.

As for conditional effects of modality on encoding of action, pick-a-point procedure included in the same omnibus test indicated that conditional effects of modality were statistically significant at all three levels of language proficiency.

At one standard deviation below the mean of the language proficiency score ($\overline{X} - 1SD = 17.11$), interaction between language proficiency and modality increased R^2 by .043. Thus, at the mean of the language proficiency score, the interaction accounted for 4.31% of the variance in encoding of action over and above the main effect of language proficiency and modality (expressed as D1 and D2), $F_{\text{change}}(2, 125) = 3.4607$, $p = .034$.

At the mean of the language proficiency score ($\overline{X}$ = 19.09), interaction between language proficiency and modality increased R^2 by .120. Thus, at the mean of the language proficiency score, the interaction accounted for 11.95% of the variance in encoding scores over and above the main effect of language proficiency and modality (expressed as D1 and D2), $F_{\text{change}}(2, 125) = 9.6052$, $p < .001$.

At the maximum of the language proficiency score (X = 20.00), interaction between language proficiency and modality increased R^2 by .107. Therefore, at the maximum language proficiency score, the interaction accounted for 10.65% of the variance in encoding scores over and above the main effect of language proficiency and modality, $F_{\text{change}}(2, 125) = 8.5576$, $p < .001$, see Table 32.

Table 32. Unstandardized regression coefficients and standard errors (*SE*) for the omnibus tests of the two-way interaction effects of modality and language proficiency on encoding of action, 2-tailed test.

Variable	Coefficient	*SE*	*t*	*p*
(Constant)	1.874	1.190	1.575	.118
Gender (being a woman)	-.375	.208	-1.805	.074
Education in the U.S.	.004	.019	.236	.814
Having K-12 children	.064	.207	.308	.759
Plans to go back to home country	-.038	.255	-.148	.882
Acculturation	-.016	.103	-.159	.874
Psychological wellbeing	-.003	.017	.168	.867
News consumption	-.119	.165	-.723	.471
Source of recruitment (being in the researcher's subsample)	.326	.224	1.459	.147
Language proficiency	.096	.052	1.832	.619
Length of stay	.009	.007	1.356	.178
$\overline{X}_{\text{"spoken words"}} - \overline{X}_{(\text{"written words" + "spoken words + pictures"})}$	-1.044	2.093	-.499	.619
$\overline{X}_{\text{"written words"}} - \overline{X}_{\text{"spoken words" + pictures"}}$	1.451	2.225	.652	.516
R^2	.216†		n/a	n/a
Omnibus test of interaction effects of modality x language proficiency				
R^2_{change}	.007	n/a	n/a	.584
Total R^2	.223	1.174		.003
Conditional effects within the omnibus test				
Modality x One standard deviation below mean language proficiency ($\overline{X} - 1SD = 17.11$)				
R^2_{change}	.043			.034
Modality x Mean language proficiency ($\overline{X} = 19.09$)				
R^2_{change}	.120			.001
Modality x Maximum language proficiency ($X = 20.00$)‡				
R^2_{change}	.107			.001

Note. †Calculated by hand based on "Model summary" section of PROCESS output.
‡At one standard deviation above the mean, the value for language proficiency was replaced with the maximum possible score, $X = 20.00$ points, because one standard deviation above the mean was outside the range of language proficiency data.

More specifically, pick-a-point procedure for probing for interaction effects between modality and language proficiency on encoding of action identified that at one standard deviation below the mean value of language proficiency, significant differences were found between the average encoding of action score in "spoken

words" and the unweighted average encoding of action scores for participants in the "written words" and "spoken words + pictures" conditions, D1 = .6116 [95% *CI*: .0371, 1.1861, $t(140) = 2.1068$, $p = .037$. However, no differences were found between the average encoding of action scores of participants in the "written words" and "written words + pictures" conditions, D2 = .5657 [95% *CI*: –.0709, 1.2023], $t(140) = 1.7588$, $p = .081$.

At the mean value of language proficiency, significant differences were found between the average encoding of action score in "spoken words" and the unweighted average encoding of action scores for participants in the "written words" and "spoken words + pictures" conditions, D1 = .8029 [95% *CI*: .3955, 1.2104, $t(140) = 3.9001$, $p < .001$. Likewise, significant differences were found between the average encoding of action scores of participants in the "written words" and "written words + pictures" conditions, D2 = .4634 [95% *CI*: .0124, .9144], $t(140) = 2.0337$, $p = .044$.

At the maximum value of language proficiency, significant differences were found between the average encoding scores of participants in "spoken words" and the unweighted average encoding scores for participants in the "written words" and "spoken words + pictures" conditions, D1 = .8907 [95% *CI*: .4279, 1.3534], $t(140) = 3.8095$, $p < .001$. However, no differences were found between the average encoding scores of participants in the "written words" and "written words + pictures" conditions, D2 = .4165 [95% *CI*: –.0823, .9153], $t(140) = 1.6525$, $p = .101$. See Table 33 for the summary of results.

Table 33. Effect sizes and standard errors (*SE*) for the effects of three levels of modality on encoding of action at three levels of language proficiency, 2-tailed test.

Language proficiency, score in points	Modality			
	$\overline{X}_{\text{"spoken words"}} - \overline{X}_{\text{("written words" + "spoken words + pictures")}}$		$\overline{X}_{\text{"written words"}} - \overline{X}_{\text{"spoken words" + pictures"}}$	
	Effect size	*SE*	Effect size	*SE*
17.11	.6116*	.2903	.5657	.3217
19.09	.8029***	.2059	.4634*	.2279
20.00	.8907***	.2338	.4165	.2520

*p < .05. **p < .01. ***p < .001.

A 1-tailed *t*-test was not performed because the effects of predictor variables on encoding of action were tested to answer a research question, not the directional hypotheses.

The omnibus test's output also included estimated means for encoding of action scores in all three conditions and three levels of language proficiency. Specifically, estimated conditional means for encoding of action at one standard deviation below the mean value of language proficiency were 2.92 points in the "spoken words" condition, 3.25 points in the "written words" condition, and 3.82 points in the "spoken words + pictures" condition. The differences in encoding scores between the "written words" and "spoken words + pictures" conditions failed to obtain statistical significance.

Estimated conditional means for encoding of action at mean value of language proficiency were 2.99 points in the "spoken words" condition, 3.56 points in the "written words" condition, and 4.02 points in the "spoken words + pictures" condition. The differences in effects sizes for encoding of action scores among the three conditions did obtain statistical significance.

Estimated conditional means for encoding of action at maximum value of language proficiency were 3.01 points in the "spoken words" condition, 3.70 points in the "written words" condition, and 4.11 points in the "spoken words + pictures" condition. The differences in encoding scores between the "written words" and "spoken words + pictures" conditions failed to obtain statistical significance, see Table 34.

Table 34. Estimated conditional means for encoding of action scores at three levels of language proficiency across modality conditions.

Language proficiency, score in points	Modality		
	"Spoken words"	"Written words"	"Spoken words + pictures"
17.11‡	2.9233	3.2520	3.8177
19.09†	2.9852	3.5564	4.0198
20.00‡	3.0136	3.6960	4.1125

†Effect sizes obtained statistical significance ($p = .044$ for 2-tailed *t*-test) between the "spoken words + pictures" and "spoken words" conditions; differences in effects between "spoken words" and the other two condition as a group also obtained statistical significance ($p < .001$ for 2-tailed *t*-test).
‡Effect sizes obtained statistical significance between "spoken words" and the other two condition as a group but not between "spoken words + pictures" and "spoken words."

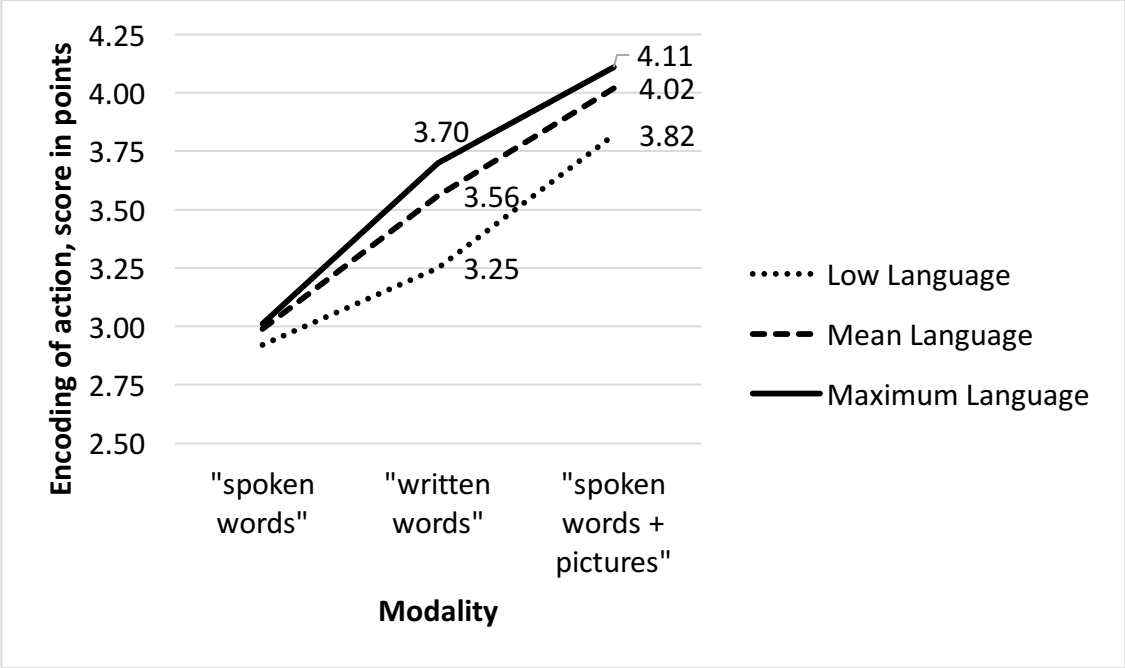


Figure 16. Estimated conditional effects of modality on encoding of action at levels of language proficiency.

Figure 16 above illustrates that data on encoding of action followed some of the patterns of data on encoding in general. Since results for low-proficiency participants failed to obtain statistical significance, results for mean-proficiency participants were used as evidence of performance of participants with relatively low language proficiency. Mean-proficiency participants correctly recognized almost half-an-answer ($\Delta = .46$) more on encoding of action measure in the "spoken words + pictures" condition than they did in the "written words" condition.

Johnson-Neyman technique for probing for interaction effects between modality and language proficiency on encoding of action. Johnson-Neyman technique identified that the difference between the average encoding of action scores of participants in the "spoken words" condition and the unweighted average encoding of action scores of participants in the "written words" and "spoken words +

pictures" conditions was statistically significant at the values of language proficiency starting from 16.97 and above, which—due to a highly skewed distribution of language proficiency scores—included approximately 86.43% of the sample. Specifically, interaction between modality and language proficiency was a significant predictor of encoding of action scores at the value of language proficiency of 16.97, $t(140) = 1.9787$, $p = .05$, through the maximum possible value of 20.00, $t(140) = 3.8095$, $p < .001$. Holding other variables constant, the interaction between modality and language proficiency was estimated to increase encoding of action scores by .5974 points [95% *CI*: .0000, 1.1948] at the language proficiency value of 16.97, and by .8907 points [95% *CI*: .4279, 1.3534] at the maximum possible value of language proficiency, in comparison to the constant score of 1.8736 points, which failed to reach statistical significance. Overall, Johnson-Neyman technique demonstrated that the difference between the mean encoding of action scores in the "spoken words" condition and the unweighted average encoding of action scores in the "written words" and "spoken words + pictures" conditions was by .29 points lower for low-proficiency participants than for high-proficiency participants, see Figure 17 and Table 35.

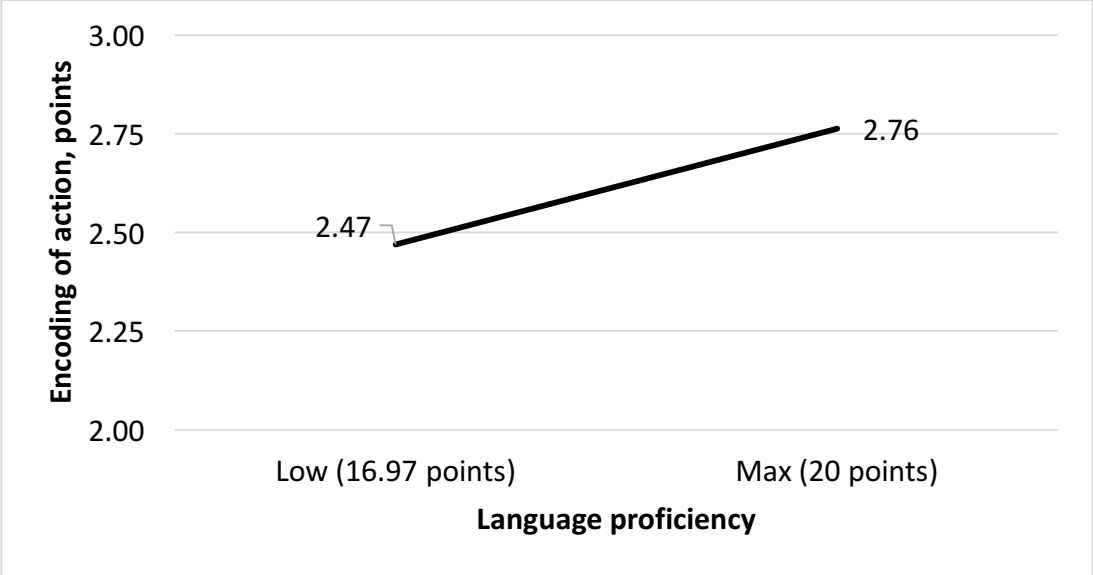


Figure 17. Effects of language proficiency on unweighted average encoding of action scores in the "written words" and "spoken words + pictures" conditions.

Johnson-Neyman technique also identified a region of language proficiency where the difference between the average encoding of action scores of participants in the "written words" condition and participants in the "spoken words + pictures" condition was statistically significant. This region started at the value of language proficiency equal to 17.90 and capped at the score of 19.28, which included the language proficiency scores of approximately 7.14% of the sample because roughly three-fourths of the sample perceived their language proficiency to be at the maximum possible score of 20.00. More specifically, interaction between modality and language proficiency was a significant predictor of encoding of action scores starting at the value of language proficiency of 17.90, $t(140) = 1.9787$, $p = .05$, through the value of 19.28, $t(140) = 1.9787$, $p = .05$. Holding other variables constant, the interaction between modality and language proficiency was estimated to increase encoding of action scores by .5251 points [95% *CI*: .0000, 1.0502] at the

language proficiency score of 17.90, but only by .4536 points [95% *CI*: .0000, .9071] at the value of 19.28 on language proficiency. This means that in "spoken words + pictures" condition, subjects with lower language proficiency correctly recognized .07 answers more on the encoding of action measure than did participants with higher language proficiency, see Figure 18 and Table 35.

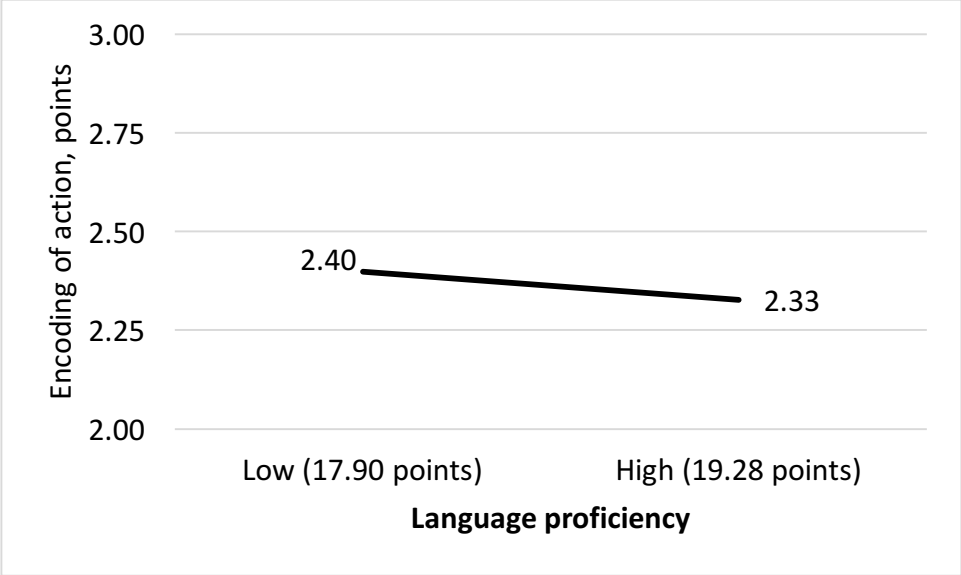


Figure 18. Effects of language proficiency on encoding of action scores in the "spoken words + pictures" condition.

Table 35. Effect sizes and standard errors (*SE*) for the conditional effects of modality on encoding of action at the range of language proficiency.

	Modality			
	$\overline{X}_{\text{"spoken words"}} - \overline{X}_{\text{("written words" + "spoken words + pictures")}}$		$\overline{X}_{\text{"written words"}} - \overline{X}_{\text{"spoken words" + pictures"}}$	
Language proficiency, score in points	Effect size	*SE*	Effect size	*SE*
16.75	.5763	.3198	.5846	.3528
16.98	.5974*	.3019	n/a	n/a
17.40	.6392*	.2691	.5510	.2992
17.90	n/a	n/a	.5251*	.2653
18.05	.7020**	.2296	.5173*	.2568
18.70	.7649***	.2079	.4837*	.2319
19.28	n/a	n/a	.4536*	.2292
19.35	.8278***	.2094	.4501†	.2301
20.00	.8907***	.2338	.4165	.2520

Note. Data included represents, where available, common statistical significance points within the range of language proficiency with at least one point outside the range of statistical significance.
†This point at the range of language proficiency in the "spoken words + pictures" condition approached statistical significance, $t(140) = 1.9559$, $p = .053$.
*$p < .05$. **$p < .01$. ***$p < .001$.

Data from Table 35 were used to construct Figure 19 based on two common points in range of language proficiency where D1 and D2 were statistically significant.

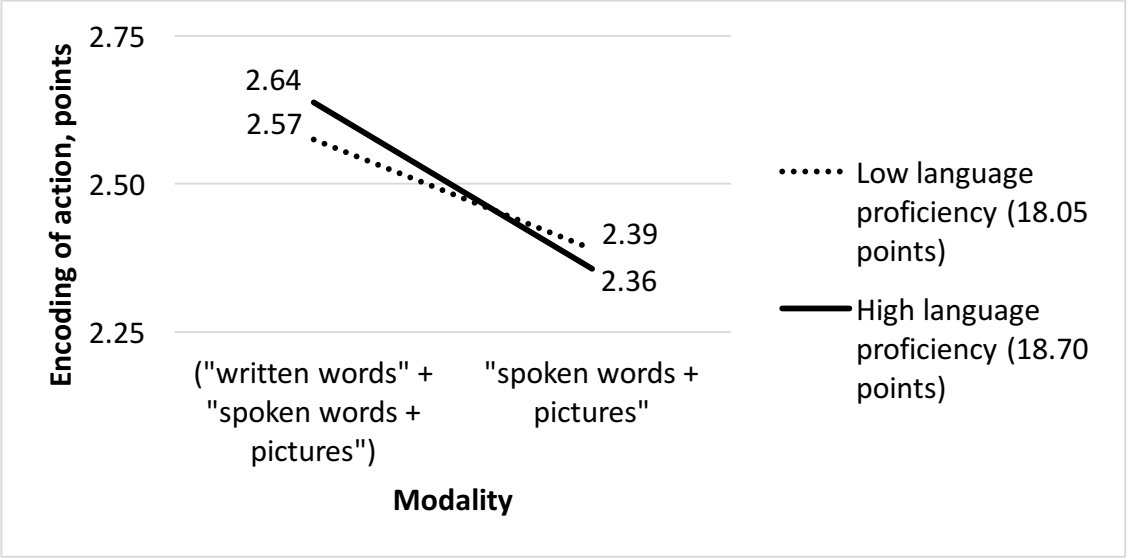


Figure 19. Effects of modality on encoding of action scores at common points in the range of language proficiency.

Results of Johnson-Neyman technique presented in Figure 19 illustrate that in the "spoken words + pictures" condition low-proficiency participants slightly, by .03 points, outperformed high-proficiency participants. Importantly, this finding held only at the range of language proficiency from 18.05 points to 18.70 points.

Encoding of things. Encoding of action was measured with three multiple-choice questions based on information that featured objects. The data were analyzed with multiple regression analysis in PROCESS Model 1.

Omnibus test of interaction effects of modality and language proficiency on encoding of things. The omnibus test of interaction effects between modality and language proficiency on encoding things failed to reach statistical significance, R^2 = .148, $F(14, 125) = 1.5507$, $p = .103$. Likewise, the interaction between modality and language proficiency failed to reach statistical significance, $R^2_{change} = .005$, $F_{change}(2, 125) = .3408$, $p = .712$, see Table 36.

Table 36. Unstandardized regression coefficients and standard errors (*SE*) for the omnibus tests of the two-way interaction effects of modality and language proficiency on encoding of things, 2-tailed test.

Variable	Coefficient	*SE*	*t*	*p*
(Constant)	2.562	.779	3.291	.001
Gender (being a woman)	-.122	.136	-.900	.370
Education in the U.S.	-.013	.012	-1.064	.289
Having K-12 children	-.101	.136	.746	.457
Plans to go back to home country	-.098	.167	-.587	.558
Acculturation	.044	.067	.651	.516
Psychological wellbeing	-.011	.011	-.978	.330
News consumption	-.181	.108	-1.671	.097
Being in the researcher's subsample	.441	.146	3.011	.003
Language proficiency	.002	.034	.059	.953
Length of stay	.010	.005	2.122	.036
$\overline{X}_{\text{"spoken words"}} - \overline{X}_{(\text{"written words" + "spoken words + pictures"})}$	-.610	1.370	-.446	.657
$\overline{X}_{\text{"written words"}} - \overline{X}_{\text{"spoken words" + pictures"}}$	.783	1.456	.538	.592
R^2	.143†		n/a	n/a
Omnibus test of interaction effects of modality x language proficiency				
R^2_{change}	.005		n/a	n/a	.712
Total R^2	.148		.503		.103
Conditional effects within the omnibus test				
Modality x One standard deviation below mean language proficiency ($\overline{X}$ – 1*SD* = 17.11)				
R^2_{change}	.004			.772
Modality x Mean language proficiency ($\overline{X}$ = 19.09)				
R^2_{change}	.013			.388
Modality x Maximum language proficiency (X = 20.00)‡				
R^2_{change}	.014			.353

Note. †Calculated by hand based on "Model summary" section of PROCESS output.
‡At one standard deviation above the mean, the value for language proficiency was replaced with the maximum possible score, X = 20.00 points, because one standard deviation above the mean was outside the range of language proficiency data.

Johnson-Neyman technique for probing for interaction effects between modality and language proficiency on encoding of things. Johnson-Neyman technique failed to identify statistical significance transition points within the range of language proficiency.

Encoding of causes and effects. Encoding of cause and effects was measured with three multiple-choice questions, one per each of the three stories. The data were analyzed with multiple regression analysis in PROCESS Model 1.

Omnibus test of interaction effects of modality and language proficiency on encoding of causes and effects. The omnibus test of interaction effects between modality and language proficiency on encoding of causes and effects failed to reach statistical significance, $R^2 = .100$, $F(14, 125) = .9899$, $p = .468$. Likewise, the interaction between modality and language proficiency failed to reach statistical significance, $R^2_{\text{change}} = .013$, $F_{\text{change}}(2, 125) = .8993$, $p = .410$.

Table 37. Unstandardized regression coefficients and standard errors (*SE*) for the omnibus tests of the two-way interaction effects of modality and language proficiency on encoding of causes and effects, 2-tailed test.

Variable	Coefficient	*SE*	*t*	*p*
(Constant)	1.534	.942	1.628	.106
Gender (being a woman)	-.059	.165	-.359	.720
Education in the U.S.	-.023	.015	-1.539	.126
Having K-12 children	.062	.164	.375	.708
Plans to go back to home country	-.209	.202	-1.034	.303
Acculturation	.120	.081	1.471	.144
Psychological wellbeing	-.009	.013	-.660	.511
News consumption	-.086	.131	-.661	.510
Being in the researcher's subsample	.290	.177	1.640	.104
Language proficiency	.019	.041	.467	.641
Length of stay	.010	.006	1.878	.063
$\overline{X}_{\text{"spoken words"}} - \overline{X}_{(\text{"written words"} + \text{"spoken words + pictures"})}$	-.767	1.657	-.463	.644
$\overline{X}_{\text{"written words"}} - \overline{X}_{\text{"spoken words" + pictures"}}$	2.116	1.761	1.201	.232
R^2	.087†		n/a	n/a
Omnibus test of interaction effects of modality x language proficiency				
R^2_{change}	.013		n/a	n/a	.410
Total R^2	.100		.736		.468
Conditional effects within the omnibus test				
Modality x One standard deviation below mean language proficiency ($\overline{X}$ – 1*SD* = 17.11)				
R^2_{change}	.012			.430
Modality x Mean language proficiency ($\overline{X}$ = 19.09)				
R^2_{change}	.012			.437
Modality x Maximum language proficiency (X = 20.00)‡				
R^2_{change}	.011			.471

Note. †Calculated by hand based on "Model summary" section of PROCESS output.
‡At one standard deviation above the mean, the value for language proficiency was replaced with the maximum possible score, X = 20.00 points, because one standard deviation above the mean was outside the range of language proficiency data.

Two-way Interaction Effects of Modality and Length of Stay

Predictions about the effects of length of stay were based on understanding that longer stay in the U.S. is associated with first, ability to recognize local realities as in recognize what pictures say, and second, better developed schemas that allow

to incorporate new incoming information into existing knowledge. Because no effects were expected for low-tenure participants on a memory measure of encoding, no predictions were made for encoding. However, it was expected that on comprehension measure, longer stay in the U.S. will help incorporate new information into existing schemas, which will also supply the information needed to understand the incoming information—the information that might be missing from the news story in the stimuli. At the same time, "spoken words + pictures" offers a second channel of pictorial information that needs recognition of information. Recognition will be aided by familiarity with what participants see, which will increase as the length of stay in the U.S. Therefore, H6 predicted that participants with long length of stay would score higher on comprehension in the "spoken words + pictures" condition than they would in the "written words" condition and even higher than they would in the "spoken words" condition. H6 was tested with linear regression analysis in PROCESS Model 1 with modality coded with indicator method entered as an independent variable and with continuous length of stay entered as a moderator. The interaction between modality and length of stay was further probed with pick-a-point procedure and with the Johnson-Neyman technique in PROCESS Model 1 with modality dummy-coded with Helmert technique entered as an independent variable and with length of stay entered as a moderator. Overall, H6 was not supported because interaction effects and the overall model failed to reach statistical significance. A detailed report of results is provided below.

Interaction effects of modality and length of stay on comprehension.

The omnibus test of interaction effects between modality and length of stay on

comprehension suggested that regression model with all variables entered failed to reach statistical significance, R^2 = .105, $F(14, 125)$ = 1.047, p = .412. Inclusion of the interaction between modality and length of stay failed explain additional variance in comprehension scores, R^2 = .011, $F_{change}(2, 125)$ = .7791, p = .461.

The same omnibus test also failed to identify conditional effects of modality at any of the three levels of length of stay. Therefore, H6 was not supported.

Table 38. Unstandardized regression coefficients and standard errors (*SE*) for the omnibus tests of the two-way interaction effects of modality and length of stay on comprehension, 2-tailed test.

Variable	Coefficient	*SE*	*t*	*p*
(Constant)	.827	.918	.900	.370
Gender (being a woman)	-.074	.164	-.450	.653
Education in the U.S.	.035	.014	2.422	.017
Having K-12 kids	-.038	.164	.230	.818
Plans to go back to home country	-.083	.202	-.413	.680
Acculturation to mainstream culture	-.017	.083	-.199	.843
Psychological wellbeing	.013	.013	.951	.344
News consumption	.056	.130	.426	.671
Being in the researcher's subsample	.115	.177	.650	.517
Language proficiency (Lang)	-.021	.040	-.514	.608
Length of stay (LOS)	-.004	.006	-.685	.495
$\overline{X}_{\text{"spoken words"}} - \overline{X}_{(\text{"written words" + "spoken words + pictures"})}$	-.767	1.657	-.463	.644
$\overline{X}_{\text{"written words"}} - \overline{X}_{\text{"spoken words" + pictures"}}$	2.116	1.761	1.201	.232
R^2	.094†		n/a	n/a
Omnibus test of interaction effects of modality x length of stay				
R^2_{change}	.011	n/a	n/a	.461
Total R^2	.105	.733		.412
Conditional effects within the omnibus test				
Modality x One standard deviation below mean LOS ($\overline{X} - 1SD$ = 5.74)				
R^2_{change}	.011			.479
Modality x Mean LOS ($\overline{X}$ = 22.52)				
R^2_{change}	.031			.120
Modality x One standard deviation above the mean LOS ($\overline{X} + 1SD$ = 39.30)				
R^2_{change}	.031			.122

Note. †Calculated by hand based on "Model summary" section of PROCESS output.

Three-Way Interaction Effects of Modality, Language Proficiency and Length of Stay

Hypothesis 7a was based on theorizing that on a memory measure of encoding language proficiency will increase the gap in performance between participants with low- and high length of stay while length of stay will narrow down the gap in performance between participants low and high on language proficiency. In addition, hypotheses were based on theorizing that pictures in the "spoken words + pictures" condition will increase the encoding scores for participants with low language proficiency. Finally, the hypothesis were based on understanding that all groups of participants will perform on memory measures the worst in the "spoken words" condition due to it transiency and lack of pictures.

At the same time, H7b was based on understanding that when it comes to comprehension, length of stay will have stronger impact than will language proficiency because participants who lived in the country longer may have developed schemas that will incorporate new information from the news and complement the information in the news report with existing political knowledge needed to answer questions testing comprehension.

Interaction effects of modality, language proficiency, and length of stay on encoding. Hypothesis 7a was based on understanding that when it comes to encoding, pictures in "spoken words + pictures" would compensate for weak language skills while the longer length of stay would assist in recognizing pictures. Therefore, H7a predicted that low-proficiency participants with long residential tenure in the U.S. in the "spoken words + pictures" condition will perform on

encoding best, followed by low-proficiency participants with long tenure in the "written words" condition, followed by low-proficiency participants with short tenure in the "spoken words + pictures" condition, followed by low-proficiency participants with short tenure in the "written words" condition.

Overall, H7a was not supported. A detailed report follows below.

Pick-a-point procedure for testing three-way interaction effects on encoding. The test of three-way interaction effects among modality, language proficiency, and length of stay was run in PROCESS for SPSS Model 3 because Model 3 allows to include two moderators—language proficiency and length of stay—into the same model. The test was run twice: The first time, with d1 as an independent variable; the second time, with d2 as an independent variable.

The overall regression model that included the interaction among modality, language proficiency, and length of stay failed to reach statistical significance in explaining variance in encoding scores, $R^2 = .193$, $F(19, 120) = 1.514$, $p = .092$. Improvement of the model's fit with the inclusion of the three-way interaction term was handcalculated by summing up the coefficient for the improvement of fit due to the inclusion of the interaction term among d1, language proficiency and length of stay ($R^2_{change} = .0079$, $F_{\text{change}}[1, 120] = 1.073$, $p = .281$), and the coefficient for the improvement of fit due to the inclusion of the interaction term among d2, language proficiency and length of stay ($R^2_{change} = .0005$, $F_{\text{change}}[1, 120] = 1.077$, $p = .783$). The inclusion of the three-way interaction term improved the model's fit in predicting encoding by .84%, handcalculated $R^2_{\text{change}} = .0084$.

However, as can be seen from the paragraph above, both three-way interaction terms failed to explain additional variance in encoding scores. More specifically, the three-way interaction among d1, language proficiency, and length of stay failed to reach statistical significance in the regression model predicting encodings scores, $R^2_{change} = .008$, $F_{\text{change}}(1, 120) = 1.173$, $p = .281$. Likewise, the three-way interaction among d2, language proficiency, and length of stay failed to reach statistical significance in the regression model predicting encodings scores, $R^2_{change} = .001$, $F_{\text{change}}(1, 120) = 1.077$, $p = .783$.

Table 39. Unstandardized regression coefficient and standard errors (*SE*) for the overall hierarchical regression model predicting effects of modality, language proficiency, and length of stay on encoding.

Variable	Unstandardized coefficient *B*	*SE*	*t*	*p*
(Constant)	8.398	3.813	2.203	.030
General demographic characteristics				
Gender (being a woman)	-.560	.439	-1.275	.205
Education in the U.S.	-.034	.039	-.880	.381
Having K-12 children	-.069	.431	-.161	.873
Immigrant-specific characteristics				
Plans to go back to home country	-.378	.537	-.702	.484
Acculturation to mainstream culture	.169	.220	.770	.443
Psychological wellbeing	-.023	.035	-.657	.512
News consumption	-.412	.348	-1.184	.239
Being in the researcher's subsample	1.051	.468	2.245	.027
Language and length of stay				
Language proficiency (Lang)	.053	.184	.288	.774
Length of stay (LOS)	-.074	.150	-.491	.625
Modality				
$\overline{X}_{\text{"spoken words"}} - \overline{X}_{(\text{"written words" + "spoken words + pictures"})}$	3.308	7.156	.462	.645
$\overline{X}_{\text{"written words"}} - \overline{X}_{\text{"spoken words" + pictures"}}$	4.653	8.691	.535	.593
Two-way interaction terms				
Length of stay x Language proficiency	.005	.008	.675	.501
$(\overline{X}_{\text{"spoken words"}} - \overline{X}_{[\text{"written words" + "spoken words + pictures"}]})$ x LOS	-.301	.276	-1.092	.277
$(\overline{X}_{\text{"spoken words"}} - \overline{X}_{[\text{"written words" + "spoken words + pictures"}]})$ x Lang	1.108	.377	-.286	.775
$(\overline{X}_{\text{"written words"}} - \overline{X}_{\text{"spoken words" + pictures"}})$ x LOS	.124	.419	.295	.769
$(\overline{X}_{\text{"written words"}} - \overline{X}_{\text{"spoken words" + pictures"}})$ x Lang	-.222	.450	-.494	.622
R^2	.185‡			n/a
Three-way interaction terms				
$(\overline{X}_{\text{"spoken words"}} - \overline{X}_{[\text{"written words" + "spoken words + pictures"}]})$ x LOS x Lang	.016	.014	1.083	.281
R^2_{change}	.0079			.281
$(\overline{X}_{\text{"written words"}} - \overline{X}_{\text{"spoken words" + pictures"}})$ x LOS x Lang	-.006	.021	-.277	.783
R^2_{change}	.0005			.783
Total R^2_{change}	.008‡			n/a
Total R^2	.193		--	.092

Note. ‡Handcalculated from the PROCESS output.

The interaction between language proficiency and the difference between the average encoding scores for participants in the "spoken words" condition and the unweighted average encoding scores for participants in the "written words" and "spoken words + pictures" conditions obtained statistical significance at two levels of length of stay. Holding other variables constant, mean-proficiency participants with low length of stay ($\overline{X}$ – *1SD* = 5.74 years) were estimated to increase their

encoding scores by 1.215 [95% *CI*: 0494, 2.3814], $t(140) = 2.0639$, $p = .041$, if they were in the "written words" or in the "spoken words + pictures" conditions in comparison to being in the "spoken words" condition. Mean-proficiency participants with mean length of stay ($\overline{X}$ = 22.52 years) were estimated to increase their encoding scores by 1.1213 [95% *CI*: .2644, 1.9782], $t(140) = 2.5907$, $p = .011$, when they were in the "written words" or in "spoken words + pictures" conditions in comparison to the "spoken words" condition.

For participants with high language proficiency (X = 20.00), the three-way interaction was a significant predictor of encoding scores at two levels of length of stay. Holding other variables constant, high-proficiency participants with mean length of stay ($\overline{X}$ = 22.52 years) were estimated to increase their encoding scores by 1.3399 points [95% *CI*: .3361, 2.3037], $t(140) = 2.7526$, $p = .007$, if they were in the "written words" or "spoken words + pictures" conditions in comparison to the "spoken words" condition. High-proficiency participants with high length of stay ($\overline{X} + 1SD$ = 39.30 years) were estimated to increase their encoding scores by 1.4816 points [95% *CI*: .1386, 2.8246], $t(140) = 2.1843$, $p = .031$, if they were in the "written words" or "spoken words + pictures" conditions in comparison to the "spoken words" condition.

Overall these data demonstrated that in the "written words" and "spoken words + pictures" conditions, participants with mean language proficiency on average performed on encoding slightly better (Δ = .0937) if they were in the U.S. for a shorter period. Participants with high language proficiency behaved as predicted:

They performed on encoding scores better (Δ = .1417) if they were in the U.S. for a longer period.

The interaction between language proficiency and the difference between the average encoding scores for participants in the "written words" condition and participants in the "spoken words + pictures" condition failed to obtain statistical significance at all three levels of length of stay. Coefficients indicated that regardless of language proficiency, encoding scores increased as participants' length of stay increased. Also of interest is the finding that while language proficiency and length of stay in the U.S. increased, the sizes of the interaction effects on encoding decreased, see Table 40.

Table 40. Conditional effects and standard errors (*SE*) for effects of language proficiency and length of stay on encoding.

Interaction term		Modality			
		$\overline{X}_{\text{"spoken words"}} - \overline{X}_{(\text{"written words" + "spoken words + pictures"})}$		$\overline{X}_{\text{"written words"}} - \overline{X}_{\text{"spoken words" + pictures"}}$	
Language proficiency	Length of stay	Effect	*SE*	Effect	*SE*
Low	Low	1.2531	.7976	.9803	.9887
Low	Mean	.6447	.6301	1.3559	.7463
Low	High	.0363	1.0259	1.7316	1.4759
Mean	Low	1.2154*	.5889	.4740	.6821
Mean	Mean	1.1213*	.4244	.6535	.4825
Mean	High	1.0272	.6482	.8330	.7459
High	Low	1.1981	.6910	.2418	.7473
High	Mean	1.3399**	.4868	.3313	.5263
High	High	1.4816*	.6783	.4209	.7373

Note. *$p < .05$. **$p < .01$.

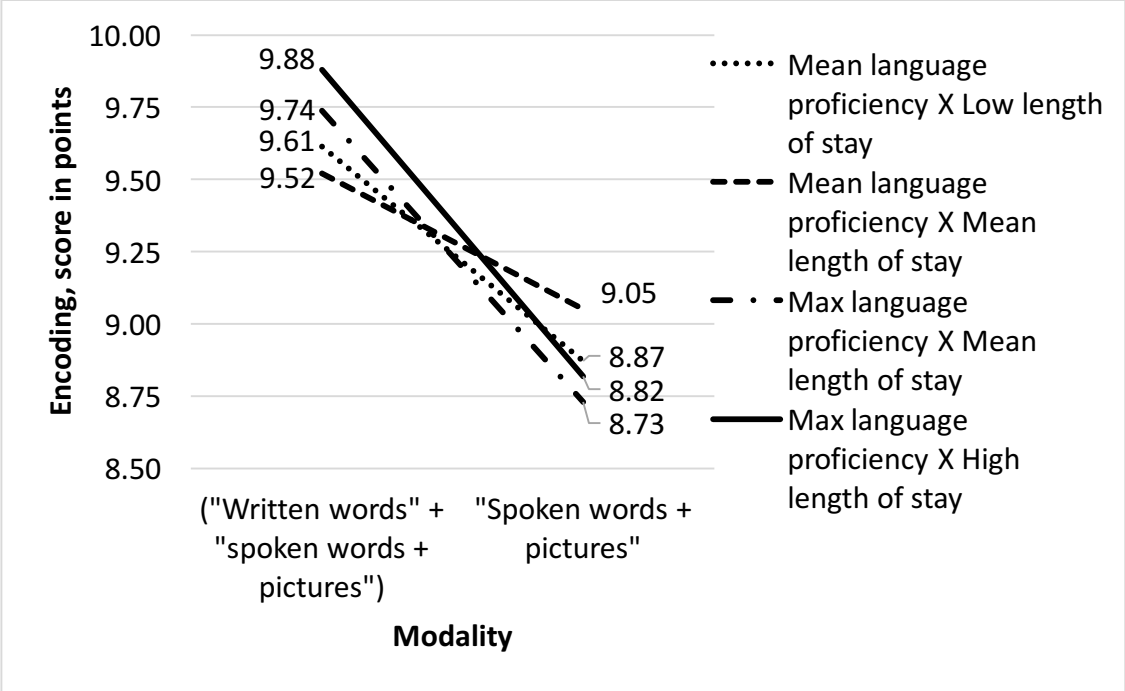


Figure 20. Three-way interaction effects of modality, language proficiency and length of stay on encoding.

Johnson-Neyman technique for probing for the three-way interaction effects on encoding. Johnson-Neyman technique found no points of transition in statistical significance within the range of interaction between language proficiency and length of stay in the "written words" and "spoken words + pictures" conditions.

Because data did not provide statistically significant results for the "spoken words + pictures" condition, no meaningful conclusions could be drawn about the three-way interaction effects of modality, length of stay and language proficiency on encodings. Therefore, H7a was not supported.

Interaction effects of modality, language proficiency, and length of stay on encoding of news schema elements. Research Question 5 inquired encoding of which elements of news schema—action, things, places, and causes and effects—was affected the most by the three-way interaction among modality, language

proficiency and length of stay. Overall, data failed to provide statistically significant evidence for drawing conclusions.

Encoding of action. Encoding of action was computed by summing answers to 5 multiple-choice questions measuring participants' recognition of information about processes and people's actions. The omnibus test and probing tests of three-way interaction effects among modality, language proficiency, and length of stay on encoding of action was run as one procedure in PROCESS's Model 3 with language proficiency and length of stay included as moderators. A separate omnibus test for the three-way interaction term with a multilevel independent variable was not available in PROCESS at the time the test was performed in April-June 2017.

Pick-a-point procedure of testing three-way interaction effects on encoding of action. The overall regression model that included the interaction among modality, language proficiency, and length of stay accounted for approximately 24% of variance in encoding of action scores, R^2 = .240, $F(19, 120) = 1.9944$, p = .013. The three-way interaction term was handcalculated by summing up coefficient for the improvement of fit due to the inclusion of the interaction term among d1, language proficiency and length of stay (R^2_{change} = .0095, $F_{\text{change}}[1, 120] = 1.4939$, p = .224), and the coefficient for the improvement of fit due to the inclusion of the interaction term among d2, language proficiency and length of stay (R^2_{change} = .0027, $F_{\text{change}}[1, 120] = .4313$, p = .513). The inclusion of the three-way interaction term improved the model's fit in predicting encoding of action by 1.22%, handcalculated R^2_{change} = .0122.

However, it should be noted that both three-way interaction terms failed to explain additional variance in encoding of action scores. As noted in the previous paragraph, the three-way interaction among d1, language proficiency, and length of stay failed to reach statistical significance in the regression model predicting encodings of action scores, $R^2_{change} = .010$, $F_{\text{change}}(1, 120) = 1.4939$, $p = .224$. Likewise, the three-way interaction among d2, language proficiency, and length of stay failed to reach statistical significance in the regression model predicting encodings of action scores, $R^2_{change} = .003$, $F_{\text{change}}(1, 120) = .431$, $p = .513$.

Table 41. Unstandardized regression coefficients and standard errors (*SE*) for the overall hierarchical regression model predicting effects of modality, language proficiency, and length of stay on encoding of action.

Variable	Unstandardized coefficient *B*	*SE*	*t*	*p*
(Constant)	1.689	1.858	.909	.365
General demographic characteristics				
Gender (being a woman)	-.396	.214	-1.851	.067
Education in the U.S.	.004	.019	.188	.851
Having K-12 children	.054	.210	.255	.799
Immigrant-specific characteristics				
Plans to go back to home country	-.048	.261	-.185	.854
Acculturation to mainstream culture	-.001	.107	-.011	.991
Psychological wellbeing	.002	.017	.089	.929
News consumption	-.156	.170	-.917	.361
Being in the researcher's subsample	.300	.228	1.316	.191
Language and length of stay				
Language proficiency	.111	.090	1.244	.216
Length of stay	.021	.073	.281	.779
Modality				
$\overline{X}_{\text{"spoken words"}} - \overline{X}_{\text{("written words" + "spoken words + pictures")}}$	2.781	3.487	.798	.427
$\overline{X}_{\text{"written words"}} - \overline{X}_{\text{"spoken words" + pictures"}}$	4.231	4.235	.999	.320
Two-way interaction terms				
Length of stay x Language proficiency	-.001	.004	-.177	.860
$(\overline{X}_{\text{"spoken words"}} - \overline{X}_{\text{["written words" + "spoken words + pictures"]}})$ x LOS	-.161	.135	-1.197	.224
$(\overline{X}_{\text{"spoken words"}} - \overline{X}_{\text{["written words" + "spoken words + pictures"]}})$ x Lang	-.107	.184	-.580	.563
$(\overline{X}_{\text{"written words"}} - \overline{X}_{\text{"spoken words" + pictures"}})$ x LOS	-.134	.204	-.657	.512
$(\overline{X}_{\text{"written words"}} - \overline{X}_{\text{"spoken words" + pictures"}})$ x Lang	-.195	.219	-.889	.376
R^2	.228‡			n/a
Three-way interaction terms				
$(\overline{X}_{\text{"spoken words"}} - \overline{X}_{\text{["written words" + "spoken words + pictures"]}})$ x LOS x Lang	.009	.007	1.222	.224
R^2_{change}	.010			.224
$(\overline{X}_{\text{"written words"}} - \overline{X}_{\text{"spoken words" + pictures"}})$ x LOS x Lang	.007	.010	.657	.512
R^2_{change}	.003			.512
Total R^2_{change}	.012‡			n/a
Total R^2	.240			.013

Note. ‡Handcalculated from the PROCESS output.

Conditional effects of modality on encoding of action reached statistical significance at different combinations of levels of language proficiency and length of stay.

Specifically, the interaction between language proficiency, length of stay, and the difference between the average encoding scores for participants in the "spoken words" condition and the unweighted average encoding scores for participants in

the “written words” and “spoken words + pictures” conditions was a significant predictor of encoding of action scores for participants with low language proficiency at two levels of length of stay. Holding other variables constant, low-proficiency participants with low length of stay ($\overline{X}$ – *1SD* = 5.74 years) were estimated to increase their encoding of action scores by .8681 (95% *CI*: 0986, 1.6376), $t(140)$ = 2.2337, p = .027, if they were in either “written words” or “spoken words + pictures” conditions in comparison to the “spoken words” condition. Low-proficiency participants with mean length of stay ($\overline{X}$ = 22.52 years) were estimated to increase their encoding of action scores by .6148 [95% *CI*: .0069, 1.2227], $t(140)$ = 2.0025, p = .048, if they were in either “written words” or “spoken words + pictures” conditions in comparison to the “spoken words” condition.

For participants with mean language proficiency, the three-way interaction between language proficiency, length of stay, and the difference between the average encoding scores for participants in the “spoken words” condition and the unweighted average encoding scores for participants in the “written words” and “spoken words + pictures” conditions was a significant predictor of encoding of action scores at all three levels of length of stay. Holding other variables constant, mean-proficiency participants with low length of stay ($\overline{X}$ – *1SD* = 5.74 years) were estimated to increase their encoding of action scores by .7538 [95% *CI*: 1856, 1.3219], $t(140)$ = 2.6268 p = .010, if they were in either “written words” or “spoken words + pictures” conditions in comparison to the “spoken words” condition. Mean-proficiency participants with mean length of stay ($\overline{X}$ = 22.52 years) were estimated to increase their encoding of action scores by .7833 [95% *CI*: .3658, 1.2009], $t(140)$

= 3.7143, $p < .001$, if they were in either "written words" or "spoken words + pictures" conditions in comparison to the "spoken words" condition. Mean-proficiency participants with high length of stay ($\overline{X}$ = 39.30 years) were estimated to increase their encoding of action scores by .8129 [95% *CI*: .1876, 1.4382], $t(140) = 2.5739$, $p = .011$, if they were in either "written words" or "spoken words + pictures" conditions in comparison to the "spoken words" condition.

For participants with high language proficiency (X = 20.00), the three-way interaction was a significant predictor of encoding of action scores at all three levels of length of stay. Holding other variables constant, high-proficiency participants with low length of stay ($\overline{X}$ = 5.74 years) were estimated to increase their encoding of action scores by .7013 points [95% *CI*: .0347, 1.3680], $t(140) = 2.0828$, $p = .039$, if they were in either "written words" or "spoken words + pictures" conditions in comparison to the "spoken words" condition. Holding other variables constant, high-proficiency participants with mean length of stay ($\overline{X}$ = 22.52 years) were estimated to increase their encoding of action scores by .8606 points [95% *CI*: .3910, 1.3302], $t(140) = 3.6284$, $p < .001$, if they were in either "written words" or "spoken words + pictures" conditions in comparison to the "spoken words" condition. High-proficiency participants with high length of stay ($\overline{X} + 1SD$ = 39.30 years) were estimated to increase their encoding of action scores by 1.0199 points [95% *CI*: .3655, 1.6743], $t(140) = 3.0859$, $p = .003$, if they were in either "written words" or "spoken words + pictures" conditions in comparison to the "spoken words" condition.

Overall, data demonstrated that participants with low language proficiency performed on encoding of action better if they were in the country for a shorter period; mean language proficiency managed to perform on encoding of action better if they were in the U.S. for a longer period; participants with high language proficiency increased their encoding of action scores if they were in the U.S. for a longer period.

The interaction between language proficiency and the difference between the average encoding scores for participants in the "written words" condition and participants in the "spoken words + pictures" condition failed to obtain statistical significance at all three levels of length of stay. Effect sizes indicated that low- and mean-proficiency participants decreased their encoding scores as their length of stay increased, while high-proficiency participants increased their encoding of action scores as their length of stay increased, see Table 42.

Table 42. Unstandardized regression coefficients and standard errors (*SE*) for conditional effects of language proficiency and length of stay on encoding of action in modality conditions.

Interaction term		Modality			
		$\overline{X}_{\text{“spoken words”}} - \overline{X}_{\text{(“written words” + “spoken words + pictures”)}}$		$\overline{X}_{\text{“written words”}} - \overline{X}_{\text{“spoken words” + pictures”}}$	
Language proficiency	Length of stay	Effect	*SE*	Effect	*SE*
Low	Low	.8681*	.387	.8009	.482
Low	Mean	.6148*	.307	.5118	.364
Low	High	.3616	.500	.2228	.719
Mean	Low	.7538**	.287	.4935	.332
Mean	Mean	.7833***	.211	.4315	.235
Mean	High	.8129**	.316	.3695	.363
High	Low	.7013*	.337	.3525	.364
High	Mean	.8606***	.237	.3947	.257
High	High	1.0199**	.331	.4368	.359

Note. *$p < .05$. **$p < .01$. ***$p < .001$.

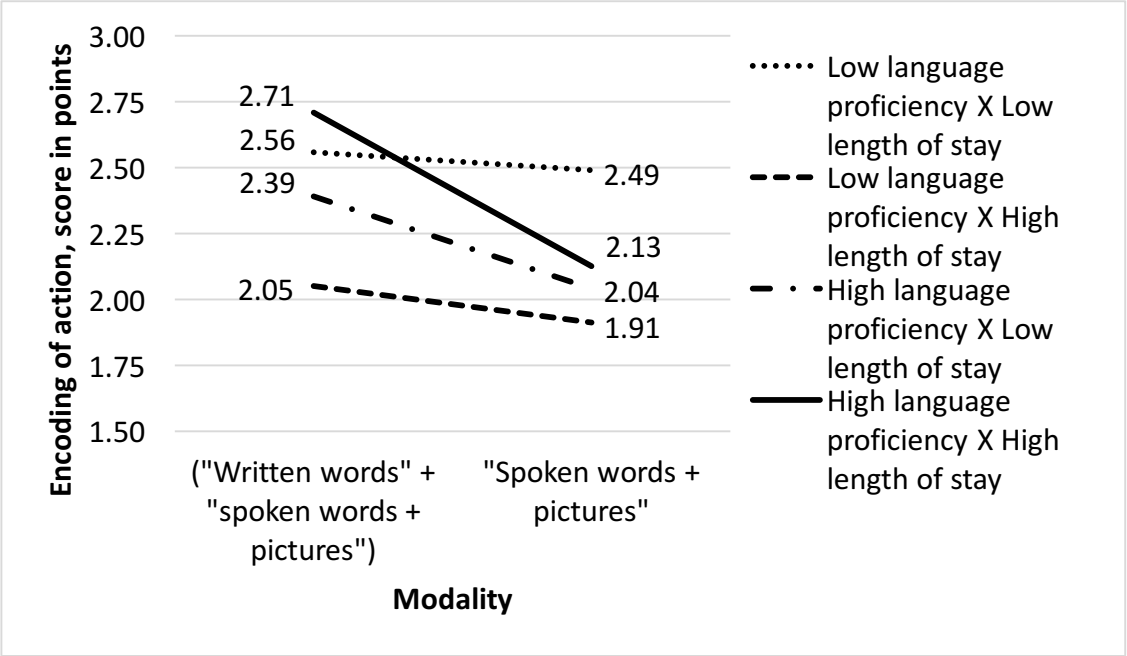


Figure 21. Conditional effects of modality on encoding of action at two levels of language proficiency and length of stay.

Figure 21 demonstrates that low-proficiency low-tenure participants' performance on encoding of action was the closest to high-language high-tenure

participants than other groups of participants, all of whom were either in the "written words" or "spoken words + pictures" conditions. Group differences in the "spoken words + pictures" condition failed to obtain statistical significance, though the effect sizes showed that encoding of action scores of low-proficiency low-tenure participants benefitted the most in the "spoken words + pictures" condition. At the same time, effect sizes demonstrated that high-proficiency high-tenure participants correctly recognized .36 answers fewer than did low-proficiency low-tenure participants.

Johnson-Neyman technique for probing for three-way interaction effects on encoding of action. Johnson-Neyman technique found no points of transition in statistical significance within the range of interaction between language proficiency and length of stay.

Encoding of things. Encoding of things was measured with three multiple-choice questions based on information that featured physical objects. The data were analyzed with multiple regression analysis in PROCESS Model 3.

Pick-a-point procedure for testing three-way interaction effects on encoding of things. The omnibus test of interaction effects among modality, length of stay, and language proficiency on encoding of things failed to reach statistical significance, $R^2 = .186$, $F(19, 120) = 1.4437$, $p = .119$. The interaction among d1, length of stay, and language proficiency failed to reach statistical significance, $R^2_{change} = .001$, $F_{change}(1, 120) = .1571$, $p = .693$. Likewise, the interaction among d2, length of stay, and language proficiency failed to reach statistical significance, $R^2_{change} = .010$, $F_{change}(1, 120) = 1.4305$, $p = .234$.

Table 43. Unstandardized regression coefficients and standard errors (*SE*) for the overall hierarchical regression model predicting effects of modality, language proficiency, and length of stay on encoding of things.

Variable	Unstandardized coefficient *B*	*SE*	*t*	*p*
(Constant)	4.366	1.202	3.632	.001
General demographic characteristics				
Gender (being a woman)	-.140	.138	-1.012	.314
Education in the U.S.	-.012	.012	-.984	.327
Having K-12 children	-.122	.136	-.896	.372
Immigrant-specific characteristics				
Plans to go back to home country	-.073	.169	-.429	.669
Acculturation to mainstream culture	.041	.069	.595	.553
Psychological wellbeing	-.011	.011	-1.028	.306
News consumption	-.178	.110	-1.617	.108
Being in the researcher's subsample	.454	.148	3.076	.003
Language and length of stay				
Language proficiency)	-.090	.058	-1.552	.123
Length of stay (LOS)	-.087	.047	-1.848	.067
Modality				
$\overline{X}_{\text{"spoken words"}} - \overline{X}_{\text{("written words" + "spoken words + pictures")}}$	-.472	2.256	-.209	.835
$\overline{X}_{\text{"written words"}} - \overline{X}_{\text{"spoken words" + pictures"}}$	-1.517	2.740	-.554	.581
Two-way interaction terms				
Length of stay x Language proficiency	.005	.002	2.053	.042
$(\overline{X}_{\text{"spoken words"}} - \overline{X}_{\text{["written words" + "spoken words + pictures"]}})$ x Length of stay	-034	.087	-.395	.694
$(\overline{X}_{\text{"spoken words"}} - \overline{X}_{\text{["written words" + "spoken words + pictures"]}})$ x Language proficiency	.034	.119	.282	.779
$(\overline{X}_{\text{"written words"}} - \overline{X}_{\text{"spoken words" + pictures"}})$ x Length of stay	.164	.132	1.238	.218
$(\overline{X}_{\text{"written words"}} - \overline{X}_{\text{"spoken words" + pictures"}})$ x Language proficiency	.072	.142	.506	.614
R^2	.175‡			n/a
Three-way interaction terms				
$(\overline{X}_{\text{"spoken words"}} - \overline{X}_{\text{["written words" + "spoken words + pictures"]}})$ x LOS x Language proficiency	.002	.005	.396	.693
R^2_{change}	.001			.693
$(\overline{X}_{\text{"written words"}} - \overline{X}_{\text{"spoken words" + pictures"}})$ x Length of stay x Language proficiency	-.008	.007	-1.196	.234
R^2_{change}	.010			.234
Total R^2_{change}	.011‡			n/a
Total R^2	.186			.119

Note. ‡Handcalculated from the PROCESS output.

Pick-a-point procedure failed to identify statistically significant conditional effects of modality and length of stay on encoding of things at the three levels of language proficiency.

Johnson-Neyman technique for probing for three-way interaction effects on encoding of things. Johnson-Neyman technique failed to identify statistical significance transition points within the of language proficiency.

Encoding of causes and effects. Encoding of causes and effects was measured with three multiple-choice questions based on information that featured a sequence of events related causally. The data were analyzed with multiple regression analysis in PROCESS Model 3.

Pick-a-point procedure for testing three-way interaction effects on encoding of causes and effects. The test of interaction effects among modality, length of stay, and language proficiency on encoding of causes and effects failed to reach statistical significance, $R^2 = .117$, $F(19, 120) = .8364$, $p = .660$. The interaction among d1, length of stay, and language proficiency failed to reach statistical significance, $R^2_{\text{change}} = .008$, $F_{\text{change}}(1, 120) = 1.0469$, $p = .308$. Likewise, the interaction among d2, length of stay, and language proficiency failed to reach statistical significance, $R^2_{\text{change}} = .009$, $F_{\text{change}}(1, 120) = 1.2005$, $p = .275$.

Table 44. Unstandardized regression coefficients and standard errors (*SE*) for the overall hierarchical regression model predicting effects of modality, language proficiency, and length of stay on encoding of causes and consequences.

Variable	Unstandardized coefficient *B*	*SE*	*t*	*p*
(Constant)	2.118	1.474	1.437	.153
General demographic characteristics				
Gender (being a woman)	-.039	.170	-.232	.817
Education in the U.S.	-.122	.015	-1.450	.149
Having K-12 children	.051	.167	.309	.758
Immigrant-specific characteristics				
Plans to go back to home country	-.162	.207	-.781	.436
Acculturation to mainstream culture	.137	.085	1.613	.109
Psychological wellbeing	-.009	.014	-.684	.495
News consumption	-.075	.134	-.554	.581
Source of recruitment (being in the researcher's subsample)	.292	.181	1.612	.110
Language and length of stay				
Language proficiency	-.018	.071	-.256	.799
Length of stay (LOS)	-.038	.058	-.655	.514
Modality				
$\overline{X}_{\text{"spoken words"}} - \overline{X}_{(\text{"written words"} + \text{"spoken words + pictures"})}$	1.188	2.766	.430	.668
$\overline{X}_{\text{"written words"}} - \overline{X}_{\text{"spoken words"} + \text{pictures"}}$	-.669	3.359	-.199	.842
Two-way interaction terms				
Length of stay x Language proficiency	.002	.003	.818	.415
$(\overline{X}_{\text{"spoken words"}} - \overline{X}_{[\text{"written words"} + \text{"spoken words + pictures"}]})$ x Length of stay	-.117	.107	-1.092	.277
$(\overline{X}_{\text{"spoken words"}} - \overline{X}_{[\text{"written words"} + \text{"spoken words + pictures"}]})$ x Language proficiency	-.045	.146	-.308	.759
$(\overline{X}_{\text{"written words"}} - \overline{X}_{\text{"spoken words"} + \text{pictures"}})$ x Length of stay	.181	.162	1.118	.266
$(\overline{X}_{\text{"written words"}} - \overline{X}_{\text{"spoken words"} + \text{pictures"}})$ x Language proficiency	.034	.174	.197	.845
R^2	.100‡			n/a
Three-way interaction terms				
$(\overline{X}_{\text{"spoken words"}} - \overline{X}_{[\text{"written words"} + \text{"spoken words + pictures"}]})$ x LOS x Language proficiency	.006	.006	1.023	.308
R^2_{change}	.008			.308
$(\overline{X}_{\text{"written words"}} - \overline{X}_{\text{"spoken words"} + \text{pictures"}})$ x Length of stay x Language proficiency	-.009	.008	-1.096	.275
R^2_{change}	.009			.275
Total R^2_{change}	.017‡			n/a
Total R^2	.117			.660

Note. ‡Handcalculated from the PROCESS output.

Pick-a-point procedure failed to identify statistically significant conditional effects of modality and length of stay on encoding of causes and effects at the three levels of language proficiency.

Johnson-Neyman technique for probing for three-way interaction effects on encoding of causes and effects. Johnson-Neyman technique failed to identify statistical significance transition points within the ranges of language proficiency.

Interaction effects of modality, language proficiency, and length of stay on comprehension. Hypothesis 7b was based on understanding that when it comes to comprehension, length of stay will have stronger impact than will language proficiency because participants who lived in the country longer may have developed schemas that will incorporate new information from the news and complement the information in the news report with existing political knowledge needed to answer questions testing comprehension. As in previous hypotheses involving length of stay, it was expected that length of stay will narrow the gap in comprehension between low- and high-proficiency participants. Finally, the increase in length of stay was expected to help participants better recognize images in the "spoken words + pictures" condition. No interaction effects were expected for participants with short length of stay regardless of language proficiency and modality condition. Therefore, H7b predicted that high-tenure low-proficiency participants will perform on comprehension best in the "spoken words + pictures" condition than in the "written words" condition.

H7b about the three-way interaction effects among modality, language proficiency, and length of stay was run in PROCESS for SPSS Model 3 because Model

3 allows to include two moderators—language proficiency and length of stay—into the same model. The test was run twice: The first time, with d1 as an independent variable; the second time, with d2 as an independent variable. A separate omnibus test for three-way interaction effects involving a multicategorical independent variable was not available in PROCESS at the time of data analysis in April-June 2017.

Overall, H7b was not supported. A detailed report of the results follows below.

Pick-a-point procedure for testing three-way interaction effects on comprehension. The overall regression model that included the interaction among modality, language proficiency, and length of stay failed to reach statistical significance in explaining variance in comprehension scores, R^2 = .148, $F(19, 120)$ = 1.098, p = .362. The three-way interaction term was handcalculated by summing up coefficient for the improvement of fit due to the inclusion of the interaction term among d1, language proficiency and length of stay and the coefficient for the improvement of fit due to the inclusion of the interaction term among d2, language proficiency and length of stay. The inclusion of the three-way interaction term improved the model's fit in predicting comprehension by .02%, handcalculated R^2_{change} = .0002. However, both three-way interaction terms failed to explain additional variance in comprehension scores. Specifically, the three-way interaction among d1, language proficiency, and length of stay failed to reach statistical significance in the regression model predicting encodings scores, R^2_{change} = .0000, $F_{\text{change}}(1, 120)$ = .0041, p = .949. Likewise, the three-way interaction among d2

language proficiency, and length of stay failed to reach statistical significance in the regression model predicting encodings scores, R^2_{change} = .0002, $F_{\text{change}}(1, 120)$ = .0302, p = .862.

Table 45. Unstandardized regression coefficients and standard errors (*SE*) for the overall hierarchical regression model predicting effects of modality, language proficiency, and length of stay on comprehension.

Variable	Unstandardized coefficient *B*	*SE*	*t*	*p*
(Constant)	.579	1.449	.400	.690
General demographic characteristics				
Gender (being a woman)	-.015	.167	-.089	.929
Education in the U.S.	.039	.015	2.648	.009
Having K-12 children	.057	.164	.346	.730
Immigrant-specific characteristics				
Plans to go back to home country	-.066	.204	-.325	.746
Acculturation to mainstream culture	-.017	.083	-.209	.835
Psychological wellbeing	.013	.013	.952	.343
News consumption	.037	.132	.280	.780
Being in the researcher's subsample	.096	.178	.542	.589
Language proficiency and length of stay				
Language proficiency	-.008	.070	-.110	.913
Length of stay	.030	.057	.530	.597
Modality				
$\overline{X}_{\text{“spoken words”}} - \overline{X}_{\text{(“written words” + “spoken words + pictures”)}}$	-2.262	2.720	-.832	.407
$\overline{X}_{\text{“written words”}} - \overline{X}_{\text{“spoken words” + pictures”}}$	2.214	3.304	.670	.504
Two-way interaction terms				
Length of stay x Language proficiency	-.002	.003	-.610	.543
$(\overline{X}_{\text{“spoken words”}} - \overline{X}_{\text{[“written words” + “spoken words + pictures”]}})$ x LOS	.003	.105	.031	.976
$(\overline{X}_{\text{“spoken words”}} - \overline{X}_{\text{[“written words” + “spoken words + pictures”]}})$ x Lang	.125	.144	.872	.385
$(\overline{X}_{\text{“written words”}} - \overline{X}_{\text{“spoken words” + pictures”}})$ x LOS	.020	.159	.127	.899
$(\overline{X}_{\text{“written words”}} - \overline{X}_{\text{“spoken words” + pictures”}})$ x Lang	-.103	.171	-.600	.550
R^2	.148‡			n/a
Three-way interaction terms				
$(\overline{X}_{\text{“spoken words”}} - \overline{X}_{\text{[“written words” + “spoken words + pictures”]}})$ x Length of stay x Language proficiency	.000	.005	.064	.949
R^2_{change}	.0000			.949
$(\overline{X}_{\text{“written words”}} - \overline{X}_{\text{“spoken words” + pictures”}})$ x LOS x Lang	-.001	.008	-.174	.862
R^2_{change}	.0002			.862
Total R^2_{change}	.0002‡			n/a
Total R^2	.148		n/a	.362

Note. ‡Handcalculated from the PROCESS output.

While overall regression model indicated that the three-way interaction effects failed to reach statistical significance in explaining the variance in comprehension scores, conditional effects of modality on comprehension at four

combinations of levels of language proficiency and length of stay did reach statistical significance.

Specifically, the interaction between length of stay and the difference the average comprehension scores of participants in "spoken words" and the unweighted average comprehension scores of participants in "written words" and "spoken words + pictures" was a significant predictor of comprehension scores for participants with mean length of stay ($\overline{X}$= 22.52 years) at two levels of language proficiency. Holding other variables constant, mean-tenure participants with mean language proficiency ($\overline{X}$ = 19.09 points) were estimated to increase their comprehension scores by .3472 [95% *CI*: 0215, .6729], $t(140) = 2.1103$, $p = .037$, if they were in either "written words" or "spoken words + pictures" conditions in comparison to the "spoken words" condition. In addition, mean-tenure participants with maximum language proficiency (X = 20.00 points) were estimated to increase their comprehension scores by .4677 [95% *CI*: .1013, .8340], $t(140) = 2.5276$, $p = .013$, if they were in either "written words" or "spoken words + pictures" conditions in comparison to the "spoken words" condition.

For participants with long length of stay ($\overline{X}$ + 1*SD* = 39.30), the three-way interaction was a significant predictor of comprehension scores at two levels of language proficiency. Holding other variables constant, long-tenure participants with mean language proficiency ($\overline{X}$ = 19.09 points) were estimated to increase their comprehension scores by .5124 points [95% *CI*: .0246, 1.0002], $t(140) = 2.0796$, $p = .040$, if they were in either "written words" or "spoken words + pictures" conditions in comparison to the "spoken words" condition. Also, long-tenure participants with

maximum possible language proficiency (X = 20.00 points) were estimated to increase their comprehension scores by .6382 points [95% *CI*: .1276, 1.1487], $t(140) = 2.4750$, $p = .015$, if they were in either "written words" or "spoken words + pictures" conditions in comparison to the "spoken words" condition, see Table 46.

Table 46. Coefficients and standard errors (*SE*) for conditional effects of length of stay and language proficiency on comprehension in modality conditions.

Interaction term		Modality			
		$\overline{X}_{\text{"spoken words"}} - \overline{X}_{(\text{"written words"} + \text{"spoken words + pictures"})}$		$\overline{X}_{\text{"written words"}} - \overline{X}_{\text{"spoken words" + pictures"}}$	
Length of stay	Language proficiency	Effect	*SE*	Effect	*SE*
Low	Low	-.0692	.303	.4362	.376
Low	Mean	.1820	.224	.2174	.259
Low	High	.2972	.263	.1171	.284
Mean	Low	.0845	.240	.3692	.284
Mean	Mean	.3472*	.165	.1035	.183
Mean	High	.4677*	.185	-.0183	.200
High	Low	.2382	.390	.3022	.561
High	Mean	.5124*	.246	-.0104	.284
High	High	.6382*	.258	-.1538	.280

Note: *$p < .05$.

Statistically significant results about the difference between the average comprehension scores for participants who were in the "spoken words" and the unweighted average comprehension scores for participants who were in the "written words" and "spoken words + pictures" conditions showed that participants with long length of stay and high language proficiency performed on comprehension the best, followed by participants with high length of stay and relatively low language proficiency, followed by participants with relatively low length of stay and high language proficiency, followed by participants relatively low on both length of stay and language proficiency, see Figure 22. Data failed to return statistically

significant results about the interaction effects of language proficiency, length of stay and the difference between the average comprehension scores for participants in the "written words" condition and participants in the "spoken words + pictures" condition.

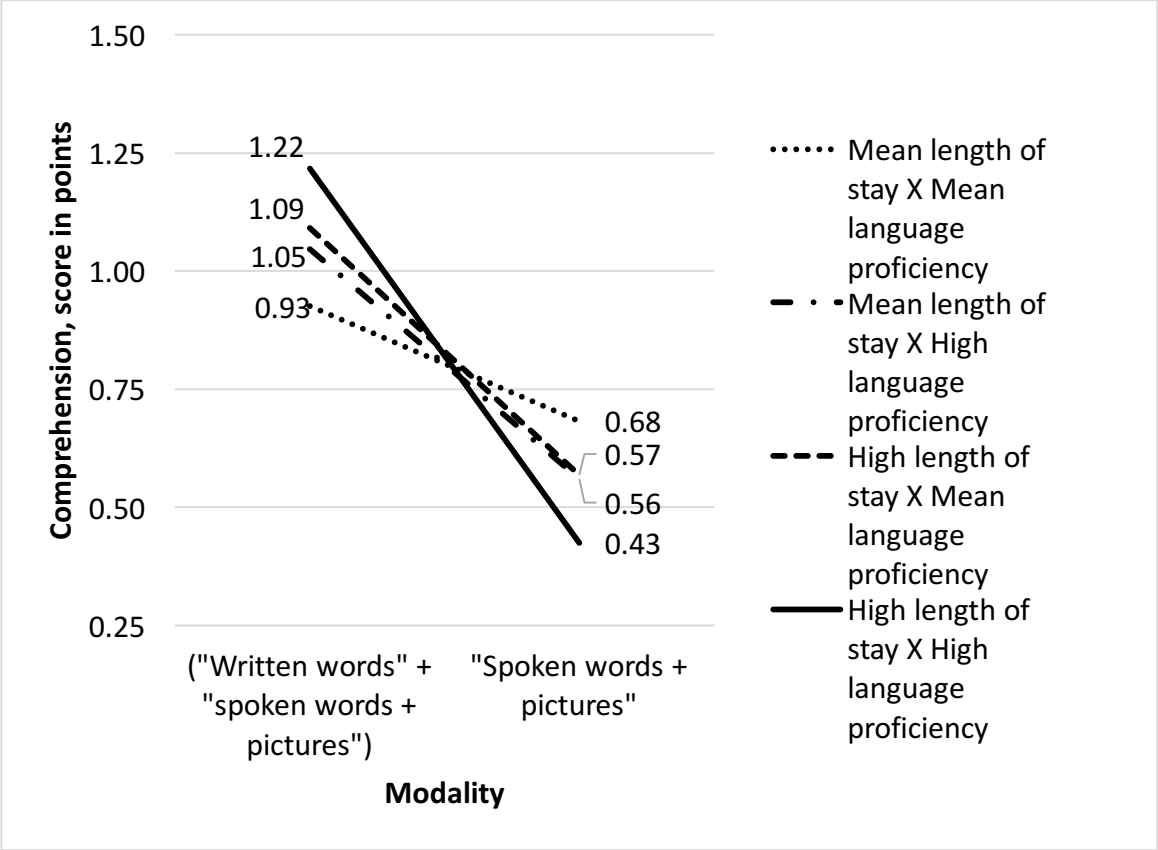


Figure 22. Three-way interaction effects of modality, length of stay and language proficiency on comprehension.

Johnson-Neyman technique for probing for the three-way interaction effects on encoding. Johnson-Neyman technique found no points of transition in statistical significance within the range of interaction between language proficiency and length of stay.

Overall, data failed to provide sufficient evidence about the three-way effects of modality, language proficiency and length of stay on storage. Therefore, H7c was not supported.

V. DISCUSSION

This experiment aimed to verify the findings of a survey that found that television news allowed immigrants with low language skills and short length of stay learn more about American politics than they would from newspaper news (Chaffee et al., 1990). Purloined stimuli used in this online experiment were edited based on previous research that attributed better learning outcomes to the audiovisual redundancy, that is, the similarity in meaning of words and pictures (Lang, 1995; Walma van der Molen, 2001b). In this study, I hypothesized that audiovisual redundancy is more effective in its effects on memory and comprehension due to the symbol systems it combines, words and pictures. More specifically, words as a symbol system require training in decoding the symbols that comprise them while pictures require no specific training but the ability to be able to recognize what the pictures portray (Salomon, 1979). One-hundred-forty-six foreign-born individuals residing in the U.S. took part in the online experiment devised to test whether or not the inclusion of moving pictures assisted learning of those who perceived their language skills as relatively weak and those who stayed in the U.S. for a longer period. Longer length of stay in the U.S., not shorter as in Chaffee's et al. (1990) survey, was expected to have a positive effect on learning because modality was classified as words and pictures, and because one of the two outcome variables was comprehension. It was expected that the ability to recognize the meaning of pictures and the opportunity to rely on well-established schemas for

comprehension depend on time spent in the environment portrayed in the news, hence the modification of hypotheses involving length of stay in this study.

This section restates and interprets the results of the experiment.

Summary of Hypotheses, Research Questions and Findings

Hypotheses 1a-b about the effects of language proficiency on participants' performance were based on understanding that decoding of words depends on the level of language skills. Thus, H1 predicted that as language proficiency increases, scores for (a) encoding and (b) comprehension will also increase. H1a-b were tested with hierarchical multiple regression analysis where language proficiency was entered together with length of stay as the last block. Results showed that each additional year in the U.S. increased encoding scores by .03 points. Therefore, H2a about effects of length of stay on encoding was supported. H1a about effects of language proficiency on encoding was not supported. Likewise, H1b about main effects of language proficiency on comprehension and H2b about main effects of length of stay on comprehension were not supported.

H3a predicted that participants in the "spoken words + pictures" condition will score higher on encoding than will participants in the "written words" condition; participants in the "spoken words" condition will have the lowest scores among the three modality conditions. At the same time, H3b predicted that participants in the "written words" and "spoken words + pictures" conditions will not differ in their scores in comprehension, but participants in the "spoken words" condition will score on comprehension lower in comparison to the other two conditions. H3a-b were tested with hierarchical multiple regression analysis with

modality dummy-coded and entered into the model as the last block. Results showed that participants in the "spoken words + pictures" condition correctly recognized .64 answers more than did participants in the "written words" condition and almost 1.5 (Δ = .1.47) more answers than did participants in the "spoken words" condition. Therefore, H3a was supported. At the same time, modality failed to explain additional variance in comprehension scores, and the overall regression model with all variables included failed to obtain statistical significance. Therefore, H3b was not supported.

Hypothesis 4a about the interaction effects of length of stay and language proficiency was based on prediction that language proficiency widens the gap in performance on a memory measure of encoding between participants with shorter length of stay and participants with longer length of stay. Therefore, H4a predicted that as language proficiency increases, participants with long length of stay would increase their encoding scores in comparison to participants with low length of stay. The omnibus test of multiple regression analysis in PROCESS Model 1 revealed that two-way interaction effects between length of stay and language proficiency on encoding failed to explain additional variance in encoding scores, and the overall regression model with all variables included failed to reach statistical significance. While pick-a-point procedure did identify statistically significant effects of length of stay on encoding at two levels of language proficiency, the difference was so small (Δ = .0001), that it was concluded that H4a was not supported.

Unlike in the case of a memory measure of encoding, H4b predicting interaction effects of language proficiency and length of stay on comprehension was

based on understanding that length of stay narrows the gap in comprehension scores between participants with low language proficiency and high language proficiency. Therefore, H4b predicted that as length of stay increases, low-proficiency participants will relatively keep up in their scores on comprehension with the high-proficiency participants. The omnibus test of multiple regression analysis in PROCESS Model 1 failed to return statistically significant results for the overall regression model and for the interaction term of length of stay and language proficiency. Therefore, H4b was not supported.

Hypothesis 5 was based on theorizing that on a memory measure of encoding, language proficiency assists in decoding the meaning of words. At the same time, while all levels of modality require the ability to understand words, "spoken words + pictures" offers an additional channel with pictorial information that does not require decoding of information but rather recognition of it. Thus, predictions for the interaction effects of modality and language proficiency hypothesized that the "spoken words + pictures" condition will narrow the gap in performance on memory measures between low- and high-proficiency participants. More specifically, H5 predicted that participants with low language proficiency would score higher on encoding in the "spoken words + pictures" condition than they would in the "written words" condition and even higher than they would in the "spoken words" condition. To test H5, two separate tests of linear regression analysis run with the pick-a-point procedure and Johnson-Neyman technique available in PROCESS Model 1. For the omnibus test of interaction effects, modality was coded with indicator method and entered as an independent variable. For

probing for interaction effects with Johnson-Neyman technique, modality was recoded with Helmert method, and two analyses were run to complete Helmert contrasts and to arrive to the effects sizes in the "spoken words + pictures" condition on the range of language proficiency. Pick-a-point procedure within the omnibus test revealed that participants with low language proficiency in the "spoken words + pictures" condition correctly recognized 1.14 answers more than they did in the "written words" condition, the difference that was statistically significant. Therefore, H5 was supported. Moreover, Johnson-Neyman technique revealed that in the "spoken words + pictures" condition participants with relatively low language proficiency correctly recognized approximately half-an-answer more ($\Delta = .56$) than did participants with relatively high language proficiency.

On the comprehension measure, it was expected that length of stay will help incorporate new information into existing schemas, which will also supply the information needed to understand the incoming information—the information that might be missing from the news story in the stimuli. Therefore, H6 predicted that participants with longer length of stay would score higher on comprehension in the "spoken words + pictures" condition than they would in the "written words" condition and even higher than they would in the "spoken words" condition. H6 was tested with linear regression analysis in PROCESS Model 1 with modality coded with indicator method entered as an independent variable and with continuous length of stay entered as a moderator. The interaction between modality and length of stay was further probed with the Johnson-Neyman technique in PROCESS Model 1 with Helmert-coded modality entered as an independent variable and with length of stay

entered as a moderator. Results showed that both the overall model and the interaction term failed to reach statistical significance, and no conditional effects of modality at any of the three levels of length of stay as the moderator were identified. Therefore, H6 was not supported.

Hypothesis 7a was based on theorizing that on a memory measure of encoding, language proficiency will increase the gap in performance between participants with low and high length of stay while length of stay will narrow down the gap in performance between participants low and high on language proficiency. In addition, hypotheses were based on theorizing that pictures in the "spoken words + pictures" condition will increase the encoding and storage scores for participants with low language proficiency. Finally, hypotheses were based on understanding that all groups of participants will perform on memory measures the worst in the "spoken words" condition due to its transiency and lack of pictures. Therefore, H7a predicted that low-proficiency participants with long residential tenure in the U.S. in the "spoken words + pictures" condition will perform on encoding best, followed by low-proficiency participants with long tenure in the "written words" condition, followed by low-proficiency participants with short tenure in the "spoken words + pictures" condition, followed by low-proficiency participants with short tenure in the "written words" condition. All three-way interaction effects were tested in PROCESS Model 3 with both omnibus test and probing for interactions included in the same output. Results revealed that data for all groups in the "spoken words + pictures" condition failed to reach statistical significance. Therefore, H7a was not supported.

In relation to the comprehension measure, H7b was based on understanding that length of stay will have stronger impact than language proficiency because participants who lived in the U.S. longer will have better developed schemas that will incorporate new information from the news better and will complement the information in the news report with existing political knowledge needed to answer comprehension questions. Finally, the increase in length of stay was expected to help participants better recognize images in "spoken words + pictures" condition. Participants with high length of stay and high language proficiency were expected to perform on comprehension equally well in "spoken words + pictures" and "written words" conditions. Therefore, H7b predicted that long-tenure high-proficiency participants will perform best in both "written words" and "spoken words + pictures" conditions while high-tenure low-proficiency participants will follow them in "spoken words + pictures" condition and will perform weaker in "written words" condition. Data failed to provide statistically significant results for the "spoken words + pictures" condition. Therefore, H7b was not supported.

Research Questions 1-5 asked about the most effective combination of focal predictors on encoding of news schema elements. Encoding of action was the only element that proved to return statistically significant results and provided an unexpected insight: In the "spoken words + pictures" condition, participants with relatively high language proficiency correctly recognized .03 answers fewer than did participants with relatively low language proficiency. Importantly, this small difference held only at the range of language proficiency scores from 18.05 points to

18.70 points, meaning that at other points of language proficiency high- and low-proficiency participants did not differ in their encoding scores.

Theoretical Implications and Interpretation for Each Supported Hypothesis

Overall, three hypotheses in this study were supported. One of these hypotheses predicted the effects of length of stay on encoding, and the other two hypotheses predicted the effects of modality on encoding. Specifically, H2a was supported in its predictions that length of stay will increase encoding scores, H3a was supported in its predictions that the "spoken words + pictures" condition will be the most beneficial for encoding scores in comparison to the other two conditions, and H5a was supported in its predictions that participants with low language proficiency will perform on encoding better in the "spoken words + pictures" condition than they would in the "spoken words" condition. However, the effect of length of stay on encoding was small: Each additional year in the U.S. contributed only .03 of a correctly recognized answer to the encoding scores. Therefore, the rest of the discussion focuses on the findings that involved the effect of modality.

Main effects of modality on encoding. Hypothesis 3a predicted that participants will perform the best in the "spoken words + pictures" condition, followed by the "written words" condition, followed by the "spoken words" condition. A 1-tailed test of hierarchical multiple regression analysis revealed that participants did indeed performed best on encoding in "spoken words + pictures." Specifically, participants in "spoken words + pictures" condition correctly recognized .64 answers more than did participants in "written words" condition,

and this difference was statistically significant. In addition, participants in "spoken words + pictures" condition correctly recognized almost 1.5 (Δ = .1.47) more answers than did participants in "spoken words" condition.

These findings add to our knowledge about the effectiveness of learning from materials containing pictures. Previous studies showed that people retain information learned from still pictures better than information learned from words (Borges, Stepnowsky, & Holt, 1977; Defeyter, Russo, & McPartlin, 2009; Jenkins, Neale, & Deno, 1967; Madigan, 1983). This study suggests that moving pictures, despite the increased volume of information contained it them (Lang, 1995), have the same potential as still pictures do. The possible reasons for such results are discussed below.

Recall that facing empirical data about the lack of differences in memory for televised and print information (Furnham, De Siena, & Gunter, 2002; Pezdek, Lehrer, & Simon, 1984; Stauffer et al., 1981), this dissertation based its predictions on Walma van der Molen's (2001b) argument that such results are due to low degree of audiovisual redundancy in TV news. Walma van der Molen's (2001b) demonstrated that when presented with stimulus material with higher degrees of semantic overlap between video and audio, adults and children learned more from television than from print. This prediction turned out to be true for participants of this study. Because this dissertation's stimulus and instrument were based on direct and indirect degrees of semantic overlap, it is reasonable to argue that pictures in "spoken words + pictures" contributed to superior results on encoding possibly because two-channel messages with pictures are more attention-grabbing than are

single-channel messages (Lang, 1995). In addition, it is also reasonable to conclude that it was the relatively close sematic overlap between the pictures and words that contributed to better encoding in "spoken words + pictures" condition by avoiding the information overload in viewers, which is likely to occur in viewers exposed to two-channel messages with divergent audio-visual redundancy (Lang, 1995). Finally, given that the verbal content in this experiment was the same across conditions, this study lends support to suggestions that knowledge gap occurs between newspaper users and television news viewers due to the larger volume of information that newspapers can fit in comparison to television newscast (Jenssen, 2012).

Also of interest is the following observation: English-speaking Kenyan students in Stauffer's et al. (1981) experiment correctly recognized on average 24% fewer answers in radio condition than they did in television and print, means for both of which—television and print—did not differ significantly. In my study, participants in the "spoken words" condition correctly recognized on average 22.63% fewer answers than did participants in the "spoken words + pictures" condition. This means that close to a quarter of information encoded during the exposure to television news failed to be encoded during the exposure to radio news.

Interaction effects of modality and language proficiency on encoding. Hypothesis 5 predicted that low-proficiency participants will perform on encoding better in the "spoken words + pictures" condition than they would in the "written words" condition. Results revealed that encoding scores of low-proficiency participants did increase in the "spoken words + pictures" condition in comparison

to the "written words" condition. Pick-a-point procedure in PROCESS Model 1 showed that participants with low language proficiency in the "spoken words + pictures" condition correctly recognized 1.14 answers more than they did in the "written words" condition, the difference that was statistically significant.

In addition, an unexpected result was found about the performance of high-proficiency participants, predictions about whom were not included in H5. Specifically, the 1-tailed Johnson-Neyman technique revealed that in the "spoken words + pictures" condition, participants with relatively high language proficiency correctly recognized approximately half-an-answer ($\Delta = .56$) fewer than did participants with relatively low language proficiency. It is important to note, though, that this finding obtained statistical significance on the range of language proficiency from 16.12 points to 18.28 points on a scale of maximum 20 points, a range that accounted for only 7.86% ($n = 11$) of the sample.

Looking deeper into the reasons why high-proficiency participants in the "spoken words + pictures" correctly recognized .56 answers fewer in than did their low-proficiency peers, the explanation may be found in the existence of a certain attitude of high-proficiency participants toward television news. Interestingly, the possible essence of the attitude was explained by the same author on whose theory of symbol systems being words and pictures this study relied. Salomon (1984) found that sixth-graders who perceived themselves to be more efficacious with the medium of television invested less effort into learning from that medium and as a result learned less from it than did those who felt themselves less efficacious. While attitudes toward television and newspapers were not measured in this study, it is

reasonable to suggest that immigrants in our study thought that, in the terms of Salomon's (1984) article, "television is 'easy' and print is 'tough'." Self-reporting language proficiency in this study might help explain this. It seems likely that in a sample where participants overwhelmingly reported their language proficiency at the maximum possible score of 20 points, participants who had doubts about the strength of their language skills paid more attention to television news and particularly to the pictures than did participants who had no such doubts. Further investigation of this hypothesis is needed.

This study's results about main effects of modality on encoding suggested that modality itself does not explain knowledge gap hypothesis: Differences in learning from television and print most probably stem from the sheer volume of detail that can fit onto a newspaper page. However, when language proficiency is taken into account, only high-proficiency participants learned less in condition simulating television news while low-proficiency participants actually increased their learning from television news. Therefore, this study's results support knowledge gap hypothesis that skilled audience members do not benefit from television news while less skilled audience members such as adolescents and immigrants, do (Chaffee et al., 1990). Chaffee and colleagues referred to such effect as the bridging role of television in political socialization of immigrants and adolescents, and this study's results explain that, for immigrants at least, it is the pictures that are the building blocks of that bridge.

Results in this study not only supported the findings of Chaffee et al. (1990) about the direction of effects of exposure to television news for people with low

language skills, but also clarified the sizes of interaction effects. To be sure, comparison between Chaffee's et al. (1990) survey with its use of standardized regression coefficients and this experiment with its unstandardized regression coefficients is not quite justified. Yet it is notable that the gain of .02 in knowledge of American politicians by Korean immigrants with weak English competency who rely on television news compared to immigrants with weak English competency who rely on print news in the 1990 survey turned into a gain of 1.14 points on encoding from televised news for low-proficiency immigrants in this study in comparison to low-proficiency immigrants from print news. To put this into perspective, the 1 full answer correctly recognized by participants of this experiment accounted for one-twelfth of the maximum possible score on encoding in the study.

At least two practical implications of this study may be articulated. One of them concerns a suggestion to newsrooms and news audiences, and the other concerns a suggestion for organizations that directly work with immigrant and refugees. First, the findings show the value in television stations' and newspapers' efforts to get relevant video footage and still photos to support their reporting. These efforts should be continued and supported by the management and the audiences. It is important to remember that watching a commercial before the video starts might be one of the few options for newspapers to get us exposed to online advertising, the revenue that ultimately supports the newsgathering process. Second, immigrant and refugee organizations should strive to provide the communities they serve access to local and national news via television sets and online-enabled devices in community centers. Importantly, what should also be

provided are the opportunities to discuss the news and to compare how well immigrants understood the stories they have just watched.

Summary and Interpretation of Findings for Each Dependent Variable

This dissertation had two dependent variables. Encoding reflected a dimension of Lang's (2000) Limited Capacity Model of Mediated Message Processing. The other variable measured comprehension. Overall, data on the effects of modality and language proficiency on encoding provided the most insightful results in this study.

Encoding. Specifically, results showed that "spoken words + pictures" was the most beneficial condition for encoding. Length of stay almost always contributed a steady .03 points to encoding scores, and language proficiency contributed slightly more to encoding scores, though it reached statistical significance only in the regression model describing main effects of modality.

Among the control variables, the only predictor that achieved statistical significance was source of recruitment. Furthermore, source of recruitment obtained statistical significance in every model predicting encoding scores starting from Regression 5, which included length of stay and language proficiency, see Appendix G. Participants recruited by the researcher consistently correctly recognized approximately 1 answer more than did participants recruited by Qualtrics Panels. This means that one-twelfth of the maximum possible score on encoding was attributed to being recruited by the researcher whose personal network was heavily rooted in American academia.

Comprehension. Data showed that modality and length of stay did not contribute significantly to immigrants' comprehension of news. The only variable that emerged as a statistically significant predictor of comprehension was the number of years of education in the U.S., see Appendix H. This finding suggests that news stories require the kind of knowledge that is not supplied by simply living in the U.S. longer. This finding lends support to those studies of knowledge gap hypotheses that employ education as a proxy for SES. This finding also highlights the importance of civics curriculum in U.S. schools.

In the absence of opportunities to attend a school in the U.S., immigrants' children might be the ones who contribute to their parents' political socialization. Unfortunately, findings in this dissertation showed that having K-12-aged children did not assist participants' comprehension—and encoding—of news stories, thus failing to lend support to McDevitt and Chaffee's (2000, 2002) scholarly work about trickle-up influence of children on parents' political socialization in the immigrant families. Such situation might be explained by the fact that parents' opportunities to get some schooling in the U.S. somehow made them less sensitive toward discussions of politics with children. In addition, these findings might be attributed to the fact that not all schools provide civics curriculum, which, McDevitt and Chaffee argue, turns children into an agent of political socialization for their parents. While in this study years of education in the U.S. and having children who attend K-12 was used in the same block in regression models, further study is needed in search for models that would explain the factors that contribute the most to adult immigrants' political socialization with children being one of these factors.

Limitations and Anomalies

Despite its insights into immigrants' learning about politics from American news, this study has limitations. Many of these limitations stem from the use of an experiment as a method of data collection. More specifically, some of the limitations are directly related to the disadvantages of experimental designs while other limitations stem from the decisions the researcher made in designing the study. First, because this study employed experimental design, its results cannot be generalized to the entire population of immigrants in America. However, this experiment's findings confirm the findings of a survey of Korean immigrants that found a correlation between TV news use and political knowledge for individuals who self-reported lower levels of language expertise (Chaffee et al., 1990). Importantly, this experiment's findings may be generalized to psychological processes of learning from media such as attention, motivation and memory for information communicated with different kinds of modality.

Two other concerns are also related to generalizability. First, participants in this study came from diverse ethnic backgrounds while Korean Americans in the survey by Chafee and his colleagues came from a relatively homogenous population of immigrants who fled the economic hardships in their home country. Ethnic diversity of participants in this study most probably had an effect on their interest and attention paid to American news, which, in turn, might have impacted their memory for and comprehension of news in this study's stimuli. More specifically, it is plausible that economic immigrants such as American Koreans differed less among themselves in their interest in public affairs and in their trust in American

government than did participants in this study, some of whom might have fled gang violence or persecution by the government in their home countries. It is reasonable to expect that a more homogenous sample might have yielded different results, i.e. more hypotheses might have been supported if differences within groups introduced by differences in reasons for immigration were smaller. Second, it is important to remember that in real life print and television contain different information, with print providing more background and explaining complicated information better than television can. Participants in this study were exposed to the same information in both television and print conditions. As a result, participants of this study recognized more information in television condition while overall people who rely on television tend to possess less political knowledge due to less comprehensive political content. Although external validity of this experiment might be low because the volume of information was constant across conditions, a finding that television news with matched meaning of words and pictures aided encoding by low-proficiency participants who came from various ethnic backgrounds seems to be a solid one.

Another concern is the use of self-reported language proficiency measure instead of an established language test. Such decision was made to decrease the amount of time needed from participants for completion of the experiment. Results showed that three-quarters of the sample (n = 110) reported their language proficiency at the maximum possible score. However, participants who had at least some doubts about their English language skills still followed the predictions about

their performance in the "spoken words + pictures" condition, which means that perceptions of their competences also have an effect on their learning.

One more limitation related to measurement concerns the use of multiple-choice questions to test comprehension. One might argue that multiple choice questions simply test recognition of information because they provide multiple cues that help participants remember what they have learned (Lang, 2000). The decision to employ multiple-cued recall to measure comprehension in this study was made to reduce the time required for participation. However, in a study that focuses only on comprehension as a primary outcome variable, prompts should be used to encourage participants type in their response the way they understood it.

One more limitation of this study's methodology is the use of an online software for data collection instead of a laboratory that would allow to strictly control participants' environment. For example, there was no way to make sure that participants who were confident in their language skills or the ones who regularly take part in research studies for supplemental income, as Qualtrics Panels participants did, were not multitasking while being exposed to the "spoken words + pictures" condition, hence poorer performance in that condition in comparison to the "written words" condition.

Yet another limitation related to the method of this study is that it employed complex factorial design with three factors, one of which, modality, had three levels. While precautions were made to avoid increasing Type I error, replications with simpler design are needed. One of the ways to simplify the design is omitting "spoken words" condition because as a control condition for "spoken words +

pictures" in this and other studies, it provided evidence that observed effects of modality are due to pictures in television news. Another way to simplify the study is not hypothesize about the effects of three-way interaction terms to reduce the number of *F*-tests run to test each hypothesis.

Finally, one might question how viable is it for television reporters to be able to include more pictures in their political reporting. The stimuli for this study often came from investigative stories that probably took additional time to research and report. Even if television stations had sufficient resources, not every story about politics has a potential for obtaining a moving picture corresponding in meaning to what must be communicated in spoken words.

Among the unexpected findings is already mentioned finding about worsening performance of high-proficiency participants in the "spoken words + pictures" condition. While no predictions were made regarding the effects of modality on encoding for participants with high language proficiency, it was reasonable to expect that this group of participants would perform at least equally well in the "spoken words + pictures" and "written words" conditions. Instead, scores on encoding demonstrated that in the "spoken words + pictures" condition high-proficiency participants correctly recognized half-an-answer less than did low-proficiency participants.

Another unexpected finding was that longer stay in the U.S. did not lead to better performance on comprehension in the "spoken words + pictures" condition. This dissertation did not rely on the findings of Chaffee's at al. (1990) study where participants with shorter length of stay benefitted from television news because my

theorizing about the mechanisms of why television news is more beneficial for immigrants' learning could not find a justification for reasoning why low-tenure participants would benefit from exposure to the news stories in the "spoken words + pictures" condition. More research is needed into how length of stay contributes to immigrants' learning from media.

Finally, it came as a surprise that the measure of news consumption failed to become a significant predictor of encoding and comprehension. To be fair, the measure I used rather gauged interest in topic domains regardless of the source of news, which might have contributed to the small predictive power of this variable. I am looking for a scale of news consumption that will incorporate measures of interest in topic domains and frequency of exposure to these topics via different sources of news. The language of such a scale must prompt participants to identify their use of media across physical sources (e.g. TV, newspaper, magazine, PC or portable device) and at the same time differentiate among modality to which participants are primarily exposed while they are "watching TV" or "getting news online."

Suggestions for Future Research

A logical next step in this line of research might lie in including measures of attitudes toward print and TV news as well as measures of self-efficacy in engaging with these kinds of media. Such experimental instrument might yield evidence of whether the effects on immigrants' learning from news stem from the presence of pictures or from attitudes toward print and television. In addition, a formal test of language proficiency instead of a self-reported measure should be considered.

Ideally, collecting heart-rate data as an indicator of attention paid during the exposure to print, radio, and television news should be done. However, such opportunity for a study seems to be a highly unlikely given that immigrants are still a hard-to-reach population. Perhaps individuals who are at various stages of learning English language might be an appropriate convenience sample for answering such research questions. In this case, an instrument may be developed in two languages—English and students' native language—to assist obtaining meaningful results from participants with English-language too low to answer the questions in English.

Future studies should also look into immigrants' learning from news about a variety of topics. This study aimed to minimize the possibility of participants' previous exposure to news and thus its stimuli were related to issues of local governance that might have been perceived not only new but even foreign by many participants. It might be argued that results for memory and comprehension might have been different if the topics included the ones of interest to immigrants. Thinking stereotypically, one might suggest that immigrants would be interested in topics related to immigration. However, if purloined stimuli are used in such studies, precautions should be made against using recent and highly publicized national stories.

As mentioned earlier, further exploration of the mechanism that allows immigrants with shorter residential tenure in the U.S. to learn more from television news is needed to explain the findings related to immigrants with shorter residential tenure in the study of Chaffee and colleagues.

Finally, more research into the role of news schema elements in learning from news should be done. Specifically, questions that need answering include why did newspaper condition fail to assist immigrants in remembering causes and consequences when print is viewed to explain the relationships the best.

Importantly, scholars interested in developing this line of research should seek partnerships with organizations that serve immigrants and refugees including public libraries and K-12 schools with diverse student body. Such partnerships not only allow access to hard-to-reach research population—more importantly, they help foster trust between the scholars and the people for the good of whom these organizations and scholars ultimately work.

Conclusion

Chaffee et al. (1990) started their discussion with an optimistic conclusion about the television's role in political socialization for immigrants even though "it is fashionable to denigrate television as an important agent in political cognition" (p. 283). Twenty-seven years later, this optimistic conclusion is supported with experimental data. Pictures in television's two-channel stream indeed seem to have a potential for a bridging role in political socialization for immigrants with lower language proficiency even if the effect holds only for the ability to correctly recognize some information and not for the ability to understand the entire news story. However, the results also supported knowledge gap hypothesis when it comes to immigrants with high language proficiency: They indeed learned less from television news than they did from print. When it comes to comprehension,

education in the U.S. seems to the most reliable predictor of scores, which means that schooling remains an important agent of political socialization of immigrants.

Immigrants and refugees who come to the U.S. as adults—and therefore missed out on civics courses and did not attend college in America—most probably rely almost solely on media for both basic facts about how American democracy works and for updates on day-to-day developments in American politics. Given the low rates of political participation among immigrants, the media carry responsibility to inform and engage all segments of the audience, to communicate how everyone has a stake in their local and national communities, and do so in a format that is accessible to all. As argued by Verba, Schlozman, & Brady (1995), knowledge of political issues and interest in them are indicators of political engagement, which leads to behavioral outcomes such as speaking up about politics and volunteering, and through it, to the ultimate privilege of a citizen in a democracy—casting a vote in elections.

REFERENCES

American National Election Study (1996). Codebook Variable Documentation, pp. 83-84, retrieved January 19, 2015 from http://www.electionstudies.org/studypages/1996prepost/nes1996var.pdf.

Atkin, C. K. (1981). Communication and political socialization. In Nimmo, D. D., & Sanders, K. R. (Eds.). *Handbook of political communication (pp.* 299-328*)*. Beverly Hills: Sage Publications.

Barreto, M. A., & Muñoz, J. A. (2003). Reexamining the "Politics of In-between": Political participation among Mexican immigrants in the United States. *Hispanic Journal of Behavioral Sciences, 25*(4), 427-447.

Batalova, J., McHugh, M., & Morawski, M. (2014). Brain waste in the U.S. workforce: Select labor force characteristics of college-educated native-born and foreign-born adults. Washington, DC: Migration Policy Institute. Accessed May 31, 2014 at http://migrationpolicy.org/research/brain-waste-US-state-workforce-characteristics-college-educated-immigrants.

Berry, J. W. (1997). Immigration, acculturation, and adaptation. *Applied psychology*, *46*(1), 5-34.

Berry, J.W. (1980). Ecological analyses for cross-cultural psychology. In N. Warren (Ed.), *Studies in cross-cultural psychology* (Vol. 2) (pp. 157-189). London: Academic Press.

Blosser, B. J. (1988). Television, reading and oral language development: The case of the Hispanic child. *NABE Journal, 13*(1), 21-42.

Borges, M. A., Stepnowsky, M. A., & Holt, L. H. (1977). Recall and recognition of words and pictures by adults and children. *Bulletin of the Psychonomic Society*, *9*(2), 113-114.

Brosius, H. B., Donsbach, W., & Birk, M. (1996). How do text-picture relations affect the informational effectiveness of television newscasts? *Journal of Broadcasting & Electronic Media*, *40*(2), 180-195.

Carnevale, A. P., Fry, R. A., & Lowell, B. L. (2001). Understanding, speaking, reading, writing, and earnings in the immigrant labor market. *American Economic Review*, 159-163.

Chaffee, S. H., & Kanihan, S. F. (1997). Learning about politics from the mass media. *Political Communication*, *14*(4), 421-430.

Chaffee, S. H., Nass, C. I., & Yang, S. M. (1990). The bridging role of television in immigrant political socialization. *Human Communication Research*, *17*(2), 266-288.

Cho, J., & McLeod, D. M. (2007). Structural antecedents to knowledge and participation: Extending the knowledge gap concept to participation. *Journal of Communication*, *57*(2), 205-228.

Chorpita, B. F., Reise, S., Weisz, J. R., Grubbs, K., Becker, K. D., & Krull, J. L. (2010). Evaluation of the Brief Problem Checklist: child and caregiver interviews to measure clinical progress. *Journal of Consulting and Clinical Psychology, 78*(4), 526.

Corston, R., & Coleman, A. M. (1997). Modality of communication and recall of health-related information. *Journal of health psychology*, *2*(2), 185-194.

Crigler, A. N., Just, M., & Neuman, W. R. (1994). Interpreting visual versus audio messages in television news. *Journal of Communication*, *44*(4), 132-149.

Cruz, T. H., Marshall, S. W., Bowling, J. M., & Villaveces, A. (2008). The validity of a proxy acculturation scale among US Hispanics. *Hispanic Journal of Behavioral Sciences*, *30*(4), 425-446.

Dalisay, F. (2012). Media Use and Acculturation of New Immigrants in the United States. *Communication Research Reports*, *29*(2), 148-160.

David, P. (1998). News Concreteness and Visual-Verbal Association Do News Pictures Narrow the Recall Gap Between Concrete and Abstract News? *Human Communication Research*, *25*(2), 180-201.

Defeyter, M. A., Russo, R., & McPartlin, P. L. (2009). The picture superiority effect in recognition memory: A developmental study using the response signal procedure. *Cognitive Development*, *24*(3), 265-273.

DeLoache, J. S. (2004). Becoming symbol-minded. *Trends in cognitive sciences*, *8*(2), 66-70.

Diao, Y., & Sweller, J. (2007). Redundancy in foreign language reading comprehension instruction: Concurrent written and spoken presentations. *Learning and Instruction*, *17*(1), 78-88.

Diener, E. D., Emmons, R. A., Larsen, R. J., & Griffin, S. (1985). The satisfaction with life scale. *Journal of Personality Assessment, 49*(1), 71-75.

Dona, G., & Berry, J. W. (1994). Acculturation attitudes and acculturative stress of Central American refugees. *International journal of psychology, 29*(1), 57-70.

Dutta-Bergman, M. J. (2004). Complementarity in consumption of news types across traditional and new media. *Journal of Broadcasting & Electronic Media, 48*(1), 41-60.

Eveland, W. P., Marton, K., & Seo, M. (2004). Moving beyond "just the facts" the influence of online news on the content and structure of public affairs Knowledge. *Communication Research*, *31*(1), 82-108.

Eveland Jr, W. P., & Scheufele, D. A. (2000). Connecting news media use with gaps in knowledge and participation. *Political Communication*, *17*(3), 215-237.

Field, J. (2004). *Psycholinguistics: The key concepts*. Routledge.

File, T., & Crissey, S. (2010). Voting and registration in the election of November 2008. *Current Population Reports*. Washington, DC: U.S. Census Bureau.

Findahl, O. (2001). News in Our Minds. In Renckstorf, K., McQuail, D, & Jankowski, N. *Television news research: Recent European approaches and findings* (Vol. 2) (pp. 111-127). Quintessence Publishing Company, Incorporated.

Findahl, O., & Höijer, B. (1985). Some Characteristics of News Memory and Comprehension. *Journal of Broadcasting & Electronic Media*, *29*(4).

Fiske, S. T., Kinder, D. R., & Larter, W. M. (1983). The novice and the expert: Knowledge-based strategies in political cognition. *Journal of Experimental Social Psychology*, *19*(4), 381-400.

Frey, W. H. (2017). Census shows pervasive decline in 2016 minority voter turnout. The Brookings Institution, retrieved July 17, 2017, from https://www.brookings.edu/blog/the-avenue/2017/05/18/census-shows-pervasive-decline-in-2016-minority-voter-turnout/

Furnham, A., De Siena, S., & Gunter, B. (2002). Children's and adults' recall of children's news stories in both print and audio-visual presentation modalities. *Applied Cognitive Psychology*, *16*(2), 191-210.

Furnham, A., Gunter, B., & Green, A. (1990). Remembering science: The recall of factual information as a function of the presentation mode. *Applied Cognitive Psychology*, *4*(3), 203-212.

Gamst, G., Liang, C. T., & Der-Karabetian, A. (2011). *Handbook of multicultural measures*. SAGE Publications.

Gaziano, C. (2010). Notes on "revisiting the knowledge gap hypothesis: a meta-analysis of thirty-five years of research". *Journalism & Mass Communication Quarterly*, *87*(3-4), 615-632.

Geiger, S., & Newhagen, J. (1993). Revealing the black box: Information processing and media effects. *Journal of Communication*, *43*(4), 42-50.

Graber, D. A. (2001). *Processing politics: Learning from television in the Internet age*. University of Chicago Press.

Graber, D. A. (1990). Seeing is remembering: How visuals contribute to learning from television news. *Journal of communication*, *40*(3), 134-156.

Grabe, M. E., Bas, O., & van Driel, I. I. (2015). Defecting from the Gutenberg legacy: Employing images to test knowledge gaps. *Journal of Communication, 65*(2), 300-319.

Grimes, T. (1990). Encoding TV news messages into memory. *Journalism & Mass Communication Quarterly*, *67*(4), 757-766.

Gunter, B. (1987). *Poor reception: Misunderstanding and forgetting broadcast news*. Routledge.

Gunter, B. (1979). Recall of brief television news items: Effects of presentation mode, picture content and serial position. *Journal of Educational Television and Other Media*, *5*(2), 57-61.

Gunter, B., Furnham, A., & Griffiths, S. (2000). Children's memory for news: A comparison of three presentation media. *Media Psychology*, *2*(2), 93-118.

Hayes, A. F., & Matthes, J. (2009). Computational procedures for probing interactions in OLS and logistic regression: SPSS and SAS implementations. *Behavior Research Methods*, 41(3), 924-936.

Hayes, A.F., & Montoya, A.K. (2017). A Tutorial on Testing, Visualizing, and Probing an Interaction Involving a Multicategorical Variable in Linear Regression Analysis, *Communication Methods and Measures*, 11:1, 1-30, DOI: 10.1080/19312458.2016.1271116

Hoskin, Marilyn. (1989). "Socialization and Anti-
Socialization: The Case of Immigrants" in
Sigel, R.(ed.) Political Learning in Adulthood: A Sourcebook of Theory and Rese
arch. Chi-cago: University of Chicago Press.

Hwang, Y., & Jeong, S. H. (2009). Revisiting the knowledge gap hypothesis: A meta-analysis of thirty-five years of research. *Journalism & Mass Communication Quarterly*, *86*(3), 513-532.

Hyman, H. H. (1969). Political socialization: A study in the psychology of political behavior. New York: The Free Pres.

Immigration Explorer. (2009, March 10). The New York Times. Accessed November 29, 2014 at http://www.nytimes.com/interactive/2009/03/10/us/20090310-immigration-explorer.html

Jenkins, J. R., Neale, D. C., & Deno, S. L. (1967). Differential memory for picture and word stimuli. *Journal of Educational Psychology*, *58*(5), 303.

Jennings, M. K. (2007). Political socialization. In Dalton, R. J., & Klingemann, H. D. (Eds.). *The Oxford handbook of political behavior* (pp. 29-44). Oxford University Press.

Jenssen, A. T. (2013). Widening or closing the knowledge gap? *Nordicom Review, 33*(1), 19-36.

Junn, J. (1999). Participation in liberal democracy: The political assimilation of immigrants and ethnic minorities in the United States. *American Behavioral Scientist, 42*(9), 1417-1438.

Kaltenbacher, M. (2004). Perspectives on multimodality: From the early beginnings to the state of the art. *Information design journal + document design*, *12*(3), 190-207.

Kalyuga, S. (2012). Instructional benefits of spoken words: A review of cognitive load factors. *Educational Research Review*, *7*(2), 145-159.

Kintsch, W. (1998). *Comprehension: A paradigm for cognition.* Cambridge University Press.

Kintsch, W. (1994). Text comprehension, memory, and learning. *American Psychologist*, *49*(4), 294.

Kochhar, Rakesh, Richard Fry and Paul Taylor. (2011). Twenty-to-One: Wealth Gaps Rise to Record Highs Between Whites, Blacks and Hispanics. Washington, DC: Pew Social & Demographic Trends, July. Accessed on November 21, 2013 at http://www.pewsocialtrends.org/files/2011/07/SDT-Wealth-Report_7-26-11_FINAL.pdf.

Kosicki, G. M., & McLeod, J. M. (1990). Learning from political news: Effects of media images and information-processing strategies. In Kraus, S. (Ed.). *Mass Communication and political information processing* (pp. 69-83). Hillsdale, New Jersey: Lawrence Erlbaum Associates.

Kozma, R. B. (1991). Learning with media. *Review of educational research*,*61*(2), 179-211.

Kwak, N. (1999). Revisiting the Knowledge Gap Hypothesis Education, Motivation, and Media Use. *Communication Research*, *26*(4), 385-413.

Lang, A. (2000). The limited capacity model of mediated message processing. *Journal of communication*, *50*(1), 46-70.

Lang, A. (1995). Defining audio/video redundancy from a limited-capacity information processing perspective. *Communication Research*, *22*(1), 86-115.

Lang, A. (1991). Emotion, formal features, and memory for televised political advertisements. *Television and political advertising, 1*, 221-243.

Lang, A., Potter, R. F., & Bolls, P. D. (1999). Something for nothing: Is visual encoding automatic? *Media Psychology*, *1*(2), 145-163.

Leal, D. L. (2002). Political participation by Latino non-citizens in the United States. *British Journal of Political Science, 32*(2), 353-370.

Lee, D., & Zhou, L. (2004). An Empirical Test of SES and Media Use: Modeling the Knowledge Gap Hypothesis in the TV versus Newspaper Context. Paper presented at the annual International Communication Association convention.

Leshner, G., & Coyle, J. R. (2000). Memory for television news: Match and mismatch between processing and testing. *Journal of Broadcasting & Electronic Media*, *44*(4), 599-613.

Lonner, W. J, & Berry, J. W. (1986). Sampling and surveying. In W. J. Lonner, & Berry, J. W. *Field methods in cross-cultural research* (pp. 85-110). Sage Publications.

Luke, C. (1985). Television discourse processing: A schema theoretic approach. *Communication Education*, *34*(2), 91-105.

Madigan, S. (1983). In J. C. Yuille (Ed.), *Imagery, memory, and cognition: Essays in honor of Allan Paivio* (pp. 65-89). Lawrence Erlbaum Assoc Incorporated.

Martinelli, K. A., & Chaffee, S. H. (1995). Measuring new-voter learning via three channels of political information. *Journalism & Mass Communication Quarterly*, *72*(1), 18-32.

Mayer, R. E. (2002). Multimedia learning. *Psychology of Learning and Motivation*, 41, 85-139.

McBride, D. M., & Dosher, B. A. (2002). A comparison of conscious and automatic memory processes for picture and word stimuli: A process dissociation analysis. *Consciousness and cognition*, *11*(3), 423-460.

McDevitt, M., & Chaffee, S. (2002). From top-down to trickle-up influence: Revisiting assumptions about the family in political socialization. *Political Communication*, *19*(3), 281-301.

McDevitt, M., & Chaffee, S. (2000). Closing gaps in political communication and knowledge effects of a school intervention. *Communication research*, *27*(3), 259-292.

McLeod, D. M., Kosicki, G. M., & McLeod, J. M. (2002). Resurveying the boundaries of political communication effects. In Bryant, J., & Zillmann, D. (Eds.). *Media effects: Advances in theory and research* (pp. 215-268). Mahwah, New Jersey: Lawrence Erlbaum Associates.

McLeod, J. M. (2000). Media and civic socialization of youth. *Journal of Adolescent Health*, *27*(2), 45-51.

Mezzich, J. E., Ruiperez, M. A., Yoon, G., Liu, J., & Zapata-Vega, M. I. (2009). Measuring cultural identity: Validation of a modified Cortes, Rogler and Malgady Bicultural Scale in three ethnic groups in New York. *Culture, medicine and psychiatry, 33*(3), 451-472.

Morales, A., & Hanson, W. E. (2005). Language brokering: An integrative review of the literature. *Hispanic Journal of Behavioral Sciences*, *27*(4), 471-503.

Morris, C. D., Bransford, J. D., & Franks, J. J. (1977). Levels of processing versus transfer appropriate processing. *Journal of verbal learning and verbal behavior*, *16*(5), 519-533.

Neuman, W.R., Just, M.R., & Crigler, A.N. (1992*). Common knowledge: News and the construction of political meaning*. Chicago: University of Chicago Press. Chapter 1: Knowledge in common, pp. 1-22.

Pezdek, K., Lehrer, A., & Simon, S. (1984). The relationship between reading and cognitive processing of television and radio. *Child Development*, 2072-2082.

Price, V., & Zaller, J. (1993). Who gets the news? Alternative measures of news reception and their implications for research. *Public Opinion Quarterly*,*57*(2), 133-164.

Reeves, B., & Nass, C. (1996). *How people treat computers, television, and new media like real people and places*. CSLI Publications and Cambridge university press.

Roediger III, H. L., & Weldon. M. S. (1987). Reversing the Picture Superiority Effect. In M. A. McDaniel & M. E. Pressley (Eds.), *Imagery and related mnemonic processes: Theories, individual differences, and applications* (pp. 151-174). Springer-Verlag Publishing.

Ryder, A. G., Alden, L. E., & Paulhus, D. L. (2000). Is acculturation unidimensional or bidimensional? A head-to-head comparison in the prediction of personality, self-identity, and adjustment. *Journal of personality and social psychology, 79*(1), 49.

Sabatier, C. (2012). Acculturation scales. Working paper. Received via email from Dr. Colette Sabatier on January 6, 2015.

Salomon, G. (1984). Television is "easy" and print is "tough": The differential investment of mental effort in learning as a function of perceptions and attributions. *Journal of educational psychology*, 76(4), 647.

Salomon, G. (1979). Interaction of media, cognition, and learning: An exploration of how symbolic forms cultivate mental skills and affect knowledge acquisition. Jossey-Bass Publishers.

Smith, R. A., Levine, T. R., Lachlan, K. A., & Fediuk, T. A. (2002). The high cost of complexity in experimental design and data analysis: Type I and type II error rates in multiway ANOVA. *Human Communication Research*, 28(4), 515-530.

Stauffer, J., Frost, R., & Rybolt, W. (1981). Recall and learning from broadcast news: Is print better?. *Journal of Broadcasting & Electronic Media*, *25*(3), 253-262.

Stauffer, J., Frost, R., & Rybolt, W. (1978). Literacy, illiteracy, and learning from television news. *Communication Research*, *5*(2), 221-232.

Stephenson, M. (2000). Development and validation of the Stephenson Multigroup Acculturation Scale (SMAS). *Psychological assessment, 12*(1), 77.

Subrahmanyam, K., & Greenfield, P. (2008). Media Symbol Systems and Cognitive Processes. Pp. 166-187. In: Calvert, S. L., & Wilson, B. J. (Eds.). (2008). *The handbook of children, media, and development*. John Wiley & Sons.

Sumner, W. G. (1907). *Folkways: A study of the sociological importance of usages, manners, customs, mores, and morals*. Ginn.

Tam Cho, W. K. (1999). Naturalization, socialization, participation: Immigrants and (non-) voting. *The Journal of Politics*, *61*(04), 1140-1155.

Thorson, E., & Lang, A. (1992). The effects of television videographics and lecture familiarity on adult cardiac orienting responses and memory. *Communication Research, 19*(3), 346-369.

Tichenor, P. J., Donohue, G. A., & Olien, C. N. (1970). Mass media flow and differential growth in knowledge. *Public opinion quarterly*, *34*(2), 159-170.

U.S. Census. (2010). State & County QuickFacts. Sedalia, Missouri. Accessed Dec. 4, 2014 at http://quickfacts.census.gov/qfd/states/29/2966440.html.

Verba, S., Schlozman, K. L., & Brady, H. E. (1995). *Voice and equality: Civic voluntarism in American politics*. Cambridge, Mass.: Harvard University Press.

Vig, S. R. (1980). *The role of visual elements in the learning of television news by adolescents* (Doctoral dissertation, Columbia University.).

Walma van der Molen, J. H. (2001a). Assessing text-picture correspondence in television news: The development of a new coding scheme. *Journal of Broadcasting & Electronic Media, 45*(3), 483-498.

Walma van der Molen, J. H. (2001b). Children's and adults' recall of television versus print news: Is print really better. *Television news research: Recent European approaches and findings. Berlin: Quintessenz*, 231-246.

Waters, M. C., & Jiménez, T. R. (2005). Assessing immigrant assimilation: New empirical and theoretical challenges. *Annual review of sociology*, 105-125.

Webber, M. (2014). University YMCA assists Champaign immigrants gain citizenship. The Daily Illini. Accessed November 27, 2014 at http://www.dailyillini.com/news/article_c64caaf4-3942-11e4-ad00-0017a43b2370.html

White, S., Nevitte, N., Blais, A., Gidengil, E., & Fournier, P. (2008). The Political Resocialization of Immigrants Resistance or Lifelong Learning? *Political Research Quarterly*, *61*(2), 268-281.

Wilson, C. E. (1974). The effect of medium on loss of information. *Journalism Quarterly*, pp. 111-115.

Williams, C. L., & Berry, J. W. (1991). Primary prevention of acculturative stress among refugees: Application of psychological theory and practice. *American Psychologist*, *46*(6), 632.

Wong, J., & Tseng, V. (2008). Political socialisation in immigrant families: Challenging top-down parental socialisation models. *Journal of Ethnic and Migration Studies*, *34*(1), 151-168.

Yang, J., & Grabe, M. E. (2011). Knowledge acquisition gaps: A comparison of print versus online news sources. *new media & society*, *13*(8), 1211-1227.

Zea, M. C., Asner-Self, K. K., Birman, D., & Buki, L. P. (2003). The Abbreviated Multidimentional Acculturation Scale: Empirical validation with two Latino/Latina samples. *Cultural Diversity and Ethnic Minority Psychology, 9*(2), 107.

Zhou, Y., & Pinkleton, B. E. (2012). Modeling the effects of political information source use and online expression on young adults' political efficacy. *Mass Communication and Society, 15*(6), 813-830.

Zwaan, R. A., & Radvansky, G. A. (1998). Situation models in language comprehension and memory. *Psychological bulletin*, *123*(2), 162.

APPENDIX A. Power analysis in G*Power software.

F tests - ANOVA: Fixed effects, special, main effects and interactions
Analysis: A priori: Compute required sample size

Input:	Effect size f	=	0.25
	α err prob	=	0.05
	Power (1-β err prob)	=	.8
	Numerator df	=	2
	Number of groups	=	12
Output:	Noncentrality parameter λ	=	9.8750000
	Critical F	=	3.0580504
	Denominator df	=	146
	Total sample size	=	158
	Actual power	=	0.8016972

APPENDIX B. Coding sheet for video stories.

Scene #	Words	Pictures	Zooms?	Pano-ramic views?	Motion?	Music?	Vivid pictures?	Novel pic-tures?	Loud sounds?	What is in the picture? 1-Talking head without meaningful background or meaningful clothing such as uniform; 2 – Talking head with meaningful background; 3 – Video footage of things or people; 4 – Photo/ Still; 5 – Infographic/ Map; 6 - "jingle" of the news program	Correspondence (semantic overlap) between pictures and words: 0 - not applicable 1 – Direct – Pictures and words convey the same propositional meaning; 2 – Indirect – Pictures and words only partially related. Visuals relate to verbal information but require too much interpretation from the viewer. Include standard news pictures that visually document the news event but so not provide a direct semantic relation with the concurrent verbal information; 3 – Divergent – Picture does not at all capture the content or meaning of the text. Instead, it carries a different or even conflicting meaning; 4 – Talking Head – A shot that shows exclusively a talking newsreader, correspondent, or interviewee. Code into categories 1-3 if the shot did contain relevant additional pictorial information.
1											

Direct (One-to-one) correspondence is observed about the following element of news/events schema (Place a "1" for a positive answer):						
			Footage of something happening and causing something else (between the two cuts)	Sequence of video scenes and/or pictures that establish the cause and/or effect	An infographic that conveys a cause and/or effect relationship	Reverse order: the cause is shown after the effect

APPENDIX C. Summary of hypotheses.

#	Independent variable(s)	Effect	Dependent variable(s)	Hypothesis	Expected finding	Supported?
1a-b	Language proficiency (Lang)	Main	(a) encoding, (b) comprehension.	Decoding and understanding of word-based information depends on language skills.	High Lang > Low Lang	No
2a-b	Length of stay (LOS)	Main	(a) encoding, (b) comprehension.	LOS is a proxy for prior knowledge and developed detailed schemas that assist in incorporating incoming information and remembering it.	High LOS > Low LOS	Yes for 2a
3a	Modality	Main	Encoding	Pictures in "spoken words + pictures" improve memory (Walma van der Molen, 2001b). "Written words" offers control over the pace of information processing. "Spoken words" offers a transient single-channel message.	"spoken words + pictures" > >"written words" > "spoken words"	Yes
3b	Modality	Main	Comprehension	Pictures in "spoken words + pictures" do not improve comprehension (Pezdek et al., 1984; Salomon, 1979). "Spoken words" offers a transient single-channel message.	"spoken words + pictures" = = "written words" > "spoken words"	No
4a	Lang, LOS	Two-way interaction	Storage	Lang widens the gap between high and low LOS on a memory measure.	High Lang/High LOS > > High Lang/High LOS > > Low Lang/High LOS > > Low Lang/Low LOS	No

4b	LOS, Lang	Two-way interaction	Comprehension	LOS narrows the gap between low and high Lang on a comprehension measure.	High LOS/High Lang > > High LOS/Low Lang > > Low LOS/High Lang > > Low LOS/Low Lang	No
5	Modality, Lang	Two-way interaction	Encoding	Pictures compensate for weak language skills by depicting referents.	Low Lang: "spoken words + pictures" > "written words"> > "spoken words"	Yes
6	Modality, LOS	Two-way interaction	Comprehension	High LOS will provide well-developed schemas and ability to recognize pictures.	High LOS: "spoken words + pictures" > "written words"> "spoken words"	No
7a	Modality, Lang, LOS	Three-way interaction	Encoding	Pictures will compensate for weak language skills, and developed schemas associated with longer LOS will help interpret them and connect new information to existing knowledge.	Low Lang: High LOS/ "spoken words + pictures" > > High LOS/"written words" > Low LOS/"spoken words + pictures > Low LOS/"written words"	No
8b	Modality, LOS, Lang	Three-way interaction	Comprehension	Pictures will compensate for weak language skills, and developed schemas will help fill in the blanks in learning.	High LOS/High Lang: "spoken words + pictures" = "written words"; High LOS/Low Lang: "spoken words + pictures" > "written words"	No

APPENDIX D. Bivariate correlations between the two outcome variables and independent and control variables (N = 146).

Predictor	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1. Age														
2. Being a woman	-.24**													
3. U.S. education	-.09	.00												
4. Having K-12 kids	-.01	-.09	-.07											
5. Plans to go back	-.18*	.00	-.13	.06										
6. Acculturation	-.05	-.06	.20*	.01	-.09									
7. Psychological wellbeing	.13	-.15	.00	-.06	-.15	.36***								
8. Following news	.09	-.33***	-.05	-.03	.01	.34***	.09							
9. Being in the researcher's sample	-.26**	.21*	-.14	.10	.01	-.31	-.21*	-.36***						
10. Language proficiency	-.03	.01	.25**	-.06	-.06	.30***	.10	.06	-.03					
11. Length of stay	.70***	-.18*	.47**	-.07	-.26**	.17	.08	.06	-.40***	.14				
12. Print	.02	-.00	-.17*	.06	.09	-.03	-.07	.08	.05	.00	-.10			
13. Television	-.01	.07	.23**	-.08	-.06	.08	.00	.07	-.07	.05	.12	-.55**		
14. Encoding	.18*	-.07	.07	-.01	-.13	.03	-.02	-.04	.14	.16*	.16	-.01	.21**	
15. Comprehension	-.04	-.04	.21**	.01	-.06	.08	.07	.07	-.02	.05	.05	-.01	.15	.33***

*p < .05. **p < .01. ***p < .001.

APPENDIX E. Skewness, kurtosis, and normality tests for language proficiency.

Language proficiency, points	*n*	Mean ± *SD*	Mean ± SE of Mean	Skewness	SE for skewness	Kurtosis	SE for kurtosis	Kolmogorov-Smirnov			Shapiro-Wilk		
								Statistic	*Df*	*p*	Statistic	*Df*	*p*
14	4	8.500 ± 2.082	8.500 ± 1.041	.000	1.04	.391	2.619	.155	4	n/a	.998	4	.995
15	3	6.000 ± 3.606	6.000 ± 2.082	1.152	1.225	n/a	n/a	.276	3	n/a	.942	3	.537
16	11	9.091 ± 2.023	9.091 ± .610	-.771	.661	.280	1.279	.219	11	.147	.921	11	.325
17	4	8.000 ± 3.559	8.000 ± 1.780	-.266	1.014	-4.483	2.619	.300	4	n/a	.838	4	.189
18	7	8.286 ± 2.984	8.286 ± 1.128	-1.914	.794	4.210	1.587	.319	7	.030	.790	7	.032
19	4	9.250 ± .957	9.250 ± .479	-.855	1.014	-1.289	2.619	.283	4	n/a	.863	4	.272
20	110	9.346 ± 2.182	9.346 ± .208	-.918	.230	.554	.457	.182	110	.001	.910	110	.001

Language proficiency of 7 points (n = 1) and 12 points (n = 1) were omitted from analyses of normality of distribution because encoding was a constant.

APPENDIX F. Instrument.

Yulia Medvedeva – Instrument – Oct. 20, 2015
Dissertation Experiment Campus IRB #2004006 C; Exempt Application: 209461

Q2 Please do not use the forward and backward navigation buttons in your browser while taking this survey. Use only the forward progress button on the bottom right of your screen.

Q3 Are you on a student/exchange visa?
- ❍ Yes (1)
- ❍ No (2)

If Yes Is Selected, Then Skip To End of Survey

Answer If Are you on a student/exchange visa? No Is Selected

Q4 Do you feel comfortable completing a questionnaire in English?
- ❍ Yes (1)
- ❍ No (2)

If No Is Selected, Then Skip To End of Survey

Q5 What is your gender (biological sex)?
- ❍ Male (Man) (1)
- ❍ Female (Woman) (2)

Q7 How old are you?

Q6 Which country you were born?

Q9 How many full years have you lived in the United States?

Q10 Which of the following best describes your current status in the U.S.?
- ❍ Immigrant (2)
- ❍ Asylee (3)
- ❍ Refugee (4)
- ❍ None of the above (5)

Q11 Do you plan to move back to your home country at some point of your life?
- ❍ Yes (1)
- ❍ No (2)

Q12 How many years of education in the U.S. do you have?

Q397 Do you have any children who attend school (K-12) in the U.S.?

- ❍ Yes (1)
- ❍ No (2)

Answer If Do you have any children who attend school (K-12) in the U.S.? Yes Is Selected

Q17 What are the ages and grades in school of your children who live in the U.S.?

	Age (1)	Grade (from 1 to 12) (2)
Oldest child (1)		
Second child (2)		
Third child (3)		
Fourth child (4)		
Fifth child (5)		
Sixth child (6)		
Seventh child (7)		

Q385 In what state do you currently reside?

- ❍ Alabama (1)
- ❍ Arizona (2)
- ❍ Arkansas (3)
- ❍ California (4)
- ❍ Colorado (5)
- ❍ Connecticut (6)
- ❍ Delaware (7)
- ❍ District of Columbia (8)
- ❍ Florida (9)
- ❍ Georgia (10)
- ❍ Idaho (11)
- ❍ Illinois (12)
- ❍ Indiana (13)
- ❍ Iowa (14)
- ❍ Kansas (15)
- ❍ Kentucky (16)
- ❍ Louisiana (17)
- ❍ Maine (18)
- ❍ Maryland (19)
- ❍ Massachusetts (20)
- ❍ Michigan (21)
- ❍ Minnesota (22)
- ❍ Mississippi (23)
- ❍ Missouri (24)
- ❍ Montana (25)
- ❍ Nebraska (26)
- ❍ Nevada (27)
- ❍ New Hampshire (28)
- ❍ New Jersey (29)
- ❍ New Mexico (30)
- ❍ New York (31)
- ❍ North Carolina (32)
- ❍ North Dakota (33)
- ❍ Ohio (34)
- ❍ Oklahoma (35)
- ❍ Oregon (36)
- ❍ Pennsylvania (37)
- ❍ Rhode Island (38)
- ❍ South Carolina (39)
- ❍ South Dakota (40)
- ❍ Tennessee (41)
- ❍ Texas (42)
- ❍ Utah (43)
- ❍ Vermont (44)
- ❍ Virginia (45)
- ❍ Washington (46)
- ❍ West Virginia (47)
- ❍ Wisconsin (48)
- ❍ Wyoming (49)
- ❍ Puerto Rico (50)
- ❍ Alaska (51)
- ❍ Hawaii (52)
- ❍ I do not reside in the United States (53)

Q18 Below you will find a list of different types of news. How closely do you follow each of these types of news either in the newspaper, television, radio, or on the Internet?

	Very closely 1 (1)	Somewhat closely 2 (2)	Not very closely 3 (3)	Not at all closely 4 (4)
1. Political news (1)	❍	❍	❍	❍
2. International affairs news (2)	❍	❍	❍	❍
3. Local government news (3)	❍	❍	❍	❍
4. Business and finance news (4)	❍	❍	❍	❍
5. Science and health news (5)	❍	❍	❍	❍

Q19 How many days in the past week did you...

	None 0 (1)	One day 1 (2)	Two days 2 (3)	Three days 3 (4)	Four days 4 (5)	Five days 5 (6)	Six days 6 (7)	Every day 7 (8)
... watch the national news on TV? (1)	❍	❍	❍	❍	❍	❍	❍	❍
... watch the local TV news? (2)	❍	❍	❍	❍	❍	❍	❍	❍
... read a daily newspaper? (3)	❍	❍	❍	❍	❍	❍	❍	❍
... listen to the news on radio? (4)	❍	❍	❍	❍	❍	❍	❍	❍
... read news online? (5)	❍	❍	❍	❍	❍	❍	❍	❍

Q20 How good is your English in terms of ...

	Not at all 0 (1)	1 (2)	2 (3)	3 (4)	4 (5)	Very good 5 (6)
... listening? (1)	❍	❍	❍	❍	❍	❍
... speaking? (2)	❍	❍	❍	❍	❍	❍
... reading? (3)	❍	❍	❍	❍	❍	❍
... writing? (4)	❍	❍	❍	❍	❍	❍

Q14 Many of the questions on the next two pages will refer to your heritage culture, meaning the culture that has influenced you most (other than U.S. culture). It may be culture of your birth, the culture in which you have been raised, or another culture that forms part of your background. If there are several such cultures, pick up the one that has influenced you most (e.g., Mexican, Chinese, Crimean Tatar). If you do not feel that you have been influenced by any other culture, please try to identify a culture that may have had an impact on previous generations of your family. Please write in your heritage culture in the space provided:

Q16 Please answer each of the following questions as carefully as possible by clicking on one of the circles to the right of each question to indicate your degree of agreement or disagreement.

	Strongly disagree 1 (1)	2 (2)	Disagree 3 (3)	4 (4)	Neutral/ Depends 5 (5)	6 (6)	Agree 7 (7)	8 (8)	Strongly agree 9 (9)
1. I often participate in my heritage cultural traditions. (1)	❍	❍	❍	❍	❍	❍	❍	❍	❍
2. I often participate in mainstream U.S. cultural traditions. (2)	❍	❍	❍	❍	❍	❍	❍	❍	❍
3. I would be willing to marry a person from my heritage culture. (3)	❍	❍	❍	❍	❍	❍	❍	❍	❍
4. I would be willing to marry a U.S. person. (4)	❍	❍	❍	❍	❍	❍	❍	❍	❍
5. I enjoy social activities with people from the same heritage culture as myself. (5)	❍	❍	❍	❍	❍	❍	❍	❍	❍
6. I enjoy social activities with typical U.S. people. (6)	❍	❍	❍	❍	❍	❍	❍	❍	❍

7. I am comfortable working with people of the same heritage culture as myself. (7)	❍	❍	❍	❍	❍	❍	❍	❍	❍
8. I am comfortable working with typical U.S. people. (8)	❍	❍	❍	❍	❍	❍	❍	❍	❍
9. I enjoy entertainment (e.g., movies, music) from my heritage culture. (9)	❍	❍	❍	❍	❍	❍	❍	❍	❍
10. I enjoy U.S. entertainment (e.g., movies, music). (10)	❍	❍	❍	❍	❍	❍	❍	❍	❍

Q17 Just like you did on the previous page, please answer each of the following questions as carefully as possible by clicking on one of the circles to the right of each question to indicate your degree of agreement or disagreement.

	Strongly disagree 1 (1)	2 (2)	Disagree 3 (3)	4 (4)	Neutral/ Depends 5 (5)	6 (6)	Agree 7 (7)	8 (8)	Strongly agree 9 (9)
11. I often behave in ways that are typical of my heritage culture. (1)	❍	❍	❍	❍	❍	❍	❍	❍	❍
12. I often behave in ways that are "typically U.S." (2)	❍	❍	❍	❍	❍	❍	❍	❍	❍
13. It is important for me to maintain or develop the practices of my heritage culture. (3)	❍	❍	❍	❍	❍	❍	❍	❍	❍
14. It is important for me to maintain or develop U.S. cultural practices. (4)	❍	❍	❍	❍	❍	❍	❍	❍	❍
15. I believe in the values of my heritage culture. (5)	❍	❍	❍	❍	❍	❍	❍	❍	❍

16. I believe in mainstream U.S. values. (6)	❍	❍	❍	❍	❍	❍	❍	❍	❍
17. I enjoy the jokes and humor of my heritage culture. (7)	❍	❍	❍	❍	❍	❍	❍	❍	❍
18. I enjoy typical U.S. jokes and humor. (8)	❍	❍	❍	❍	❍	❍	❍	❍	❍
19. I am interested in having friends from my heritage culture. (9)	❍	❍	❍	❍	❍	❍	❍	❍	❍
20. I am interested in having U.S. friends. (10)	❍	❍	❍	❍	❍	❍	❍	❍	❍

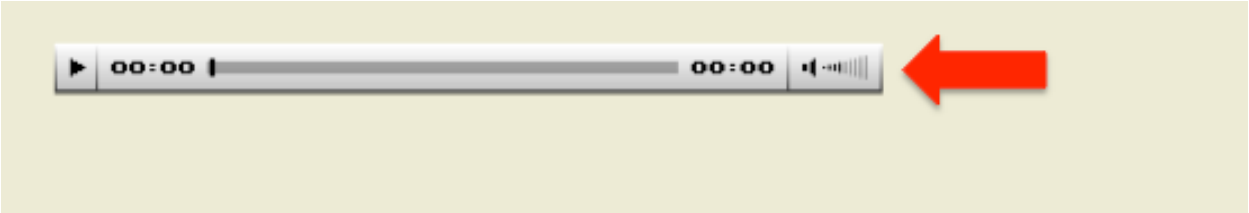
Q22 Which statement best describes how you feel?

	Strongly Disagree (1)	Disagree (2)	Agree (3)	Strongly Agree (4)
1. I feel sad or depressed. (1)	❍	❍	❍	❍
2. I feel pessimistic about the future. (2)	❍	❍	❍	❍
3. I worry about things that might go wrong. (3)	❍	❍	❍	❍
4. I feel fearful or anxious. (4)	❍	❍	❍	❍
5. I feel like I lack companionship. (5)	❍	❍	❍	❍
6. I feel isolated from others. (6)	❍	❍	❍	❍
7. I wish I could have more respect for myself. (7)	❍	❍	❍	❍
8. I feel dissatisfied with myself. (8)	❍	❍	❍	❍
9. I am satisfied with my life. (9)	❍	❍	❍	❍
10. The conditions of my life are excellent. (10)	❍	❍	❍	❍
11. In most ways my life is close to my ideal. (11)	❍	❍	❍	❍

Q387 In the following part of the study, you might or might not need to be able to watch and/or listen to the news stories.

Please check the audio (speaker control) on the device you are using to take this study. Make sure it is not muted and that the volume is set at a satisfactory level.

Apart from using speaker control on your device, you will also be able to adjust sound on the panel of the video or audio player:



Please do not use the forward and backward navigation buttons in your browser while taking this survey. Use only the forward progress button on the bottom right of your screen.

1.1 Panhandling "Spoken Words + Pictures" Version

Q28 Please watch the following news video. After watching this news video, you will be asked to answer several questions about its content:

Q53 Now, please answer the following questions about the news video you have just watched. To answer some of the questions, you will need to type answers in your

own words. For other questions, you will need to choose the correct answer from several options.

Q54 [Storage 1] From what you understood from this news story, what is panhandling?

Q55 [Encoding 1; action 1] Which of the following best describes panhandling?
- ❍ Begging for money. (1)
- ❍ Collecting donations for a charity. (2)
- ❍ Collecting money for a political cause. (3)
- ❍ Justifying begging with a made-up story. (4)
- ❍ I don't remember that part of the story. (5)
- ❍ I don't understand this question. (6)

Q56 [Storage 1] Apart from a neon vest, what else do panhandlers wear on them in Muskogee?

Q57 [Encoding 2, things 1] Apart from a neon vest, which of the following do panhandlers wear on them in Muskogee?
- ❍ Panhandling permit. (1)
- ❍ Social security card. (2)
- ❍ Birth certificate. (3)
- ❍ Unemployment card. (4)
- ❍ I don't remember that part of the story. (5)
- ❍ I don't understand this question. (6)

Q58 [Storage 3] Why do people wear neon vests and permits while panhandling?

Q59 [Encoding 3; causes and effects 1] Which of the following describes best why people wear neon vests and permits while panhandling?
- ❍ They are required by law to wear both a vest and a permit. (1)
- ❍ They are required by law to wear a permit, but most people choose to wear a neon vest for safety. (2)
- ❍ They are required by law to wear a permit, but they choose to wear a neon vest at night to attract attention of drivers. (3)
- ❍ They are required by law to wear a neon vest, but most wear a permit not to lose it. (4)
- ❍ I don't remember that part of the story. (5)
- ❍ I don't understand this question. (7)

Q60 [Storage 4] What was said about the back of the panhandling permit?

Q61 [Encoding 4; things 2] Which of the following is true about the back of the panhandling permit?

- ❍ It has a list of resources. (1)
- ❍ It has a barcode. (2)
- ❍ It has a police stamp. (3)
- ❍ It lists the rules of panhandling. (4)
- ❍ I don't remember that part of the story. (5)
- ❍ I don't understand this question. (6)

Q62 [Comprehension 1] Which of the following is true about panhandling situation in the town of Muskogee?

- ❍ Local rules do not take into account persons who panhandle while traveling from state to state. (1)
- ❍ Panhandling used to be illegal in Muskogee, but now it is legalized in that community. (2)
- ❍ Muskogee is one of only several communities in the U.S. where panhandling is legal. (3)
- ❍ Muskogee's community has discovered a perfect solution to the problem of panhandling. (4)
- ❍ I don't remember that part of the story. (5)
- ❍ I don't understand this question. (6)

1.2 Street Fee "Spoken Words + Pictures" Version

Q52 Please watch the following news video. After watching this news video, you will be asked to answer several questions about its content:

Q107 Now, please answer the following questions about the news video you have just watched. To answer some of the questions, you will need to type answers in your own words. For other questions, you will need to choose the correct answer from several options.

Q108 [Storage 5] What may be said about the atmosphere at the meeting?

Q109 [Encoding 5; action 2] Which of the following words best describes the debate during the meeting?

- ❍ Emotional. (1)
- ❍ Cheerful. (2)
- ❍ Calm. (3)
- ❍ Business-like. (4)
- ❍ I don't remember that part of the story. (5)
- ❍ I don't understand this question. (6)

Q110 [Storage 6] What issue was discussed at the meeting?

Q111[Encoding 6; things 3] Which of the following issues was discussed at the meeting?

- ❍ Sources of funding for road repairs and maintenance. (1)
- ❍ A ban on heavy transport in the business district. (2)
- ❍ Sources of funding for the construction of a bridge. (3)
- ❍ Enforcement of the use of environmentally friendly gas. (4)
- ❍ I don't remember that part of the story. (5)
- ❍ I don't understand this question. (6)

Q112 [Storage 7] Where does the money for road repairs come from now?

Q113 [Encoding 7; causes and effects 2] Which of the following is a current source of funding for road repairs and maintenance?

- ❍ Gas sales tax. (1)
- ❍ Street fee on business. (2)
- ❍ Tax on studded tires. (3)
- ❍ Federal grants. (4)
- ❍ I don't remember that part of the story. (5)
- ❍ I don't understand this question. (6)

Q114 [Storage 8] Apart from speaking at the meeting, what was the other way for people to express their ideas at the meeting?

Q115 [Encoding 8; action 3] Apart from the opportunity to speak at the meeting, which of the following was offered to the audience for expressing their ideas?

- ❍ Writing suggestions on posters. (1)
- ❍ Signing a petition. (2)
- ❍ Joining a focus group. (3)
- ❍ Voting by show of hands. (4)
- ❍ I don't remember that part of the story. (5)
- ❍ I don't understand this question. (6)

Q116 [Comprehension 2] Which of the following describes best the meeting's outcome for business owners in the city?

- ❍ They expressed their opinion, and they will not be able to further influence the text of the proposal. (1)
- ❍ They persuaded the City Council not to make business owners pay the street fee. (2)
- ❍ The proposal about the street fee will not reflect opinions of business owners. (3)
- ❍ They will be able to review the final version of the proposal about the street fee. (4)
- ❍ I don't remember that part of the story. (5)
- ❍ I don't understand this question. (6)

1.3 Senators Flee "Spoken Words + Pictures" Version

Q340 Please watch the following news video. After watching this news video, you will be asked to answer several questions about its content:

Q341 Now, please answer the following questions about the news video you have just watched. To answer some of the questions, you will need to type answers in your own words. For other questions, you will need to choose the correct answer from several options.

Q342 [Storage 9] In the building of which organization did the events take place?

Q343 [Encoding 9; place 1] Which of the following describes best the place where the events happened?

- ❍ State Senate. (1)
- ❍ High school. (2)
- ❍ State court. (3)
- ❍ Local hospital. (4)
- ❍ I don't remember that part of the story. (5)
- ❍ I don't understand this question. (6)

Q346 [Storage 10] Apart from observing the Senate chamber, how did they learn that all Democratic senators were absent from the Senate building?

Q347 [Encoding 10; action 4] Which of the following best describes how they learned that all the Democratic senators were absent from the Senate building?

- ❍ A state employee checked the offices of all missing senators to confirm they were not in the building. (1)
- ❍ They received a call from one of the Democratic senators confirming this. (2)
- ❍ Senators left notes on their tables with an explanation that they are out of the building. (3)
- ❍ Senators announced in advance their plans to miss the Senate session. (4)
- ❍ I don't remember that part of the story. (5)
- ❍ I don't understand this question. (6)

Q348 [Storage 11] What was happening at the same time with the vote on the bill and the search for the missing Democratic senators?

Q349 [Encoding 11; action 5] Which of the following best describes what the protesters were doing that day?

- ❍ They gathered inside the State Senate building. (1)
- ❍ They blocked the roads leading to the Senate. (2)
- ❍ They held a minute of silence. (3)
- ❍ They boycotted local businesses. (4)
- ❍ I don't remember that part of the story. (5)
- ❍ I don't understand this question. (6)

Q350 [Storage 12] What would be a financial outcome of the bill on which the Senate was supposed to vote that day?

Q351 [Encoding 12; causes and effects 3] Which of the following describes the best the financial outcome of the bill on which the Senate was supposed to vote that day?

- ❍ Reduction of salaries paid to public employees in Wisconsin. (1)
- ❍ Reduction of the amount of money allocated to Wisconsin's healthcare. (2)
- ❍ Reduction of rates of taxes in Wisconsin. (3)
- ❍ Reduction of the amount of money allocated to environmental programs in Wisconsin. (4)
- ❍ I don't remember that part of the story. (5)
- ❍ I don't understand this question. (6)

Q354 [Comprehension 3] Why did the Democratic senators choose to leave the Senate building and the state of Wisconsin?

- ❍ They knew they will lose the vote because they were a minority in the State Senate. (1)
- ❍ They used this as a political gesture to gain attention before the next elections. (2)
- ❍ They wanted to upset Republican Governor Scott Walker. (3)
- ❍ They wanted to postpone the end of the legislative season and get more Democrat-backed bills passed. (4)
- ❍ I don't remember that part of the story. (5)
- ❍ I don't understand this question. (6)

2.1 Panhandling "Written Words" Version

Q420 Please read the following news text. After reading this news text, you will be asked to answer several questions about its content:

Q421 Now, please answer the following questions about the news text you have just read. To answer some of the questions, you will need to type answers in your own words. For other questions, you will need to choose the correct answer from several options.

Q422 From what you understood from this news story, what is panhandling?

Q423 Which of the following best describes panhandling?
- ❍ Begging for money. (1)
- ❍ Collecting donations for a charity. (2)
- ❍ Collecting money for a political cause. (3)
- ❍ Justifying begging with a made-up story. (4)
- ❍ I don't remember that part of the story. (5)
- ❍ I don't understand this question. (6)

Q424 Apart from a neon vest, what else do panhandlers wear on them in Muskogee?

Q425 Apart from a neon vest, which of the following do panhandlers wear on them in Muskogee?
- ❍ Panhandling permit. (1)
- ❍ Social security card. (2)
- ❍ Birth certificate. (3)
- ❍ Unemployment card. (4)
- ❍ I don't remember that part of the story. (5)
- ❍ I don't understand this question. (6)

Q426 Why do people wear neon vests and permits while panhandling?

Q427 Which of the following describes best why people wear neon vests and permits while panhandling?
- ❍ They are required by law to wear both a vest and a permit. (1)
- ❍ They are required by law to wear a permit, but most people choose to wear a neon vest for safety. (2)
- ❍ They are required by law to wear a permit, but they choose to wear a neon vest at night to attract attention of drivers. (3)
- ❍ They are required by law to wear a neon vest, but most wear a permit not to lose it. (4)
- ❍ I don't remember that part of the story. (5)
- ❍ I don't understand this question. (7)

Q428 What was said about the back of the panhandling permit?

Q429 Which of the following is true about the back of the panhandling permit?
- ❍ It has a list of resources. (1)
- ❍ It has a barcode. (2)
- ❍ It has a police stamp. (3)
- ❍ It lists the rules of panhandling. (4)
- ❍ I don't remember that part of the story. (5)
- ❍ I don't understand this question. (6)

Q430 Which of the following is true about panhandling situation in the town of Muskogee?
- ❍ Local rules do not take into account persons who panhandle while traveling from state to state. (1)
- ❍ Panhandling used to be illegal in Muskogee, but now it is legalized in that community. (2)
- ❍ Muskogee is one of only several communities in the U.S. where panhandling is legal. (3)
- ❍ Muskogee's community has discovered a perfect solution to the problem of panhandling. (4)
- ❍ I don't remember that part of the story. (5)
- ❍ I don't understand this question. (6)

2.2 Street Fee "Written Words" Version

Q431 Please read the following news text. After reading this news text, you will be asked to answer several questions about its content:

Q432 Now, please answer the following questions about the news text you have just read. To answer some of the questions, you will need to type answers in your own words. For other questions, you will need to choose the correct answer from several options.

Q433 What may be said about the atmosphere at the meeting?

Q434 Which of the following words best describes the debate during the meeting?
- ❍ Emotional. (1)
- ❍ Cheerful. (2)
- ❍ Calm. (3)
- ❍ Business-like. (4)
- ❍ I don't remember that part of the story. (5)
- ❍ I don't understand this question. (6)

Q435 What issue was discussed at the meeting?

Q436 Which of the following issues was discussed at the meeting?
- ❍ Sources of funding for road repairs and maintenance. (1)
- ❍ A ban on heavy transport in the business district. (2)
- ❍ Sources of funding for the construction of a bridge. (3)
- ❍ Enforcement of the use of environmentally friendly gas. (4)
- ❍ I don't remember that part of the story. (5)
- ❍ I don't understand this question. (6)

Q437 Where does the money for road repairs come from now?

Q438 Which of the following is a current source of funding for road repairs and maintenance?
- ❍ Gas sales tax. (1)
- ❍ Street fee on business. (2)
- ❍ Tax on studded tires. (3)
- ❍ Federal grants. (4)
- ❍ I don't remember that part of the story. (5)
- ❍ I don't understand this question. (6)

Q439 Apart from speaking at the meeting, what was the other way for people to express their ideas at the meeting?

Q440 Apart from the opportunity to speak at the meeting, which of the following was offered to the audience for expressing their ideas?
- ❍ Writing suggestions on posters. (1)
- ❍ Signing a petition. (2)
- ❍ Joining a focus group. (3)
- ❍ Voting by show of hands. (4)
- ❍ I don't remember that part of the story. (5)
- ❍ I don't understand this question. (6)

Q441 Which of the following describes best the meeting's outcome for business owners in the city?

- ❍ They expressed their opinion, and they will not be able to further influence the text of the proposal. (1)
- ❍ They persuaded the City Council not to make business owners pay the street fee. (2)
- ❍ The proposal about the street fee will not reflect opinions of business owners. (3)
- ❍ They will be able to review the final version of the proposal about the street fee. (4)
- ❍ I don't remember that part of the story. (5)
- ❍ I don't understand this question. (6)

2.3 Senators Flee "Written Words" Version

Q442 Please read the following news text. After reading this news text, you will be asked to answer several questions about its content:

Q443 Now, please answer the following questions about the news text you have just read. To answer some of the questions, you will need to type answers in your own words. For other questions, you will need to choose the correct answer from several options.

Q444 In the building of which organization did the events take place?

Q445 Which of the following describes best the place where the events happened?

- ❍ State Senate. (1)
- ❍ High school. (2)
- ❍ State court. (3)
- ❍ Local hospital. (4)
- ❍ I don't remember that part of the story. (5)
- ❍ I don't understand this question. (6)

Q446 Apart from observing the Senate chamber, how did they learn that all Democratic senators were absent from the Senate building?

Q447 Which of the following best describes how they learned that all the Democratic senators were absent from the Senate building?

- ❍ A state employee checked the offices of all missing senators to confirm they were not in the building. (1)
- ❍ They received a call from one of the Democratic senators confirming this. (2)
- ❍ Senators left notes on their tables with an explanation that they are out of the building. (3)
- ❍ Senators announced in advance their plans to miss the Senate session. (4)
- ❍ I don't remember that part of the story. (5)
- ❍ I don't understand this question. (6)

Q448 What was happening at the same time with the vote on the bill and the search for the missing Democratic senators?

Q449 Which of the following best describes what the protesters were doing that day?

- ❍ They gathered inside the State Senate building. (1)
- ❍ They blocked the roads leading to the Senate. (2)
- ❍ They held a minute of silence. (3)
- ❍ They boycotted local businesses. (4)
- ❍ I don't remember that part of the story. (5)
- ❍ I don't understand this question. (6)

Q450 What would be a financial outcome of the bill on which the Senate was supposed to vote that day?

Q451 Which of the following describes the best the financial outcome of the bill on which the Senate was supposed to vote that day?

- ❍ Reduction of salaries paid to public employees in Wisconsin. (1)
- ❍ Reduction of the amount of money allocated to Wisconsin's healthcare. (2)
- ❍ Reduction of rates of taxes in Wisconsin. (3)
- ❍ Reduction of the amount of money allocated to environmental programs in Wisconsin. (4)
- ❍ I don't remember that part of the story. (5)
- ❍ I don't understand this question. (6)

Q452 Why did the Democratic senators choose to leave the Senate building and the state of Wisconsin?

- ❍ They knew they will lose the vote because they were a minority in the State Senate. (1)
- ❍ They used this as a political gesture to gain attention before the next elections. (2)
- ❍ They wanted to upset Republican Governor Scott Walker. (3)
- ❍ They wanted to postpone the end of the legislative season and get more Democrat-backed bills passed. (4)
- ❍ I don't remember that part of the story. (5)
- ❍ I don't understand this question. (6)

3.1 Panhandling "Spoken Words" Version

Q453 Please listen to the following news audio. After listening to this news audio, you will be asked to answer several questions about its content:

Q454 Now, please answer the following questions about the news audio you have just heard. To answer some of the questions, you will need to type answers in your own words. For other questions, you will need to choose the correct answer from several options.

Q455 From what you understood from this news story, what is panhandling?

Q456 Which of the following best describes panhandling?

- ❍ Begging for money. (1)
- ❍ Collecting donations for a charity. (2)
- ❍ Collecting money for a political cause. (3)
- ❍ Justifying begging with a made-up story. (4)
- ❍ I don't remember that part of the story. (5)
- ❍ I don't understand this question. (6)

Q457 Apart from a neon vest, what else do panhandlers wear on them in Muskogee?

Q458 Apart from a neon vest, which of the following do panhandlers wear on them in Muskogee?
- ❍ Panhandling permit. (1)
- ❍ Social security card. (2)
- ❍ Birth certificate. (3)
- ❍ Unemployment card. (4)
- ❍ I don't remember that part of the story. (5)
- ❍ I don't understand this question. (6)

Q459 Why do people wear neon vests and permits while panhandling?

Q460 Which of the following describes best why people wear neon vests and permits while panhandling?
- ❍ They are required by law to wear both a vest and a permit. (1)
- ❍ They are required by law to wear a permit, but most people choose to wear a neon vest for safety. (2)
- ❍ They are required by law to wear a permit, but they choose to wear a neon vest at night to attract attention of drivers. (3)
- ❍ They are required by law to wear a neon vest, but most wear a permit not to lose it. (4)
- ❍ I don't remember that part of the story. (5)
- ❍ I don't understand this question. (7)

Q461 What was said about the back of the panhandling permit?

Q462 Which of the following is true about the back of the panhandling permit?
- ❍ It has a list of resources. (1)
- ❍ It has a barcode. (2)
- ❍ It has a police stamp. (3)
- ❍ It lists the rules of panhandling. (4)
- ❍ I don't remember that part of the story. (5)
- ❍ I don't understand this question. (6)

Q463 Which of the following is true about panhandling situation in the town of Muskogee?

- ❍ Local rules do not take into account persons who panhandle while traveling from state to state. (1)
- ❍ Panhandling used to be illegal in Muskogee, but now it is legalized in that community. (2)
- ❍ Muskogee is one of only several communities in the U.S. where panhandling is legal. (3)
- ❍ Muskogee's community has discovered a perfect solution to the problem of panhandling. (4)
- ❍ I don't remember that part of the story. (5)
- ❍ I don't understand this question. (6)

3.2 Street Fee "Spoken Words" Version

Q464 Please listen to the following news audio. After listening to this news audio, you will be asked to answer several questions about its content:

Q465 Now, please answer the following questions about the news audio you have just heard. To answer some of the questions, you will need to type answers in your own words. For other questions, you will need to choose the correct answer from several options.

Q466 What may be said about the atmosphere at the meeting?

Q467 Which of the following words best describes the debate during the meeting?

- ❍ Emotional. (1)
- ❍ Cheerful. (2)
- ❍ Calm. (3)
- ❍ Business-like. (4)
- ❍ I don't remember that part of the story. (5)
- ❍ I don't understand this question. (6)

Q468 What issue was discussed at the meeting?

Q469 Which of the following issues was discussed at the meeting?
- ❍ Sources of funding for road repairs and maintenance. (1)
- ❍ A ban on heavy transport in the business district. (2)
- ❍ Sources of funding for the construction of a bridge. (3)
- ❍ Enforcement of the use of environmentally friendly gas. (4)
- ❍ I don't remember that part of the story. (5)
- ❍ I don't understand this question. (6)

Q470 Where does the money for road repairs come from now?

Q471 Which of the following is a current source of funding for road repairs and maintenance?
- ❍ Gas sales tax. (1)
- ❍ Street fee on business. (2)
- ❍ Tax on studded tires. (3)
- ❍ Federal grants. (4)
- ❍ I don't remember that part of the story. (5)
- ❍ I don't understand this question. (6)

Q472 Apart from speaking at the meeting, what was the other way for people to express their ideas at the meeting?

Q473 Apart from the opportunity to speak at the meeting, which of the following was offered to the audience for expressing their ideas?
- ❍ Writing suggestions on posters. (1)
- ❍ Signing a petition. (2)
- ❍ Joining a focus group. (3)
- ❍ Voting by show of hands. (4)
- ❍ I don't remember that part of the story. (5)
- ❍ I don't understand this question. (6)

Q474 Which of the following describes best the meeting's outcome for business owners in the city?

- ❍ They expressed their opinion, and they will not be able to further influence the text of the proposal. (1)
- ❍ They persuaded the City Council not to make business owners pay the street fee. (2)
- ❍ The proposal about the street fee will not reflect opinions of business owners. (3)
- ❍ They will be able to review the final version of the proposal about the street fee. (4)
- ❍ I don't remember that part of the story. (5)
- ❍ I don't understand this question. (6)

3.3 Senators Flee "Spoken Words" Version

Q475 Please listen to the following news audio. After listening to this news audio, you will be asked to answer several questions about its content:

Q476 Now, please answer the following questions about the news audio you have just heard. To answer some of the questions, you will need to type answers in your own words. For other questions, you will need to choose the correct answer from several options.

Q477 In the building of which organization did the events take place?

Q478 Which of the following describes best the place where the events happened?

- ❍ State Senate. (1)
- ❍ High school. (2)
- ❍ State court. (3)
- ❍ Local hospital. (4)
- ❍ I don't remember that part of the story. (5)
- ❍ I don't understand this question. (6)

Q479 Apart from observing the Senate chamber, how did they learn that all Democratic senators were absent from the Senate building?

Q480 Which of the following best describes how they learned that all the Democratic senators were absent from the Senate building?

- ❍ A state employee checked the offices of all missing senators to confirm they were not in the building. (1)
- ❍ They received a call from one of the Democratic senators confirming this. (2)
- ❍ Senators left notes on their tables with an explanation that they are out of the building. (3)
- ❍ Senators announced in advance their plans to miss the Senate session. (4)
- ❍ I don't remember that part of the story. (5)
- ❍ I don't understand this question. (6)

Q481 What was happening at the same time with the vote on the bill and the search for the missing Democratic senators?

Q482 Which of the following best describes what the protesters were doing that day?

- ❍ They gathered inside the State Senate building. (1)
- ❍ They blocked the roads leading to the Senate. (2)
- ❍ They held a minute of silence. (3)
- ❍ They boycotted local businesses. (4)
- ❍ I don't remember that part of the story. (5)
- ❍ I don't understand this question. (6)

Q483 What would be a financial outcome of the bill on which the Senate was supposed to vote that day?

Q484 Which of the following describes the best the financial outcome of the bill on which the Senate was supposed to vote that day?

- ❍ Reduction of salaries paid to public employees in Wisconsin. (1)
- ❍ Reduction of the amount of money allocated to Wisconsin's healthcare. (2)
- ❍ Reduction of rates of taxes in Wisconsin. (3)
- ❍ Reduction of the amount of money allocated to environmental programs in Wisconsin. (4)
- ❍ I don't remember that part of the story. (5)
- ❍ I don't understand this question. (6)

Q485 Why did the Democratic senators choose to leave the Senate building and the state of Wisconsin?

- ❍ They knew they will lose the vote because they were a minority in the State Senate. (1)
- ❍ They used this as a political gesture to gain attention before the next elections. (2)
- ❍ They wanted to upset Republican Governor Scott Walker. (3)
- ❍ They wanted to postpone the end of the legislative season and get more Democrat-backed bills passed. (4)
- ❍ I don't remember that part of the story. (5)
- ❍ I don't understand this question. (6)

APPENDIX G. Multiple regression analysis of predictors of encoding (unstandardized regression coefficients, 2-tailed test).

	Regression†								
Predictor variables	1	2	3	4	5	6	7	9	10
Gender (being a woman)	-.29	-.34	-.48	-.55	-.44	-.62	-.44	-.54	-.56
Education in the U.S.	.03	.02	.02	.03	-.02	-.04	-.02	-.03	-.03
Having K-12 children	-.07	-.08	-.12	-.19	-.09	-.05	-.09	-.03	-.07
Plans to go back		-.69	-.66	-.72	-.43	-.44	-.43	-.42	-.38
Acculturation		.06	.14	.19	-.14	.14	.14	.14	.17
Psychological wellbeing		-.03	-.03	-.02	-.03	-.02	-.03	-.02	-.02
News consumption			-.32	-.16	-.17	-.34	-.17	-.38	-.41
Being in the researcher's sample				.78	1.05*	1.08*	1.05*	1.07*	1.05*
Language proficiency (Lang)					.19	.18‡	.19	.14	.05
Length of stay (LOS)					.03*	.03*	.03	.03*	-.07
"Written words"						.84‡	—	—	—
"Spoken words + pictures"						1.47**	—	—	—
(Constant ["Spoken words"])						5.03*	—	—	—
(Constant)						—	5.21	6.69**	8.40*
$\overline{X}_{\text{"spoken words"}} - \overline{X}_{\text{("written words" + "spoken words + pictures")}}$						—	—	-2.65	1.15
$\overline{X}_{\text{"written words"}} - \overline{X}_{\text{"spoken words" + pictures"}}$						—	—	5.57	.55
Lang x LOS							-.00	—	.01
$\overline{X}_{\text{Lang}} - 1SD$							.03	—	—
$\overline{X}_{\text{Lang}}$							.03*	—	—
$Max\ X_{\text{Lang}}$							.03*	—	—
$(\overline{X}_{\text{"spoken words"}} - \overline{X}_{\text{["written words" + "spoken words + pictures"]}})$ x LOS								—	-.30
$\overline{X}_{\text{LOS}} - 1SD$								—	—
$\overline{X}_{\text{LOS}}$								—	—
$\overline{X}_{\text{LOS}} + 1SD$								—	—
$(\overline{X}_{\text{"written words"}} - \overline{X}_{\text{"spoken words" + pictures"}})$ x LOS								—	.12
$\overline{X}_{\text{LOS}} - 1SD$								—	—
$\overline{X}_{\text{LOS}}$								—	—
$\overline{X}_{\text{LOS}} + 1SD$								—	—
$(\overline{X}_{\text{"spoken words"}} - \overline{X}_{\text{["written words" + "spoken words + pictures"]}})$ x Lang								.20	-.11
$\overline{X}_{\text{Lang}} - 1SD$								.80	—
$\overline{X}_{\text{Lang}}$								1.19**	—
$Max\ X_{\text{Lang}}$								1.38**	—
$(\overline{X}_{\text{"written words"}} - \overline{X}_{\text{"spoken words" + pictures"}})$ x Lang								-.26	-.22
$\overline{X}_{\text{Lang}} - 1SD$								1.13†	—
$\overline{X}_{\text{Lang}}$								.62	—
$Max\ X_{\text{Lang}}$								.38	—

Predictor variables	Regression†								
	1	2	3	4	5	6	7	9	10
($\overline{X}$ "spoken words" − $\overline{X}$ ["written words" + "spoken words + pictures"]) x Lang x LOS									.02
Low Lang/Low LOS									1.25
Low Lang/Mean LOS									.64
Low Lang/High LOS									.04
Mean Lang/Low LOS									1.22*
Mean Lang/Mean LOS									1.12*
Mean Lang/High LOS									1.03
Max Lang/Low LOS									1.20
Max Lang/Mean LOS									1.34**
Max Lang/High LOS									1.48*
($\overline{X}$ "written words" − $\overline{X}$ "spoken words" + pictures") x Lang x LOS									-.01
Low Lang/Low LOS									.98
Low Lang/Mean LOS									1.36
Low Lang/High LOS									1.73
Mean Lang/Low LOS									.47
Mean Lang/Mean LOS									.65
Mean Lang/High LOS									.83
Max Lang/Low LOS									.24
Max Lang/Mean LOS									.33
Max Lang/High LOS									.42
Total R^2	.010	.025	.032	.054	.109	.170*	.109	.185*	.193
F	.449	.569	.619	.939	1.572	2.162	1.42	2.02	1.51
R^2_{change}	.010	.015	.007	.022	.054*	.061*	.000	.015[a]	.008[b]
F_{change}	.449	.691	.924	3.111	3.935	4.674	.001	1.135	n/a

†Regression model 8 testing the effects of length of stay on encoding was not run. Regression 1 included only demographic information. Regression 2 had an additional block of characteristics specific to immigrant population. Regression 3 had an additional block of news consumption. Regression 4 added a statistical control of sources of recruitment. Regression 5 tested main effects of language proficiency and length of stay. Regression 6 tested main effects of modality. Regression 7 tested interaction effects of language proficiency and length of stay. Regression 9 tested interaction effects of modality and language proficiency. Regression 10 tested three-way interaction effects of modality, language proficiency, and length of stay.

‡These results obtained statistical significance ($p < .05$) in 1-tailed *t*-tests that were run for models for which omnibus test returned statistically significant results for the model fit and effects were in the predicted direction.

[a]Omnibus test.

[b]Handcalculated.

*$p < .05$. **$p < .01$.

APPENDIX H. Multiple regression analysis of predictors of comprehension (unstandardized regression coefficients, 2-tailed test).

Predictor variables	Regression†								
	1	2	3	4	5	6	7	8	10
Gender (being a woman)	-.04	-.03	.01	-.00	-.02	-.06	.00	-.07	-.01
Education in the U.S.	.03*	.03*	.03*	.03*	.04**	.03*	.04**	.03*	.04**
Having K-12 children	.03	.05	.06	.04	.03	.04	.04	.04	.06
Plans to go back		-.01	-.02	-.03	-.07	-.07	-.06	-.08	-.07
Acculturation		-.01	-.03	-.02	-.02	-.02	-.02	-.02	-.02
Psychological wellbeing		.01	.01	.01	.01	.01	.01	.01	.01
News consumption			.09	.12	.12	.08	.12	.06	.04
Being in the researcher's sample				.15	.11	.12	.10	.12	.10
Language proficiency (Lang)					-.02	-.02	.03	-.02	-.01
Length of stay (LOS)					-.00	-.00	.04	-.00	.03
"Written words"						.24	—	—	—
"Spoken words + pictures"						.38	—	—	—
(Constant ["Spoken words"])						.53	—	—	—
(Constant)						—	-.39	.83	.58
$\overline{X}_{\text{"spoken words"}} - \overline{X}_{\text{("written words" + "spoken words + pictures")}}$							—	.10	-2.26
$\overline{X}_{\text{"written words"}} - \overline{X}_{\text{"spoken words" + pictures"}}$							—	.31	2.21
LOS x Lang							-.00	—	-.00
$\overline{X}_{\text{LOS}} - 1SD$							.02	—	—
$\overline{X}_{\text{LOS}}$							-.03	—	—
$\overline{X}_{\text{LOS}} + 1SD$							-.07	—	—
$(\overline{X}_{\text{"spoken words"}} - \overline{X}_{\text{["written words" + "spoken words + pictures"]}})$ x LOS								.01	.00*
$\overline{X}_{\text{LOS}} - 1SD$								.15	—
$\overline{X}_{\text{LOS}}$								.33*	—
$\overline{X}_{\text{LOS}} + 1SD$								.50*	—
$(\overline{X}_{\text{"written words"}} - \overline{X}_{\text{"spoken words" + pictures"}})$ x LOS								-.01	.02
$\overline{X}_{\text{LOS}} - 1SD$								.26	—
$\overline{X}_{\text{LOS}}$								.11	—
$\overline{X}_{\text{LOS}} + 1SD$								-.05	—
$(\overline{X}_{\text{"spoken words"}} - \overline{X}_{\text{["written words" + "spoken words + pictures"]}})$ x Lang								—	.13
$\overline{X}_{\text{Lang}} - 1SD$								—	—
$\overline{X}_{\text{Lang}}$								—	—
$Max\ X_{\text{Lang}}$								—	—
$(\overline{X}_{\text{"written words"}} - \overline{X}_{\text{"spoken words" + pictures"}})$ x Lang								—	-.10
$\overline{X}_{\text{Lang}} - 1SD$								—	—
$\overline{X}_{\text{Lang}}$								—	—
$Max\ X_{\text{Lang}}$								—	—

Predictor variables	Regression†								
	1	2	3	4	5	6	7	8	10
$(\overline{X}_{\text{"spoken words"}} - \overline{X}_{\text{["written words" + "spoken words + pictures"]}})$ x LOS x Lang									.00
Low LOS/Low Lang									-.07
Low LOS/Mean Lang									.18
Low LOS/Max Lang									.30
Mean LOS/Low Lang									.08
Mean LOS/Mean Lang									.35*
Mean LOS/Max Lang									.47*
High LOS/Low Lang									.24
High LOS/Mean Lang									.51*
High LOS/Max Lang									.64*
$(\overline{X}_{\text{"written words"}} - \overline{X}_{\text{"spoken words" + pictures"}})$ x LOS x Lang									-.00
Low LOS/Low Lang									.44
Low LOS/Mean Lang									.22
Low LOS/Max Lang									.12
Mean LOS/Low Lang									.37
Mean LOS/Mean Lang									.10
Mean LOS/Max Lang									-.02
High LOS/Low Lang									.30
High LOS/Mean Lang									-.01
High LOS/Max Lang									-.15
Total R^2	.045	.049	.053	.059	.065	.094	.073	.105	.148
F	2.152	1.145	1.059	1.032	.903	1.095	.912	1.108	1.098
R^2_{change}	.045	.004	.004	.006	.006	.028	.007	.011[a]	.000[b]
F_{change}	2.152	.176	.565	.853	.422	1.990	1.003	.779	n/a

†Regression model 9 testing the effects of language proficiency on comprehension was not run. Regression 1 included only demographic information. Regression 2 had an additional block of characteristics specific to immigrant population. Regression 3 had an additional block of news consumption. Regression 4 added a statistical control of sources of recruitment. Regression 5 tested main effects of language proficiency and length of stay. Regression 6 tested main effects of modality. Regression 7 tested interaction effects of language proficiency and length of stay. Regression 8 tested interaction effects of modality and length of stay. Regression 10 tested three-way interaction effects of modality, language proficiency, and length of stay.

[a]Omnibus test.

[b]Handcalculated.

*$p < .05$. **$p < .01$.

VITA

Yulia S. Medvedeva is an instructor at Zayed University's College of Communication and Media Sciences in Dubai, United Arab Emirates. She received her undergraduate degree in management from Kostroma State University in Kostroma, Russia, and her master's degree with an emphasis in magazine editing from the Missouri School of Journalism where she was studying on a Fulbright scholarship. She served as a spokesperson for the Kostroma branch of the Russian Union of Youth, a nonprofit organization that aims to develop students' leadership and communication skills, and edited the organization's newspaper produced by a group of volunteer journalists. She also edited and managed a lifestyle magazine published by a chain of health and beauty salons in Kostroma. Medvedeva's research interests include the role the media play in immigrants' socialization, and issues related to production of niche media such as immigrant newspapers and city magazines. Her research has appeared in the *Journal of Magazine & New Media Research*, *Science Communication*, and *International Communication Research Journal.* Medvedeva taught a basic newswriting and reporting class as well as a large lecture on cross-cultural journalism at the Missouri School of Journalism. She now teaches newswriting, magazine design, multimedia storytelling, and ethics to Emirati students. The teaching activity she developed appeared in *Communication Teacher*. Her research and teaching works were presented at conventions organized by Association for Education in Journalism and Mass Communication, International Communication Association, and National Communication Association.