Understanding Videotext:

Listening Strategy Use by Adult Mandarin-Chinese English Language Learners

By

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Abstract

A vast number of news video listening materials are now easily accessible to English language learners (ELLs) due to developments in broadcast and multimedia technology. While little is known about how ELLs attempt to comprehend this challenging medium, researchers agree on the critical nature of listening skills, which researchers have placed at the heart of second language acquisition (Rost, 2002; Vandergrift, 2007; Wolvin & Coakley, 2000). This study sought to identify the listening strategies (i.e., language learning strategies, LLS) that adult intermediate to advanced level, native Mandarin Chinese-speaking ELLs use to comprehend authentic short documentary-style news video listening materials (i.e. videotexts). Linguistic knowledge (i.e. grammatical and structural knowledge) has been found to have a potentially large influence on strategy use (Santos, Graham, & Vanderplank, 2008). Thus a standardized measure was used to assess subjects' linguistic knowledge and listening proficiency. This was done to determine if differences exist in how subjects (n = 27) with lower and higher abilities in these two areas use listening strategies. Immediate retrospective verbal reports (i.e. subjects' verbal reports during pauses while listening) were used to collect data about the strategies. The data were then transcribed, coded, and quantitatively analyzed to answer three research questions. A written free recall measure was used to assess subjects' comprehension of the operational videotext and to help answer three research questions. Key results include subjects with higher listening proficiency using significantly more bottom-up and total strategies as well as recalling significantly more audio-only idea units while also recalling significantly fewer image-only idea units. Linguistic knowledge was not found to have a strong quantitative relationship with strategy use. All results are discussed in order to contribute to future research and curricular development in the area of listening strategies and the use of videotext for educational purposes.

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Chapter 1

Introduction

Background of the Study

Many researchers have recognized the critical nature of listening comprehension skills in second or foreign language (L2) acquisition (Vandergrift, 2007; Wolvin & Coakley, 2000), some even viewing it as the "primary means of L2 acquisition" (Rost, 2002, p. 103). However, both teachers and students do not clearly understand how to develop this skill (Chambers, 1996; Graham, 2006). With regard to language learning in general, it is certainly true that educators have become increasingly aware of and interested in "the contribution made by the learners themselves in the teaching/learning partnership" (Griffiths, 2004, p. 10). As Griffiths points out, it is only stating the obvious that some students are more successful at learning languages than others; language learning strategy (LLS) theory postulates that, "other things being equal, at least part of this differential success rate is attributable to the varying strategies which different learners bring to the task" (p. 10). Because of this conscious ability of learners to influence their own learning, language learning is firmly a cognitive process, based on cognitive psychology and information-processing models, and similar to any other kind of learning (Anderson, 1980; Griffiths, 2004; McLaughlin, 1987; see Chapter 2 for greater explication). While there are a number of definitions, listening strategies, as used in the present study, refer to the listener's "conscious plans to manage incoming speech, particularly when the listener knows that he or she must compensate for incomplete input or partial understanding" (Rost, 2002, p. 236).

Language learning strategies have been researched quite extensively in applied linguistic books and journals for more than 30 years (Naiman et al.1978; Wenden & Rubin, 1987, O'Malley & Chamot, 1990; Oxford, 1990; Cohen 1998; Vandergrift, 2007). As in most fields,

the research has changed shape over that time period. In the 1970s, LLS research focused mostly on strategies that "good learners" exhibited (Rubin, 1975). Then in the 1980s, the emphasis shifted to the description and classification of strategies (O'Malley & Chamot, 1990; Oxford, 1990) by drawing primarily from the extensive first language (L1) literature about reading strategies. In the 1990s, there was a change to experimenting with different interventions in the classroom to determine whether learners could improve by either learning new strategies or by using those already in their repertoires more effectively (Cohen & Weaver, 2005). The past decade has seen LLS research continue to diversify, looking at strategy use in relation to such areas as: more and less proficient learners (Nisbet, Tindall, & Arroyo, 2005; Holt, 2006; Park, 2006; Magogwe & Rhonda, 2007; Wu, 2008), gender (Ozeki, 2000; Li, 2006; Karbalaei & Rajyahree, 2009; Madani & Azizmohammadi, 2009) task types (Oxford, Cho, Leung, & Kim, 2004; Chang 2009), and learning styles (Oxford, 2001; Cohen & Dörnyei, 2001; Cohen & Weaver, 2005).

Even more recently, researchers have begun exploring the relationship of strategy use with different types of listening texts. Cross (2009) used news *videotexts* as materials in his quasi-experimental study of instruction of listening strategies. Videotexts, or video media, are "characterized by the combination of visual and auditory information in close temporal sequence" (Wetzel, Radtke, & Stern, 1994, p. 40). Cross found significant improvement in listening performance for both experimental and control groups. While results showed no difference for the (experimental) group receiving the additional explicit strategy instruction, Cross suggested that the significant improvement of both experimental and control groups might be attributed to the use of a task-based pedagogical cycle and collaborative learning effects. In other words, the repetition of tasks during instruction and group work may have caused the improvement found for both groups rather than the listening strategies that were practiced by the

experimental group. Cross stated that controlling for those effects in future studies could remove a confounding variable as a cause of gains by both groups (Cross, 2009; Cross, personal communication, July 29, 2010). Though he found it impractical during his study due to time constraints, he advocates using verbal reports in which immediate introspection about strategy use during a real listening task can be recorded, rather than learner interviews (i.e., learner self-perceptions of strategy use disconnected from an authentic listening text and task). It is critical to identify, in the most valid and reliable way possible, strategies and patterns of strategy use among a group of L2 learners prior to designing a listening strategy instruction program or research project.

Use of videotexts in listening strategy research.

There is some support for visual elements being able to provide context and non-linguistic input to activate *top-down processing*, i.e., the use of context and linguistic and world knowledge "to build a conceptual framework for comprehension" (Vandergrift, 2007). However, few listening strategy studies have used videotext. Seo (2000) reported that L2 listeners who listened to and watched a videotext simultaneously appeared to use more top-down processing strategies to compensate for inadequate linguistic knowledge than those who only listened. However, Gruba (2004) found that visual elements interact with the aural channel in complex ways that "go beyond merely 'supporting' verbal elements," and should be regarded as "integral resources to comprehension whose influence shifts from primary to secondary importance as a listener develops a mature understanding of the videotext" (p. 51).

When L2 learners use a non-native language during interactions with spoken text, they rarely use only the auditory channel, such as what occurs during a telephone conversation or while listening to the radio. Thus, using videotexts allow the type of visual cues and support that most learners would have during face-to-face interactions.

Listening strategies.

Returning to L2 listening, research in this vital area has traditionally focused on the product of listening, i.e., test scores. Yet while answers "may verify comprehension . . . they reveal nothing about how students arrived at comprehension or, more importantly, how comprehension failed" (Vandergrift, 2007, p. 196). As language instruction has become more learner-focused and attempted to transfer responsibility for learning away from instructors and toward self-directed learning (Cohen & Weaver, 2005), there has been a natural movement away from product-based research and towards process-based research. Listening-strategy research has been one of the venues of this inquiry, as it attempts to shed light on comprehension processes and failures.

Although research in the area of listening processes and strategies has been increasing, it remains the least understood and least researched of the four skills (Vandergrift, 2007). The main reason for this is that as a receptive skill, listening processes can only be viewed and assessed indirectly. There is also evidence that the challenges in L2 listening create anxiety in learners because of the pressure it places on them to process input rapidly (Arnold, 2000). Thus, while reading is also a receptive skill, the fact that the text can be repeatedly viewed as well as processed at the reader's preferred rate, listening can require more cognitive resources (i.e., working-memory capacity). The listening strategies used by subjects in this study are found in the list in Appendix A.

The Problem Statement

Since strategy use and successful listening performance have been major claims of listening strategy theorists, it is not surprising that the relationship between these two variables has received the most attention by researchers (Macaro, Graham, & Vanderplank, 2007). As

implied by the above reference to 1970s research, this agenda has often been referred to as an investigation of *successful listeners* versus *unsuccessful listeners*. Successful listening, however, has been measured in a wide variety of ways. For example, participants in O'Malley, Chamot, and Küpper's (1989) study were simply designated as successful or unsuccessful by their teachers; Young (1997) used student self-ratings of listening proficiency; Vandergrift (1997b, 1998a, 1998b) assessed success qualitatively by analyzing subjects' verbal protocols; Vogely (1995), Osada (2001), and Chien and Wei (1998) assessed comprehension by means of free recall tasks (Chapters Two and Three); Laviosa (2000) and Vandergrift (2003a) used multiple-choice tests; Goh (1998) used a national listening test; Murphy (1985) used two different listening tests and a reading test; and Peters (1999) used a battery of tests including multiple choice.

However, as Macaro, et al. (2007), pointed out, the problem goes beyond assessing comprehension success. These researchers state that several factors may be impeding a putative claim for a correlation between strategy use and listening success. Chief among the variables that need to be accounted for are learners' linguistic knowledge. As Macaro, et al. (2007), stressed,

> In order to demonstrate causality, one needs to measure other aspects of learner competence in order to ensure that the choice of listening strategies is not influenced, as Laviosa (2000: 134) argues, by the general proficiency level in the target language. If strategy use is the 'value added' component in skill-related L2 processing, then, researchers need to control at the very least for linguistic knowledge (vocabulary and grammatical knowledge) (p. 168).

Research Questions

A research study reported in Graham, Santos, and Vanderplank (2010) and Santos, Graham, and Vanderplank (2008) investigated the connection between strategy use and listening success. The researchers did this by dividing subjects into four groups: top linguistic knowledge/top listening proficiency (TLK/TLP), top linguistic knowledge/bottom listening

proficiency (TLK/BLP), bottom linguistic knowledge/top listening proficiency (BLK/TLP), and bottom linguistic knowledge/bottom listening proficiency (BLK/BLP). The present research study used the linguistic knowledge and listening proficiency of participants as determined by the Oxford Online Placement Test (OOPT, see Chapter Three for further explanation) to investigate the strategy use of adult intermediate to advanced native Mandarin Chinese speakers while trying to comprehend short documentary-style news videotexts. However, the current study did not ultimately use the same groupings as Graham, et al. (2010) and Santos, et al. (2008) due to the limited number of subjects and data collected from these subjects for the quantitative analyses performed. The research questions investigated are:

1. Is there a relationship between strategy use and linguistic knowledge according to number and type of strategies used?

2. Is there a relationship between strategy use and listening proficiency according to number and type of strategies used?

3. Is there a relationship between linguistic knowledge and the number of audio-only, image-only and a combination of audio-and-image idea units recalled?

4. Is there a relationship between listening proficiency and the number of audio-only, image-only and a combination of audio-and-image idea units recalled?

5. Do the percentage of audio-only, image-only and a combination of audio-and-image idea units recalled differ according to the number and type of listening strategies used?

For Research Question One, linguistic knowledge was the dependent variable and strategy numbers and types of strategies were the independent variables. For Research Question Two, listening proficiency was the dependent variable and numbers and types of strategies were the independent variables. For Research Question Three, linguistic knowledge was again the dependent variable, but audio-only, image-only and audio-and-image idea units were the independent variables. For Research Question Four, listening proficiency was the dependent variable and audio-only, visual-only, and combined audio-and-image idea units were the

independent variables. And finally, for Research Question Five, listening strategies were the dependent variable and numbers of the three types of idea unit scores were the independent variables.

As noted in the research questions and previous paragraph, *idea units* were independent variables in Research Questions Three through Five. As used in this study, *idea units* were the unit of measure for the listening comprehension recall test given to subjects after viewing the operational news videotext. An *idea unit* was defined as "a single main or subordinate clause, including adverbial and relative clauses" (Carrell, 1985, as cited in Cross, 2009, p. 169). More explanation of the listening comprehension recall measure is provided in Chapter Three.

The first two research questions are investigated according to number and type of strategies used. *Type of strategies* consists of cognitive and metacognitive as well as bottom-up and top-down strategies. The fifth research question was also investigated according to number and type of identified strategies.

Furthermore, the first four research questions were investigated using subject scores on two sections of the Oxford Online Placement Test (OOPT) as well as strategies elicited during an immediate retrospective verbal report. Briefly, an immediate retrospective verbal report (VR) was carried out by a subject during pauses in the videotext during which the subject verbally related what he or she was thinking about in the videotext segment just prior to the pause as the subject attempted to comprehend the videotext. Further explanation of verbal reports is provided in Chapters Two and Three. For Research Questions Three and Four, besides scores from the OOPT, scores from a written free recall of idea units (i.e. comprehension measure) were used. For Research Question Five, scores on the written free recall were used along with total and

types of strategies. Null hypotheses as well as predictions of results are provided near the end of Chapter Three.

Purpose of the Study

One purpose of this primarily quantitative study is to determine if there is a relationship among linguistic knowledge, listening proficiency, and listening strategy use by intermediate to advanced native Mandarin Chinese speakers while trying to comprehend short documentary-style news videotexts. In addition, it is expected that a better understanding of the roles that audio- and image-encoded messages play in the listening comprehension process and strategy use of subjects will emerge. These two purposes were investigated quantitatively through the use of the Kendall's tau_a statistic (see Chapter 3). Macaro (2004) has written that strategies' "effectiveness or noneffectiveness derives from the way they are used and combined in tasks and processes" (p. 325) rather than in the raw number of strategies used. However, since so few studies have examined listening strategies using videotexts, researchers should attempt to establish a quantitative relationship between variables as well as qualitative examination of how subjects employ strategies. A qualitative investigation of the data may reveal more insights into listening strategy use with videotexts, but this is beyond the scope of the present research. While influenced by the work of Graham, Santos, and Vanderplank (2010), the present study differs both in its use of standardized measures with participants to determine their levels of linguistic knowledge and listening proficiency and in how groups were divided for analysis.

Significance of the Study

The skill of listening in L2 teaching is the least researched and least understood skill. Learners today expect and demand multimedia learning materials. Increased accessibility of such emerging online technologies as streaming videos and on-demand learning materials make multimedia an especially important area for listening development and research (Goodwin-Jones,

2007; Tschirner, 2001, Vandergrift, 2007). Researchers have called for increased research and understanding of learners' listening strategy use with different tasks and tests (Macaro, et al., 2007; Vandergrift, 2007). The present study will contribute to the literature of listening strategies within L2 contexts by improving the understanding of how learners with differing levels of linguistic knowledge and listening proficiency use strategies to comprehend short documentary-style news videotexts. This study is a first step towards designing listening strategy instruction programs for ELL adult, native Mandarin-speaking populations using this widely available type of news videotext. Though Graham, et al., (2010) also examined differences in strategy use according to linguistic knowledge and listening proficiency, these researchers used audio-only materials. Thus, the present study is significant for using this dynamic text type for the first time to examine strategy use in relation to the above two variables.

Limitations and Delimitations of the Study

The participants in the study were adult intermediate to advanced L2 learners of English at a large international branch of a bank in northern Taiwan. Also, since the language learning strategies employed differ by text and task type, generalizing the results to other types of listening materials beyond short, documentary-style news videotexts or to comprehension measures other than written free recalls of idea units should be done with caution. However, by carefully and explicitly revealing the steps taken to produce valid and reliable results, this study should be replicable with different populations of language learners in order to determine the value of the methods used.

Conclusion

Listening strategy research has been increasing over the past 20 years. However, there remains a need to determine how listeners understand different types of texts in order to create methodologically and pedagogically sound instructional programs. The present study seeks to

determine how intermediate- to advanced-level native Mandarin-speaking ELLs with differing levels of linguistic knowledge and listening proficiency use listening strategies to comprehend short, documentary-style news videotexts.

The subsequent chapter will review important literature related to L2 listening strategy research. Chapter Two will also detail the use of different methods of listening strategy elicitation from learners in order to explain important decisions made in Chapter Three of this study.

Chapter II

Literature Review

This chapter aims to establish a theoretical framework for the current study by reviewing the existing research pertaining to listening strategies in L2 contexts. The chapter contains four sections. The first part begins with an overview of O'Malley and Chamot's (1990) original LLS framework and its foundation within cognitive psychology and information processing, and ends with Macaro's (2006) updated framework. The second part examines listening strategy research as it relates to listening proficiency, bottom-up and top-down processing, and linguistic knowledge. The third part outlines the use of videotexts in listening strategy research, including task and text characteristics, and the final part deals with methods for eliciting listening strategies from learners.

Theoretical Framework for LLS

Cognitive theory was developed from information processing models by cognitive psychologists, and has since been applied to explaining processes in both first language (L1) and second language (L2) acquisition (Mitchell & Myles, 2004). The theory posits that "language-related codes and structures are stored and retrieved from memory much like other information, and that language acquisition follows the same principles of learning as do other complex cognitive skills" (O'Malley et al., 1987, p. 288). The major models for LLS used in L2 come from McLaughlin (McLaughlin 1987, 1990; McLaughlin & Heredia, 1996) and Anderson (1980, 1983, 1985, 1987; Singley & Anderson, 1989). Because Anderson's Adaptive Control of Thought (ACT) model has been used as the basis for LLS, Anderson's processing model, as first used by O'Malley and Chamot (1985, 1990), will be examined in detail here.

In order to process information, three different memory stores are needed (Dachler & Bukatko, 1985): sensory memory (information from the outside world, retained for a second or less, some of which is transferred to), short-term memory (STM, including a processing component – working memory – and a storage component capable of retaining a limited amount of new knowledge for a very limited amount of time), and long-term memory (LTM), where knowledge from STM is stored without the limits on amount or time as it is with STM. LTM is able to do this because of its organizational structure: schemata, or interconnected frameworks of concepts (O'Malley, 1990).

Information representation in memory.

In cognitive theory, units of knowledge from STM are chunked syntactically together with semantic meaning. They are then interpreted, and the exact words maintained in working memory disappear and the meanings extracted by the learner's individual background knowledge move to LTM (Call, 1985). However, only information that has been maintained by active repetition and elaboration transfers to long-term memory. If the input is not processed fast enough, "task overload" (Byrnes, 1984, p. 324) occurs because the items already in STM are displaced by incoming information. This has important implications for learning complex skills such as language and relates directly to the need to carefully balance the difficulty level of listening materials both in the classroom and in research studies, for if working memory is overloaded, listening comprehension will be degraded. In the present study, for example, the news videotexts need to be challenging for participants so that listening strategies are under their conscious control, and are thus describable, but not so difficult that the level of comprehension is very low. In the latter situation, participants could get frustrated and give up rather than continuing attempts to compensate for a lack of comprehension through the use of listening strategies.

Knowledge is stored in LTM as either *declarative* or *procedural* mental representations (Anderson, 1985; Gagne, 1985). Declarative or factual knowledge is static information in memory, or what we know *about*. Procedural knowledge includes dynamic information in memory, or what we know *how to do*. Strategic knowledge is categorized as procedural because it works on the applications of our knowledge of rules to solve linguistic problems. This has important implications for LLS because, according to cognitive theory, simply raising learners' awareness of strategies (i.e., declarative knowledge) would not be sufficient to enable them to actually use new or under-utilized strategies in a truly facilitative or compensatory manner. A pedagogical cycle, including explanation and/or modeling, and ample opportunities for practice and feedback, would be necessary. This, however, is beyond the scope of the present study.

Declarative knowledge may be acquired quickly, and is formed into larger "chunks" which are then linked with other concepts (i.e. schemata) through the strength of their association. When one concept is activated in LTM by information entering into STM, other related mental representations in LTM also become activated to a greater or lesser degree depending on the association strength. While learning this type of information is relatively simple, retrieval and application of declarative knowledge can be slowed by the time required for spreading activation, and forgetting such knowledge also happens readily (O'Malley, 1990). However, procedural knowledge, such as language acquisition for ELLs, is acquired gradually, and only with extensive practice.

Stages of skill acquisition.

According to cognitive theory, there are three stages the learner must go through to acquire complex cognitive skills, including language skills: *cognitive*, *associative*, and *autonomous*. During this process, they become more proceduralized or automatic (Anderson 1983, 1985).

In the *cognitive* stage, learners are provided with rules or condition-action sequences in order to perform the task at hand. This stage requires conscious activity on the part of the learner, and the acquired knowledge during this period is usually declarative and can be described verbally by the learner (O'Malley, et al., 1987). While a description is possible, knowledge is inadequate at this point for skilled performance.

During the second stage, the *associative*, two major changes take place in the development of proficiency in the skill. First, errors in the original declarative representation of the stored information are slowly detected and discarded. Second, the connections among the various elements or components of the skill are strengthened. During the associative stage, declarative knowledge is transformed into its procedural form. Performance at this stage starts to look like expert performance, but is generally still slower and some errors may take place (O'Malley, et al., 1987). In L2 terms, this would correspond to a learner's *interlanguage*, a term coined in 1972 by Selinker and referring to "language produced by learners, both as a system which can be described at any one point in time as resulting from systematic rules, and as a series of interlocking systems that characterize learner progression" (Mitchell & Myles, 2004, p. 31). The continual restructuring of the linguistic system may indeed bring about the reappearance of some L2 errors (Mitchell & Myles, 2004), often by overgeneralization of rules.

Finally, in the *autonomous* stage, the learner increasingly fine tunes his or her performance. The skill becomes virtually automatic and fewer and fewer errors occur (O'Malley, et al., 1987). A key point is that diminishing demand is made on short-term and working memory, opening up cognitive resources to take in more declarative information and begin or continue the process of proceduralizing other complex skills. Learners at this point often lose the ability to describe the rules of the process they are using – in effect, their declarative representations are lost in the transformation to procedural knowledge. As mentioned earlier, if listening strategies

are too automatized, they may no longer be under conscious control of learners (and, for Macaro, 2004, 2006, have become a different construct in unconscious processes). In the present study, news videotexts will be carefully analyzed and pilot tested to be sure they are sufficiently challenging to bring listening strategies back under conscious control of participants so that they can be identified during verbal report protocols.

Also in the present study, the researcher will be eliciting listening strategies from subjects' prior to complete proceduralization. This is because strategies that are fully automatized are unlikely to be under the conscious control of individuals, much like L1 skills used by unimpaired adults, and thus would not be detectable in subjects' verbal reports elicited during a listening task.

Major claims of LLS theory are that it is possible to observe, record, and classify LLS. Two major LLS classification schemes have predominated throughout the last 25 years, one from O'Malley, Russo, Chamot, Stewner-Manzanares, and Küpper (1985) and one from Oxford (1985). O'Malley and colleagues used three families of strategies (*cognitive*, *metacognitive*, and *social/affective*), while Oxford had six families (cognitive has become the direct strategies of memory, cognitive and compensation; socioaffective has become the indirect strategies of social and affective; and metacognitive, also indirect, remains undivided). Cognitive strategies can be seen as those that help process, store and recall information. Metacognitive strategies help learners plan for, monitor and evaluate tasks and learning. Socioaffective strategies would be those that help by focusing on learner feelings or by learners interacting with others (R. Ellis, 1994b). Oxford's inventory was used to create the Strategy Inventory for Language Learning (SILL; Oxford, 1986, 1990a). This Likert-scale questionnaire attempts to measure a learner's frequency of strategy use, with the SILL's fundamental claim being that strategies are identifiable and quantifiable. The SILL has had a tremendous impact and, by the mid-1990s, it

was estimated that the SILL had been used to assess the strategy use of more than 10,000 learners around the world (Grenfell & Macaro, 2007), and more than 30 doctoral dissertations and a number of refereed articles have been based on the SILL (White, Schramm, & Chamot, 2007). As explained in the concluding part of this chapter, however, the SILL has come under attack on several fronts.

In opposition to both O'Malley, et al., (1985) and Oxford (1985), however, Macaro (2006), argues that "strategies are either directly involved in working memory processing (perception, decoding, processing, storage, and retrieval) or they oversee cognitive strategies via planning, monitoring, and evaluating for effectiveness" (p. 328). Thus, the former type is *cognitive* and the latter *metacognitive*. Macaro argues that affective strategies are contained within metacognitive strategies because the former require knowledge of oneself as a learner through recurrent monitoring of one's learning. He also proposes that social strategies are clusters of cognitive and metacognitive strategies that lead to strategic plans. Macaro uses the example of an L2 learner seeking out native speakers of that language for interaction. By doing this "in order to improve his or her learning, perhaps overcoming fear and shyness, he or she is not, in effect, doing anything other than deciding on a plan of action based on a cluster of strategies previously evaluated" (p. 328). Thus, instead of being a separate category of strategies, social strategies are simply combinations of cognitive, metacognitive, or both types of strategies. Macaro's (2006) reasoning appears to correct for needless subdividing of strategies and will be used in the present study for organizing inventories used for coding verbal report data and for reporting results, based on results from the pilot study of the current research and the work of Santos, et al., (2008), Vandergrift (1997b, 2003), and Young, (1997).

Finally, while some of the strategies that are effective in the learner's L1 will transfer to the L2, even advanced English language learners "may not transfer to English strategies from L1

such as the use of top-down processing, in which they use contextual clues to extract meaning from text" (McLeod & McLaughlin, 1986, in O'Malley, 1990, p. 490).

A revised framework.

Macaro (2006) delineates several concerns regarding LLS research that weakens its theoretical basis. Besides the vagueness of definitions, Macaro (2006) also listed a lack of agreement on the connection of strategies to processes and skills, and uncertainty regarding strategy transferability across tasks, situations and contexts. Further, Macaro notes the uncertainty about how general or abstract learner strategies are and whether there exist substrategies as well as strategies and, as a consequence, if they can be classified in a framework or a hierarchy.

Rather than present a comprehensive definition of learning strategies, which Macaro (2004) called "virtually impossible semantically and within our current knowledge of conscious, sub-conscious, and neurological mental activity" (p. 2), he offers a revised, updated cognitive theoretical framework that includes essential features of strategies, including:

- Strategies are conscious mental activity only occurring in working-memory;
- Strategies are orchestrated in clusters (by effective learners) and these clusters are both situation- and task-specific and transferable;
- Strategies can become automatized (though as some other construct in long-term memory) freeing up working-memory space, but may again come under conscious control in working-memory in response to a change in learning goal, desired outcome, and/or situation;
- Strategies may be inhibited by working-memory limitations or when a learner is below a certain linguistic threshold, though what this threshold may be is unknown (Santos, et al., 2008);
- Interdependent top-down and bottom-up processes consist of clusters of strategies in a dynamic in working-memory, and by applying these strategies, explicit L2 processes can take place; and
- The repeated activation (in working-memory) and subsequent automatization (in long-term memory) of top-down and bottom-up processes bring about skill development.

(adapted from Cross, 2009)

Listening Strategies as Related to Linguistic Knowledge, Skills, and Language Processes

Since the present study will analyze patterns of strategy use by using the levels of listening proficiency (i.e. listening skill) and linguistic knowledge of learners, it is necessary at this point to review the research in these two areas in relation to listening strategies. Also, since both *bottom-up* (i.e. those used for decoding language at the phoneme and word level) and *top-down* strategies continue to be a basic way of describing two different though interactive ways of processing incoming information, examining studies that have attempted to determine which type predominates for different texts and tasks is critical. The thorough review of listening strategy research by Macaro et al. (2007) serves as the basis for the current review.

The relationship of listening strategies and linguistic knowledge.

Vandergrift (1998a) judged that to be successful, listeners must overcome cognitive constraints in working memory by being strategic. The problem with this for Macaro, et al. (2007) however, "is in separating strategy-related success from perception/vocabulary-related success," (p. 170). These researchers point to data from Vandergrift's own study showing that the listener having more success appeared to recognize more words on which to base an inference than the less successful listener. Vandergrift is one of only a few researchers to admit that limited linguistic knowledge may be the principal reason behind differences in strategy use. Besides recognizing few words, some of his native English-speaking participants learning French have been forced to rely more heavily on cognates (i.e., words with similar spellings and meanings across two or more languages) as a basis for making inferences. The strategy of listening out for cognates, while possible between French and English, would not be possible between Mandarin-Chinese – the native language of participants in the present study – and English. However, Vandergrift also argues that limited linguistic knowledge can be overcome by extra-linguistic contextual clues and other strategies to "instantiate a schema" (Vandergrift, 1998a, p. 391).

Macaro, et al. (2007) are skeptical of this claim, however, as it is not clear how strategies could be used by learners who are having great difficulty comprehending anything from the listening texts. This returns to the idea of a *linguistic threshold* mentioned in the previous section of this chapter, but again there has been no determination of where this threshold may be.

Only two studies this researcher is aware of have used lexical and vocabulary knowledge as a control for examining differences in listening comprehension success. The first, by Chien and Wei (1998), used both audio-only listening materials and videotext to determine both comprehension level and strategy use for 15 total participants, for whom grammar and vocabulary proficiency levels were determined using the Michigan English Language Assessment Battery. The strategy categories of linguistic, non-linguistic, and cognitive do not closely match previously developed strategy inventories, such as the previously described lists of O'Malley et al. (1985) or Oxford (1985). Likewise, individual descriptions of strategies appear to have been created *ad hoc* by the researchers. Like the present study, the researchers used written free recalls of idea units to assess listening comprehension, though the verbal reports to quantify strategy use in Chien and Wei's study took place post-listening and after the written free recalls. The current study used verbal reports of an immediately retrospective nature in which a participant paused the videotext and spoke about what he or she was thinking at that time. A section later in this chapter and in Chapter Three offers a thorough discussion of the different types of verbal reports and the advantages of those of an immediate retrospective nature.

Significant differences in strategy use were found in terms of both quantity and type, as related to listening comprehension success. Regression analysis indicated to the researchers that four strategies were "the effective factors for the understanding of listening tasks" (p. 75): *English-Chinese translation processes word for word or phrase for phrase, a tendency to rely on a vocabulary list in Chinese and English, paying attention to the verb tense, and attending to*

every word of the sentences. It was not clear from their methods why subjects had access to vocabulary lists during the free recall comprehension measure. The researchers also reported that some subjects at the same level of linguistic knowledge did not perform at similar levels in their listening comprehension. However, as Macaro et al. (2007) point out, the authors did not pursue this line of analysis to any great degree.

In a recent study using English secondary-level, lower-intermediate learners of French, Graham, et al. (2010) investigated listening strategy use and sources of knowledge (i.e. prior knowledge and linguistic knowledge). The researchers divided subjects into groups using grammaticality judgment and vocabulary recognition tests (i.e. linguistic knowledge) in addition to two types of listen tasks followed by multiple-choice tests (i.e. listening proficiency). Graham, et al. (2010) divided subjects into four groups: Top linguistic knowledge/top listening proficiency (TLK/TLP), top linguistic knowledge/bottom listening proficiency (TLK/BLP), bottom linguistic knowledge/top listening proficiency (BLK/TLP), and bottom linguistic knowledge/bottom listening proficiency (BLK/BLP). A total of 35 students' listening proficiency was assessed by means of "a recall protocol on four short listening passages on a familiar topic" (p. 5). Convenience sampling was used to select 23 students to listen to two listening passages that were used to draw insights into their strategy use. Subjects performed immediate retrospective verbal reports during self-initiated pauses in the listening passage as they attempted to answer multiple-choice comprehension questions in written English. Results were reported for the 14 students for whom complete data sets were available.

When using (metacognitive) prediction strategies, BLK subjects more commonly used them on a narrow lexical level in conjunction with selective attention and the writing of visual prompts that were often in the form of single words. When TLK students did attempt to predict lexis, it was usually together with the prediction of the overall theme of the listening passage and

with metacognitive strategies that involved questioning the appropriateness of lexical prediction (Graham, et al., 2010).

The researchers also found TLK students more likely to use problem identification strategy, and use it in combination with other strategies: self-evaluation and *strategy evaluation*, or *hypothesis formation* and comprehension monitoring. As for monitoring strategies in general, TLK students more often combined the recognition of a lack of comprehension (comprehension monitoring) with "follow-up" strategies such as *self-questioning* and *hypothesis monitoring*. For BLK students on the other hand, *comprehension monitoring* was more likely to be simply the acknowledgment of their lack of understanding, or of adopting such 'negative' strategies as deciding on a multiple-choice option that contained a word they had heard because they had not comprehended anything else. Overall, "monitoring seemed to depend on students having perceived enough relevant 'connected language' in the first place" (p. 126). Thus, it appeared that lower proficiency students had a harder time effectively monitoring their comprehension.

One of the major findings was that "while higher linguistic knowledge often led to more effective deployment of strategies, this was not always the case, leading us to conclude that it was not a guarantee of effective listening or effective strategy use" (p. 125). One TLK/BLP student exhibited strategy use that resembled BTK students: *predicting lexis* and *selective attention*. The student spoke of identifying items from multiple-choice questions to listen out for, attempting to match them with what she heard. While the researchers allowed that this might be a response to the multiple-choice task, it was not an approach followed by all students, "suggesting that individual strategy use had a bigger part to play" (p. 127). Also, three TLK/TLP students could not overcome their lack of understanding of a difficult word, 'helitreuillees' (helicoptered) through the use of world knowledge, a strategy which other TLK students, and even some BLK students, were able to use more effectively.

In their conclusions, the researchers stated that it was unclear how some learners had achieved the position of being "strategic" listeners, but others had not. Also, they inferred that a "a minimum level of vocabulary recognition is required for effective strategies to come into play, yet what that level might be is still unclear" (p. 127). Finally, they admitted that it was difficult to determine whether strategies were occurring simultaneously or whether the clusters were occurring serially. Young (1997) reported subjects using strategies in a clear linear order, thus leading her to create a hierarchy of strategy use.

Graham et al. (2010) approach the role of bottom-up and top-down processing from both a knowledge-source approach and a learner-strategies approach, unlike prior studies. While the present study will use subjects' linguistic knowledge to help answer Research Questions One and Three, non-linguistic knowledge, or prior knowledge, is also important for how listeners process language, and a number of listening strategies listed in Appendix A are prior knowledge-based. Relevant studies will thus be reviewed later in this chapter.

The relationship of listening strategies and general and listening proficiency levels.

First, it is important to understand that several studies have used what could be termed *general language proficiency* as a controlling variable in exploring the relationship between strategy use and listening success. As Macaro, et al., (2007) explains,

> 'Proficiency' is a term applied to the four language skills, usually aggregated, and is a measure of success in those skills regardless of chronological age and of the number of years that a language has been studied. Consequently, not only may it be masking other variables (for example, level of psychological maturity and language learning experience), but also includes listening proficiency by up to 25 per cent (p. 169).

Regardless, proficiency of some type has been used routinely as a measure.

O'Malley, et al., (1989) used teacher designations to divide 11 subjects into higher and lower general proficiency. The researchers described a hierarchical order of listening strategies based on Anderson's (1985) three-stage language processing model. They argued that their

subjects selected their attention in the *perceptual processing* stage, inferred the meaning of the text in the *parsing* stage, and used their prior knowledge in order to elaborate and make inferences in the *utilization* stage. Their conclusion, however, was not drawn from any thorough examination of subjects' verbal report protocols, and the systematicity of the strategy patterns was not tested (Young, 1997). Besides using different strategies than unsuccessful listeners, O'Malley, et al., (1989) reported that successful listeners appeared to divide the text into larger chunks and link them together rather than focusing on individual words. Successful listeners also made greater use of *selective attention* and *self-monitoring* (both metacognitive strategies) and *elaboration* and *inferencing* (both cognitive strategies), suggesting a greater need to use top-down strategies for successful comprehension.

Young (1997) explored the listening strategy use of 18 Cantonese-Chinese university-level ELL students in Hong Kong. She used three commercially produced, though "authentic or unscripted" (p. 38) audio recordings that were less than five minutes each in length. Data were collected through a background questionnaire, verbal report during pauses in the listening text, and post-listening interview. Like O'Malley, et al., (1989), Young also used unequal general proficiencies and reported a four-stage (systematic) hierarchy of strategies among the five out of 18 total subjects who used the most strategies, though a similar pattern was used by some of the subjects who used fewer strategies. The series of strategies repeating in the same order regardless of gender or English achievement was: 1) *Inferencing* (to guess the topic from contextual or acoustic clues) or *elaboration* (to activate their prior knowledge); 2) *summarization* (to reinforce their interpretation of the text); 3) *self-monitoring* or *self-evaluation* (to control their comprehension and to evaluate their strategy use); and 4) *feedback*, in which subjects questioned the speakers verbally, though of course, there were not any replies from the recorded speakers.

Though Young pointed out the tentative nature of her findings, such a serial ordering of strategy use, if confirmed, could have useful pedagogical implications.

Finally, it should be pointed out that unlike O'Malley, et al., (1989), Young (1997) found that listening ability was not related to frequency of strategy use nor strategy repertoires. Instead, which strategies learners deployed depended more on general English-language proficiency. Chapters Four and Five of the current study report and discuss results that differ from the above findings by Young.

Murphy (1985) and Osada (2001) based their conclusions about differences between groups of learners based on *listening* proficiency as opposed to general language proficiency. Murphy found more strategies being used by more highly proficient listeners and also that they used combinations of cognitive and metacognitive strategies more effectively than less proficient listeners. Osada used four short listening passages developed by the researcher and both free recall of idea units and analysis of answers to both global and local comprehension questions. It was determined that the less successful listeners were, the more they relied on bottom-up processing. This finding is very different from that of the current study (Chapters Four and Five). Osada "assumed that the participants were not able to activate more cognitively demanding skills (top-down processing) simply because they preoccupied themselves with extracting information from the text instead of focusing globally on the whole story" (p. 73). This led Osada to warn against an overemphasis on bottom-up skills instruction without helping students develop their ability to activate top-down knowledge. However, Macaro, et al. (2007) noted that since neither of these studies controlled for linguistic knowledge, it is not possible to tell whether a lack of success in strategy use was due to a linguistic deficiency or the inappropriate use of strategies.

In a more recent study using 75 Mandarin-Chinese speaking university students, Chang (2009) used a researcher-constructed listening proficiency test to divide subjects into low,

intermediate, and high ability levels. She reported that the major difference between lower and higher proficiency listeners was not in the number of strategies used, but in the preferential order and how they were utilized. Other findings included subjects' abilities to adapt their strategy use according to changes in the task conditions, the same strategy being used in different ways and for different purposes by subjects of unequal proficiency level, and that some strategies were interrelated and employed concurrently.

In a number of results from one major study, Vandergrift (1997b, 1998a, 1998b) reported on the relationship between strategy use and successful listening comprehension. Vandergrift used an oral proficiency interview to determine speaking and listening proficiency. He used results to classify subjects from *Novice I* to *Intermediate III* levels on the American Council of Teachers of Foreign Language (ACTFL) scale. Authentic audio-only texts were used as listening materials and verbal reports were used to collect strategy-use data. He found differences in strategy use by speaking and listening proficiency. In the 1998a article, Vandergrift reported that the five novice-level students depended more on prior knowledge to contextualize input that they could not otherwise understand. Because of their superior linguistic knowledge, the two intermediate-level participants seemed to rely less on schematic knowledge, possibly because their working memories were not being inundated by the ongoing speech. Vandergrift judged that subjects at this level were "able to create a more solid conceptual framework earlier in the listening process" (p. 393) than the novice-level subjects. Also what separated intermediate from novice subjects was the metacognitive strategy of *comprehension monitoring* used by the more advanced learners, as opposed to the widely used bottom-up surface processing strategies of translation, *transfer*, and *repetition* used by the novices.

A later study (Vandergrift, 2003), used a multiple-choice listening test to determine which of 36 seventh grade core French language students had higher or lower listening

proficiency. While exposure to French-language instruction ranged from three to six years, Vandergrift used the ACTFL scale to control for general language proficiency. He found that more successful listeners used comprehension monitoring and metacognitive strategies in general significantly more often than less successful listeners. Again, this result is different from results found in the current research (Chapters Four and Five).

Overall, Vandergrift determined that comprehension monitoring seemed "to be vital to appropriate use of elaboration and successful inferencing" (1998a, p. 392). Vandergrift used his results to determine that a model of a skilled listener was taking shape, one who was more in control of the listening process than a listener of low skill level. However, he did find strategic differences among students of about the same general proficiency levels.

Goh (1998) has also reported differences in strategy use by listening success, though she subdivided strategies into multi-step *tactics*. She used a national listening test in Singapore to choose 16 students from a pool of 80 and divide them into lower and higher listening ability. Like Vandergrift (1997b, 1998a, 1998b), Goh also found that while lower ability listeners used a few strategies quite extensively, they did not use certain strategies and tactics that higher ability listeners used successfully.

Goh highlighted that lower proficiency listeners were "conspicuously lacking in metacognitive tactics in all three areas of planning (including coping), monitoring, and evaluating" (p. 141). She also found that higher ability listeners used more top-down strategies and were able to vary their deployment of tactics within each strategy better than lower ability listeners. Higher ability listeners in the current study were found to use significantly more bottom-up strategies than less proficient listeners (Chapters Four and Five). Goh (1998) reported that better listeners used *contextualization* more, i.e. putting a key word in a familiar context to comprehend it, or relating an item to something from an earlier part of the passage. In addition,

fewer lower ability listeners used real-time assessment of input, or assessed how important a word or phrase was to the understanding of the passage. Also, more high-level listeners used *comprehension evaluation*, which helps determine the accuracy and completeness of comprehension. Macaro, et al., (2007) explain that comprehension evaluation differs from *comprehension monitoring* in that while comprehension monitoring takes place almost at the same time as listening, comprehension evaluation seems to take place after listening and when listeners have made some kind of interpretation. Also like Vandergrift, Goh reported that higher ability listeners used a greater number of strategies and were able to adapt these strategies for use in more situations than lower-level listeners. Finally, better listeners' appeared to have more ability to continue with a difficult passage without giving up.

The relationship between listening strategies and non-linguistic knowledge.

According to Rost (2002), comprehension of spoken language is essentially an inferential process. Listeners attempt to create a mental representation of what they hear by using linguistic knowledge and world knowledge in parallel interaction (Hulstijn, 2003). These two sources of knowledge are basically bottom-up processes (BUP) and top-down processes (TDP), respectively. As mentioned in Chapter 1, listeners rely on BUP when they build meaning up, "gradually combining increasingly larger units of meaning from the phoneme-level up to discourse-level features" (Vandergrift, 2007, p. 193). TDP are favored when listeners "use context and prior knowledge (topic, genre, culture, and other schema knowledge stored in long-term memory) to build a conceptual framework for comprehension" (Vandergrift, 2007, p. 193). However, the degree to which listeners favor one process over the other depends on the reason for listening, learner characteristics such as level of language proficiency, and the context of the listening situation (Vandergrift, 2007). These three reasons for varying BUP and TDP hearken back to Macaro's (2006) framework in which he advises language learner strategy researchers to

describe strategies in terms of a goal, a situation, and a mental action. For Vandergrift (2007), if listeners need to verify a specific detail, they will use more BUP than listeners who want to comprehend the gist of the text. He also points out that native-language (L1) speakers have the ability to process aural input automatically and efficiently, and with little attention to individual words (i.e. "chunking" groups of words into larger units). However, this is not the case for L2 learners, particularly, of course, for beginning-level learners. Making use of all available resources is critical to comprehension, particularly "compensatory mechanisms – contextual, visual, or paralinguistic information, world knowledge, cultural information and common sense – are used strategically by L2 listeners to compensate for their inadequate knowledge of the target language" (p. 193).

However, there are dangers of using prior knowledge as a largely compensatory strategy, as Macaro, et al. (2007) have stated, and researchers have used a wide range of perspectives to examine the role of prior knowledge in listening. These include prior knowledge and text and task types, different uses according to general or listening proficiency, and prior knowledge and the balance of BUP and TDP processing. Several researchers have focused on whether the use of non-linguistic sources of knowledge can compensate for a lack of vocabulary and grammatical knowledge.

According to O'Malley, et al. (1989), prior knowledge can be divided into *world knowledge*, which is generally shared with others, and *personal knowledge*, which is more restricted. Prior knowledge was used effectively by students in their study to aid comprehension and improve recall after listening. Effective listeners were found to use prior knowledge to *self-question* about what they were listening to rather than giving up, as ineffective listeners often did. The first subject from the pilot study of the present research in particular also exhibited this self-questioning behavior on multiple occasions. In the O'Malley, et al. (1989) study, some of the

students' elaborations based on prior knowledge were not accurate, and these could lead to incorrect inferences when listeners were asked to recall what they had heard. As Macaro, et al. (2007) put it, "prior knowledge can be 'superimposed' on a listening task unsuccessfully" (p. 175).

A similar phenomenon was found in a study by Long (1990) in which 188 participants listened to two texts chosen to provide differing levels of prior knowledge, i.e. familiar and unfamiliar topics. Procedures included the use of a written summary (i.e. a type of free recall comprehension measure) and a recognition measure in which participants chose between correct (paraphrased) information and incorrect (paraphrased and distracting) information. Participants understood more if the topic was familiar, but a subgroup of them also tried illogical guessing or distorted information because of their prior knowledge. Also, when listening to the text on the familiar topic, no significant differences occurred when participants were asked to answer specific items (i.e. the recognition measure). This indicates a strong influence for prior knowledge when listeners have the freedom to respond to a text as they wish, e.g. free recall, but less effect when they are restricted in their responses by specific tasks such as previewing and answering multiple-choice questions. In the current study, both personal and world elaboration were used extensively by participants during their verbal reports, and since they had been told that they would have their listening comprehension checked by a written free recall (see Appendix L, *Study Procedures*), this "strong influence" may have also occurred in the present study. Finally, Long noted that it could "also be inferred that linguistic knowledge plays a prominent role in comprehension when appropriate schemata are not available to the listener" (p. 73). Though the current study did not specifically investigate the relationship between application of prior knowledge and linguistic knowledge, the current data could be reanalyzed in

this way. Also, future research should examine this relationship further, especially with more text and task types.

In the previously mentioned study by Young (1997), all participants were able to use *elaboration* to help them link their personal knowledge with information from the text. Less successful listeners, however, often over-applied their use of prior knowledge. When listening to an unfamiliar passage, the more successful listeners appeared to rely more on their superior linguistic knowledge and used metacognitive strategies to plan the listening process and to evaluate their comprehension. The less successful listeners focused on the text at the word level (i.e. BUP) and used *repetition*, *summarizing*, and *translating* for comprehension.

While several studies have investigated the connection between prior knowledge and texts and test items, three of the most important ones are summarized here. Chiang and Dunkel (1992) used 360 Chinese ESL students to explore the importance of prior knowledge on *passage-dependent* (i.e. local) and *passage-independent* (i.e. global) test items when listening to lectures. For both high and low listening proficiency groups, prior knowledge had a significant effect on participants' recall of information contained in the passage-independent test items. However, whether the familiar or unfamiliar topic was listened to did not affect performance on the passage-dependent items. Thus, if information in the text did not match the listener's surmise of what the passage might contain, prior knowledge was not effectively applied. The researchers also found that redundancy of lecture information aided the higher-performing listeners, but not the lower-performing ones. This finding could have important implications for future research and L2 lecture-comprehension instruction.

Osada (2001) investigated global and local information in the study of 91 Japanese EFL students' responses to these types of questions at three low proficiency levels. While it is not

surprising that global questions were more difficult for students to answer, as proficiency level decreased, so too did the difference between the number of correct global and local questions.

Tsui and Fullilove (1998) compared mean scores on different types of test items used in listening comprehension exams in Hong Kong using a very large data set: 20,000 students' answers to 177 questions collected over a seven-year period. The variables used were schema type and question type (e.g. global or local). Two types of schema were identified: *Matching schema*, in which initial and subsequent language input are in agreement, and non-matching schema, in which the earlier and later input are incongruent. Results were consistent in showing that correct answers on items of non-matching schema type, which are harder to answer since they cannot be directly matched using prior knowledge, were chosen by the most successful listeners. This result did not change whether the items were *global* or *local* questions. Thus, the key was listeners' ability to confirm their predictions from prior knowledge (i.e. TDP) against later in-text information using decoding skills (i.e. BUP). While Tsui and Fullilove used these results to promote a pedagogy balanced between BUP and TDP, they interpreted their results as indicating BUP was "more important than top-down processing in discriminating the listening performance of L2 learners on test items" (p. 432).

As can be seen from the results in this section, the different ways researchers describe and categorize strategies, as well as the wide variety of measures of skill levels and listening comprehension make it difficult to compare results and reach conclusions of which strategies could lead to better comprehension. One of the major goals of the current study in terms of methods is to create a guide for future researchers to use so that easier comparisons can be made. One way the current study does this is by using the Oxford Online Placement Test (OOPT), which is tied to the skills descriptors of the Common European Framework of Reference (CEFR)

language proficiency scale, to provide a standardized measure of both linguistic knowledge and listening proficiency (Chapter Three).

The Use of Videotext in L2 Listening Comprehension

Traditionally, *listening comprehension* has been defined only in terms of an ability to decode aural elements (Kellerman, 1992). As Gruba (2004) points out, however, these types of definitions have come under increasing attack during the last decade for an oversimplification of the complex construct of listening comprehension. Prominent listening theorist Rubin (1995a) recognized the need to include video-based listening in a definition, calling listening comprehension, "an active process in which listeners select and interpret information which comes from auditory and visual cues in order to define what is going on and what the speakers are trying to express" (p. 7). Gruba (2004) again comments that no specific role for "visual cues" is assigned and is essentially viewed as complimentary and working together with aural elements to influence the active process of listening comprehension. Other listening researchers (Lonergan, 1984; Thompson & Rubin, 1996) have written similar opinions. Rubin has even written that videotext enables listeners to "understand much more than their linguistic knowledge alone might permit" (1995b, p. 153). For Rubin, this leads to increased motivation for learning, aids in transfer of information to long-term memory, and reduces cognitive processing load primarily through three different elements: props, action, and interaction. Rubin writes that listeners use these phenomena to narrow interpretations when observing physical settings, validate tentative hypotheses when making sense of action, and judge emotional states when viewing interaction. Besides Rubin's conjectures, however, Gruba (2004) found little theoretical support for concluding a simple supporting role for visual elements in videotext, and pointed out that these "simplistic" views overlook studies that found that visual elements both compete and collaborate in message interpretation (Chun & Plass, 1997; Kirby, 1993).

Though Gruba (2004) never mentioned *dual coding theory*, this well-established theory in cognitive psychology could be appropriately applied to videotexts. Paivio (1971, 1983, 1986) describes dual coding theory as offering an explanation for psychological objects or events by the integrated behavior of verbal and non-verbal symbolic systems specialized for dealing with linguistic and non-linguistic information. The theory has been applied to such areas as language, education (Levin & Berry, 1980; Clark & Paivio, 1991), memory (Clark & Paivio, 1987), and learning processes (Mayer, 1989, 1997; Mayer & Anderson, 1991; Michas & Berry, 2000).

Paivio and his fellow researchers suggested that the functional characteristics of linguistic information are represented by a verbal symbolic system and those of non-linguistic information are represented by non-verbal symbolic systems. Both systems can be reciprocally transformed into each other, and are simultaneously independent and interconnected. Paivio (1975) uses the example of a chair to exemplify this: A person who sees a picture of a chair can recall the word *chair* and vice versa. The individual who recognizes either an image of a chair or the word chair or knows both the word and the image could recall both. Dual coding theory, according to Clark and Paivio (1991), designates that "imagery and verbal associative processes jointly determine learning and memory performance, with direct and indirect associations between verbal code influencing storage and retrieval of information" (p. 170).

Within the two independent symbolic systems, linguistic information is organized to facilitate "sequential, syntactic processing" (Clark & Paivio, p. 473), and non-linguistic information is ordered in "holistic nested sets with information available for processing in a synchronous or parallel manner" (p. 473). By means of interconnections between the two systems, a variety of cognitive activity could occur, including attempts at comprehending videotexts.

Thus, dual coding theory seems to place the visual and auditory channels of videotext on the same level. In any case, Gruba (2004) was motivated to investigate further by what he viewed as a lack of a theoretical foundation for visual images primarily playing a supporting role to the auditory channel. Specifically, his study was an effort to determine more precisely what L2 learners do when they attempt to comprehend digital video media.

Gruba (2004) used immediate retrospective verbal reports of 12 Australian university "upper intermediate" learners of Japanese who had volunteered to participate in the study. Gruba chose this level of learner based on balance. He concluded that if learners were lower level, the contents of the verbal reports would primarily be on the cognitive demands to process individual words. If his subjects were very advanced learners, on the other hand, their processing would be so automatic and unconscious that little would be verbalized. Gruba chose authentic Japanese news videotexts based on criteria suggested by Joiner (1990) so that each videotext:

- did not depict a well-known, or particularly disturbing, news event;
- did not require extensive background knowledge;
- did not contain subtitles or dubbing;
- contained a variety of locations, speakers and features of tradecraft or style;
- was professionally produced;
- lasted approximately one to two minutes; and
- was likely to represent a distinct level of difficulty
  (adapted from Gruba, 2004)

After a training session, participants were asked to verbalize as much as possible during pauses about their thought processes as they attempted to comprehend the news videotexts. It was not clear whether the pauses were pre-chosen by the researcher or controlled by the participant.

As mentioned in Chapter 1, Gruba (2004) concluded that visual elements function in many ways that supersede playing a supporting role to verbal elements. He writes that visuals are better understood as resources that are integral to comprehension and whose importance changes

from primary to secondary "as the listener develops a mature understanding of the videotext" (p. 51). It should be noted that the videotexts Gruba (2004) used in his study differ significantly from those used in the present study. For example, the videotexts used in his study include a high incidence of superimposed Japanese text (e.g. headlines, supporting information) that Gruba reports are common to Japanese television news broadcasts. Almost no written text appears in the videotext used in the present study. The materials used in the present study could therefore be seen as more purely combinations of pictorial images and audio text, whereas Gruba's (2004) materials also include written text and therefore depend to a certain degree on subjects' reading abilities. One product of his qualitative analysis was a seven-part framework, Table 2.1.

Table 2.1.

Summary of the Role of Visual Elements during Initial Front-to-Back Comprehension

Category name	Definition
Identify text type	Listeners utilize visual elements to identify text type [(*visual*) *inferencing*]
Initiate macrostructure	Listeners may utilize decoded written text to form an initial macrostructure
Generate tentative hypotheses related to an initial macrostructure	Listeners may utilize visual elements to generate a number of tentative hypotheses [*hypothesis formation*]
Confirm interpretation	Listeners may utilize visual elements to confirm an emerging interpretation [*hypothesis confirmation*]
Constrain, or refine, an interpretation	The presence of a visual element may help the listener narrow an interpretation from amongst other plausible meanings [*double-check monitoring*]
Hinder macrostructure development	Visual elements may confuse or hinder interpretation
Provide little assistance	At times, listeners report that visual elements add little to the development of a macrostructure

Note: adapted from "Understanding Digitized Second Language Videotext," by P. Gruba, 2004, Computer Assisted Language Learning , 17, 1, p. 63.

Note: Italicized words in brackets are listening strategies mapped onto Gruba's definitions from three sources: "Second Language Listening Strategy Research: Methodological Challenges and Perspectives," by D. Santos, S. Graham, and R. Vanderplank, 2008, Evaluation and Research in Education, 21, 2, p. 131-133; "The Comprehension Strategies of Second Language (French) Listeners: A Descriptive Study," by L. Vandergrift, Foreign Language Annals, 1997, 30, 3, p. 387-409; and "A serial ordering of listening comprehension strategies used by advanced ESL learners in Hong Kong," by M.-Y. C. Young, Asian Journal of English Language Teaching, 7, p. 35-53.

As Gruba's (2004) study was exploratory in its use of a specific type of videotext (i.e. Japanese television news broadcasts) to examine strategy use, it is not surprising that existing taxonomies of listening strategies do not include some of the categories Gruba identified. Also, the final two categories (i.e. *hinder macrostructure development* and *provide little assistance*) could not be defined as strategies, but may best be understood as parts of the text itself that interfere with comprehension.

In Table 2.1, *macrostructures* are defined as "higher-level semantic or conceptual structures that organize 'local' microstructures of discourse, interaction and their cognitive processing" (van Dijk, 1980, p. v). *Macrostructure* is a term used in constructivist or generative theoretical models of comprehension (Kintsch, 1998). While Gruba favors a constructivist theoretical view of listening comprehension as opposed to an information processing-based one, *macrostructure* is more or less equivalent to the term *schema* that has been widely used within both information-processing and constructivist perspectives, and both involve activating prior knowledge to facilitate comprehension.

The categories and definitions reported by Gruba in Table 2.1 provide a good example of how text type affects the strategy use by subjects. For example, in the category "initiate macrostructure," the definition includes the utilization of superimposed written text in the video to form a tentative macrostructure or schema. This type of strategy use would only be possible if headlines or other types of supporting written materials appeared over the video image. Television news broadcasts worldwide vary greatly in the use of superimposed written text, and thus researchers and teachers attempting to use Gruba's (2004) seven-part framework need to do so cautiously. Despite this, Gruba's seven-part framework and/or findings will be referenced during Chapter 5 (Discussion) in order to aid in the interpretation of the present study's findings,

as it appears to be the only framework produced to date that describes subjects' listening strategy use while attempting to comprehend news videotexts.

Thompson and Rubin (1996) used video with audio (i.e. videotext) instead of audio-only materials as input for their strategy-instruction study of third-year Russian language learners at an American university. The rationale for this choice was that "TV-generation" students often find video more interesting, challenging, and motivating than audio recordings and because video allows for the use of a wider range of strategies than audio. Indeed, over the course of one academic year, the researchers taught the intervention group (N = 24) a large number of both metacognitive strategies (*planning*, *defining goals*, *monitoring*, and *evaluating*) and cognitive strategies (*predicting content*, *listening to tone of voice and intonation*, and *resourcing*, i.e. writing down phrases to try to see what they mean). The researchers found that the intervention group made moderately significant gains when compared to the control group (N = 12) on the videotext, but non-significant gains on an audio-only test. Thompson and Rubin suggested both that more instruction time would create more significant gains on the video test, and that non-significant gains for the experimental group on the audio-only test were due to the use of videotext for instructional materials.

Like the listening strategy instruction study by Cross (2009) referred to in Chapter 1, Seo (2000) carried out research using videotexts. The researcher first used the multiple-choice Japanese Language Proficiency Test to establish the listening comprehension level of 10 Australian university-level, Japanese-as-a-foreign-language learners. Five learners received cognitive strategy training and were compared to a non-intervention group (NIG) of equal numbers using an audio-visual test (Japanese news videotexts). Based on their own schedules, participants decided which group to join. The researcher did not discuss subject variability. Seo selected three cognitive strategies (identifying key terms, elaborating, and inferencing) identified

in verbal protocols in the first phase of the study. The intervention group (IG) received five weekly instruction periods lasting one hour each, in which the researcher spent the first three sessions modeling the strategies with concurrent verbal reporting, and the last two weeks were reserved for student practicing the strategies while verbalizing. This was followed later by a one-hour review period. After the intervention, both groups were shown a total of seven news videotexts at an interval of one videotext every two weeks. Each viewing was followed up with a multiple-choice, true-false, and key-word identification test. Despite the IG outperforming the NIG on the final two out of eight weekly tests during the intervention, the NIG also scored gains and outperformed the IG in five of the seven post-tests. The sample size was small, there were possible test-familiarity effects, and the results from the videotext post-tests were compared to an audio-only baseline pre-test. Thus, in their review of learning strategy intervention research, Hassan, et al., (2005) determined that the results of Seo's study lacked weight.

Other studies involving videotext and listening comprehension have taken a less direct approach to listening strategies. Such studies have primarily been in two areas: advanced organizers (Chung, 1999, 2004; Herron, Cole, York, & Linden, 1998; Kim, 2004; Li, 2006) and testing (Chung, 2004; Wagner 2006). Wagner's study is of particular relevance to the present study since he used videotexts as study instruments and will be dealt with in greater detail at the end of this section.

The use of advance organizers "can be viewed as an attempt to see whether a strategy involving the use of prior knowledge can be activated by the teacher and whether this activation is successful" (Macaro, et al., 2007). Chung (1999) provided listeners with three alternatives: advance organizers, L2 (i.e. English) captions, and both organizers and captions. Herron, et al., (1998) gave subjects either (declarative) statements about the content of the videotext prior to watching or (interrogative) questions about the content. Both of these studies found an advantage

for the advance-organizer condition over the non-advance organizer condition, and while the type of advance organizer did not appear to matter, the effect was enhanced when combined with other activities that stimulated strategy use. In Chung's (1999) study, besides the use of captions, *other activities* could include a variety of student answer types in response to instructor questions. Macaro, et al., (2007) interpreted the stimulated strategies in the latter study as *prediction* (by way of advance organizers), *visualization* (through captions), and a combination of *monitoring of predictions with visualization*.

Kim (2004) studied the effects of using presentations of pictures and video cues for improving listening comprehension of English news videotexts. Using 687 Korean secondary students as participants, Kim found that overall comprehension as measured by recall, multiple-choice, and true/false tests was better with visual cues than without, while video cues were found superior to pictures. Kim also varied the timing of the presentation of cues to subjects, and it was found that priming had a more positive effect on listening comprehension than either simultaneous presentation or as (post-viewing) feedback.

Li (2006) investigated the effects of advance organizers, visual images, and gender differences on a videotext-based listening comprehension task by 120 Taiwanese university students. The *question preview* advance organizer had the most positive effect on listening comprehension in comparison to *summary of major scenes* and *cultural background cues* advance organizers. While no gender differences were found, a major finding was the effect of video presentation type on listening comprehension. The most facilitative type was playing a visual-only (silent) version of the video followed by a full audio-visual presentation over the other two presentation methods: a full audio-visual presentation and a visual-only viewing followed by audio-only narration. Li (2006) interpreted this finding as evidence that "seeing the overall context first in the silent film enhanced students' retention and comprehension,

presumably because the stimuli that involved visual images and associations with prior knowledge would be processed at a deeper level in the learner's cognitive structure" (p. v).

Chung (2004) investigated the use of question previewing and vocabulary pre-teaching (advance organizers) on listening comprehension performance as measured by both multiple-choice and open-ended questions. The participants were 188 Taiwanese university students who were randomly assigned to one of four treatment groups: question-previewing group, vocabulary pre-teaching group, both advanced organizer group, and a control group that received neither treatment. The videotexts were from an American television series created to promote English learning around the world. All participants viewed the two video segments twice. Results showed that the group that received both advanced organizers outperformed the other three groups, though Chung pointed out that the effects of question previewing were likely to be "assessment task-dependent" (p. 231).

Wagner's (2006) quasi-experimental study was designed to examine the use of videotexts on L2 listening comprehension tests. In the first part of the study, an experimental group viewed two videotext segments, a short academic lecture and a dialogue, and then took a listening comprehension exam. Scores were compared to a control group that listened to an audio-only version of the video and took the same listening exam. The experimental group scored significantly – 6.5% – higher than the audio-only group on the 40-item multiple-choice test. The second part of the study found that 36 test-takers watched (i.e. attended to) the video monitor almost 69% of the time while the text was being played. Finally, Wagner used verbal reports with eight of the subjects from the earlier two parts of his study to examine how test-takers reported attending to and utilizing the non-verbal information in the videotexts, particularly in relation to test performance. The verbal report data were coded for the cognitive and metacogitive strategies used by subjects both while processing the videotext and answering the

test items. Results showed a wide variation of test-takers' abilities to use the different components of the non-verbal information, as some of the participants reported no instances of attending to the non-verbal information, while others reported extensive attention to such information while processing the videotext.

Data Elicitation Methods for Listening Strategies

A variety of methods have been used to elicit LLS from learners. A major issue in LLS research has been that "strategies are, for the most part, not directly observable since they refer to internal, mental processes, and researchers must rely on learner accounts as indirect indicators of these mental processes" (White, et al., 2007). This is particularly true for listening strategies. Written diaries, logs, and journals have gained widespread acceptance as "important introspective tools in language research" (Nunan, 1992, p. 118). In listening strategy research, a number of researchers have used these types of learner-produced, retrospective accounts, often as means of triangulating other types of data (Cross, 2009; Goh, 1998, 2002). The other major elicitation methods are questionnaires, inventories and verbal reports. As Macaro, et al. (2007), put it, questionnaires and inventories offer the wide view, while verbal reports (e.g., concurrent think-aloud techniques, immediately retrospective verbal reports given during pauses in processing the text, and post-task reports) provide insights into skill-, text-, or task-specific strategy use.

The most widely used and efficient method of collecting strategy-use data has been through self-report questionnaires (White, et al., 2007). Besides the previously mentioned SILL, the Metacognitive Awareness Listening Questionnaire (MALQ) was developed by Vandergrift, Goh, Mareschal, and Tafaghodtari (2006). The MALQ is also a Likert-scale questionnaire and is designed to assess listeners' metacognitive awareness and perceived use of strategies while listening to oral texts, and "can be used for self-assessment, diagnosis, and research purposes"

(White, et al. 2007). The MALQ was trialed and validated using more than 1,000 learners worldwide, and the 21-item questionnaire reported a significant relationship between the reported listening strategies and actual listening performance (through confirmatory factor analysis) and verified a meaningful relationship between metacognition and listening comprehension success (Vandergrift, et al. 2006, in White, et al. 2007).

However, a criticism of large and general language learner strategy inventories such as the SILL comes from LoCastro (1994). She argued that such inventories were not transferrable across sociocultural domains and that their results and conclusions, therefore, might be less valid than claimed. She suggested that strategies developed under a grammar-translation method were not the same as those developed under a communicative approach. The key point is that strategy use would seem to be influenced by the learning environment. LoCastro made these claims after comparing Japanese students' data from the SILL with interviews, observations, and group discussions in which she detected some discrepancies in their answers. Going a step further, she even claimed that students in this particular context found the SILL inappropriate, suggesting that the extent to which they used the strategy depended on the situation in which they found themselves. White, et al. (2007) list the three basic limitations of using self-report questionnaires such as the SILL or the MALQ: Learners may not understand or accurately interpret the strategy description in each item, they may claim to use strategies they do not actually use, and they may fail to recall strategies they have used in the past. This critique of inventory questionnaires points to the need to elicit the learners' strategy use during an authentic listening task, something the present study will do. In fairness, Oxford and her fellow researchers have recognized a need for the development of a task-based questionnaire to complement the SILL (White, et al., 2007).

As Bowles (2010) has written, "in the field of L2 research, it is often difficult to determine the reasoning behind learners' target language use" (p. 8). Questionnaires such as the

SILL and MALQ would not aid in determining this reasoning. Researchers have often been left to infer the reasons from learner production data and mistakes. However, as Gass and Mackey (2000) point out, it is risky to do this: "understanding the source of second language production is problematic because often there are multiple explanations for production phenomena that can only be accessed by exploring the process phenomena" (p. 26). Verbal reports allow this type of window into the "process phenomena" that are inaccessible through other means, and have been used in a wide range of L2 research. These include: reading and writing (Cavalcanti & A. D. Cohen, 1990; A. D. Cohen, 1987; A. D. Cohen & Calvalcanti, 1987; Hosenfeld, 1976, 1977, 1984), comparisons between L1 and L2 strategies (Chamot & El Dinary, 1999; J. Davis & Bistodeau, 1993; Nevo, 1989; Yamashita, 2002), L2 test-taking strategies (A. D. Cohen, 2000; S. P. Norris, 1992; Warren, 1996), translation (Enkvist, 1995; Færch & Kasper, 1986; Jaaskelainen, 2000; Kern 1994), interlanguage pragmatics (A. D. Cohen & Hosenfeld, 1981; Kasper & Blum-Kulka, 1993) and oral interaction research (Mackey et al., 2000; Nabei & Swain, 2002; Philp, 2003), and L2 attention and awareness studies (Leow, 1997b, 1998a, 1998b, 1999, 2000, 2001a, 2001b; Rosa & O'Neill, 1999).

The above research includes both concurrent (i.e. during an uninterrupted task, also known as *think-alouds*) and retrospective (during pauses or post-task) verbal reports. However, within listening strategy research, concurrent verbal reports have not been seen as feasible since the processing of the text would compete for cognitive resources (i.e. working memory) with the task of verbalizing. Therefore, retrospective verbal reports have been the type used in listening strategy research. Bowles (2010) outlines the major threats according this temporal classification of verbal reports that are just beginning to be explored in research: *veridicality* and *reactivity*. *Veridicality*, or the ability to recall thought processes, becomes a threat to retrospective verbal reports since some time has passed since the thought processes being reported occurred.

Reactivity, on the other hand, becomes a threat to concurrent verbal reports as it refers to a task competing with another task for limited cognitive resources. Since the type of verbal report used with listening (i.e. videotexts) is immediately retrospective verbal reports, the issue of veridicality will be dealt with later in this section.

Besides temporally, there is another significant way of classifying verbal reports. In Ericsson and Simon's classic work (1984/1993), the researchers also distinguish between reports that require subjects to verbalize their thoughts per se and those that require subjects to verbalize additional information, such as explanations and justifications. In previous SLA research (Bowles, 2008, 2010; Bowles & Leow, 2005), verbalizations per se have been referred to as *non-metalinguistic* and those that do require explanations or justifications have been referred to as *metalinguistic*. This distinction is important in resolving issues involving validity, as detailed below.

Ericsson and Simon's (1984/1993) model of verbal reports makes two major predictions about validity. First, it predicts that non-metalinguistic reports will be non-reactive; in other words, "they will reflect the nature of cognitive processes fairly accurately, while slowing processing slightly" (Bowles, 2010). Second, the model predicts that metacognitive verbalizations (i.e. verbal reports that require justifications or additional specific information) may be more reactive, "not only slowing processing, but also potentially causing changes in cognitive processing (Bowles, 2010, p. 14).

The use of verbal reports for collecting data in studies generally and in L2 contexts in particular is not without controversy. Two major criticisms of verbal reports quickly become apparent when reviewing this area of research:

- the *effect-of-verbalization argument* (i.e. that verbalization changes cognitive processes, and can add to the additional cognitive load by acting as an additional task; White, et al. 2007; Bowles, 2010); and

- the *incompleteness argument* (i.e. that protocols are incomplete and therefore do not reveal the cognitive processes completely; White, et al. 2007).

Ericsson and Simon (1980, 1984/1993, 1987) stress that while the latter argument is essentially accurate, it does not invalidate the data collected by means of verbal reports; while not perfect, verbal reports offer the best method presently available for eliciting data on learners' cognitive processes during a variety of tasks. As for the former criticism, both Ericsson and Simon (1984/1993) and Bowles (2010) performed an extensive research review of studies comparing the task performance of subjects giving verbal reports with silent controls during concurrent verbal reports. Both reached the same conclusion: A relatively uniform pattern of results showing that while there is a slight processing delay that occurs due to verbal reports, if the report is non-metalinguistic, it will not be reactive. Though the present study will not use concurrent verbal reports, the non-metalinguistic nature of the verbal report task could be seen as some evidence that though the verbal reports will be in subjects' L2 (i.e. English), it will not cause a significant increase in cognitive-resource use, especially since the learners are of intermediate to advanced English listening ability. Based on her understanding of Ericsson and Simon (1984/1993), Goh (2002) offers a succinct summary of data elicitation implications that are also appropriate for the present study:

- Verbal data on listening processes are predominantly retrospective. Because of the rapid flow of information, the working memory has to be freed for processing continuous input. What listeners will typically do is to process the heeded input first before reporting through introspective verbalization.
- No extra demands are made on processing capacities during listening because retrospective verbalizations do not interfere with processing of input. What may be expected, however, are incomplete verbalizations because learners may have problem expressing some things in the target language. Although this may render some information inaccessible, it does not invalidate the information reported.
- Probes [i.e. prompts] that do not require informants to consult their memories about actual cognitive processes that take place should not be used. They should be asked only to describe how they try to understand what they hear (p. 189, bracketed information added).

In addition, White, et al. (2007) list a number of issues that researchers need to consider when planning a verbal report protocol: training and prompting, language choice, and transcribing and coding verbal report data. The use of authentic texts and the manner in which pauses are chosen for points at which verbal reports begin are also important issues. These five issues will be detailed, with some references to their impact on decisions made in the present study.

Training and prompting.

As White, et al. (2007) point out, both task type and how subjects are asked to respond can affect the kind and quality of their verbal reports, so a deeper understanding of methods used by researchers in studies similar to the present study would be quite useful. Many studies that have used verbal report protocols to elicit listening strategies have failed to report whether or not modeling or practice sessions were conducted. However, some researchers have modeled the verbal report on a similar listening text (Santos, et al., 2008), while others have conducted training sessions using tasks that were either similar (Goh, 1998, 2002) or dissimilar (Young, 1997) to the task used in the operational verbal report session. Modeling the "thinking aloud" process can be problematic, as Cross (personal communication, August 27, 2010) noted it is an "artificial" process that can focus subjects' attention to particular types of strategies and thus degrade the validity of the subjects' verbal reports. Young (1997) used three tasks from Ericsson and Simon (1984/1993) in her practice session that were unrelated to the listening task in her operational session. For example, participants were asked to verbalize what they were thinking when they heard the mathematical equation (task) "36 times 24." Again, however, such dissimilar tasks can be seen as "artificial" in that the strategies used on one task or text type could be quite different than the strategies used in the operational data collection session. Santos, et al. (2008) advocate limiting the amount of prompting and pre-training so as to reduce the risk

of altering subjects' natural thought processes. The type of feedback these researchers gave subjects consisted of back-channeling (i.e. nodding or the use of positive reinforcement sounds like "mm-hmm") or simple questions like, "What are you thinking right now?" during pauses in the listening text when subjects were not verbalizing. As Santos, et al. (2008) point out, however, "some less articulate learners are prone to long periods of silence, and without any prompting, few insights are gathered about their listening processes" (p. 127).

Control of the listening text.

The issue of who controls the pausing and/or rewinding and fast forwarding of the listening text is one dealt with in different ways by researchers. For example, in Bacon (1992) and Young's (1997) studies, subjects nodded or raised a finger when they wanted the researcher to stop the listening text and allow them to begin verbalizing. Cross (2009), Peters (1999), and Vandergrift (1997b, 2003) chose *natural discourse boundaries* (i.e. researcher chosen at transition points in the listening text) at which to stop the recording and allow subjects to think aloud. Laviosa (2000), Murphy (1985), and Santos et al. (2008) allowed subjects to control when to stop the recording. Santos et al. (2008) allowed subjects to pause, rewind and fast-forward the digital audio recording and then analyzed those patterns as well as the verbal reports in order to gain "insights into how listeners are segmenting speech, which aspects of the passage they are attending to in particular, where they have problems and what they do to cope with these problems" (p 127). Laviosa (2000) commented that allowing subjects to control the moment of verbalization (i.e. when to pause the recording) could allow their thoughts to be captured more immediately and with less interruption of the normal listening process. In the present study, subjects will only be able to listen to the videotext once (i.e. no rewinding and/or fast-forwarding) in order to create uniform listening conditions for the post-task free recall measure. The second pilot study subject's verbal report (Appendix C), contained only two stops and three instances of

verbalization. Consequently, for the present study, it was deemed necessary to include more locations in the text where the text would be stopped for all participants, while also giving subjects the option of stopping more often as they choose. Thus there will be both researcher-chosen stops (Appendix F) and participant-chosen points at which they pause the videotext, verbalize, and then start the videotext again. Chapter Three includes more discussion on this subject.

Language choice for subjects' verbal reports.

For most listening strategy verbal reports, subjects have implicitly or explicitly been given the choice as to whether they verbalize in their L1, L2, or a combination of both. The procedure of asking subjects to verbalize in their L2 is usually motivated by researchers' insufficient proficiency in the L1 of their subjects, thus necessitating costly and time-consuming translations of verbal report data. White, et al. (2007) point out that there is also the important question of whether thinking aloud in an L2 alters thought processes. In fact, Bowles (2010) writes that she is only aware of one study in which subjects' were required to speak exclusively in their L2 (Sachs & Polio, 2007), though White, et al. (2007) also note this was done by others including Block (1986, 1992).

One possibility is that thinking aloud in an L2 creates more cognitive demands on subjects and might interfere with the task of verbalizing (White, et al. 2007). However, this would be much more of a concern for concurrent think alouds rather than retrospective verbal reports. Another potential source of interference is culture-specific action patterns (Ehlich & Rehbein, 1979, 1986). In other words, participants may attempt tasks differently according to the language they are asked to use. As White, et al. (2007) point out, this may impact lower-level subjects more since higher-level subjects may have greater cultural flexibility. These researchers also point out, however, that culture-specific action patterns are just as relevant for the L1 as the

L2. There is some support for verbalizing in the L2. Heine (2005) suggests that L2 verbalization problems can result in a greater number of inferences and associations and thus a deeper level of processing. Also, verbalizing in the L1 could have detrimental effects on performance in the L2 (Færch & Kasper, 1987).

Bowles (2010) suggests that since there is little empirical evidence about the effects of thinking aloud in the L1 vs. the L2, "researchers should be cautious about requiring participants to verbalize entirely in the L2" (p. 116). White, et al. (2007) note this caution is particularly important when working with lower proficiency learners.

In the present study, subjects will be intermediate to advanced learners of English. Thus, while the researcher will ask participants to verbalize as much as possible in English, it will be explicitly stated that words or phrases spoken in Mandarin Chinese are certainly acceptable if necessary for true expression of subjects' thought processes. The Chinese words and phrases will be translated later prior to transcription of verbal report data.

Transcribing and coding verbal report data.

Transcribing verbal report data, and the reporting of principles and procedures used, has received relatively little attention in strategy research (White, et al. 2007). As Bowles (2010) points out, the detail included in transcriptions varies according to the research questions asked and the theoretical framework used in a study. Studies based on conversation-analytic approaches, for example, "use a detailed transcription system that includes periods of silence indicated in tenths of a second, micropauses, indications of rising or falling intonation contours, and information about non-verbal aspects of communication, such as gestures, which are typically recorded by video (Bowles, 2010, p. 123). However, since a cognitivist approach is used in the present study, a less detailed transcription system has been deemed appropriate (Bowles, 2010). Again, Bowles writes that "these transcripts tend to include no more than word-

level detail unless the research questions specifically require information about phonetic representations, intonation, or other phenomena not captured in word-level transcriptions (Bowles, 2010, p. 124). Since the present study's research questions do not require any of the above detailed phenomena, a word-level transcription system following Leow (2001b) and Leow and Bowles (2005) will be used by the current researcher. The coded transcripts of both pilot study participants' verbal reports are included as Appendixes B and C.

A number of classifications (i.e. taxonomies) of LLS have been used by researchers for coding verbal report data. These include general LLS taxonomies of O'Malley and Chamot (1990), Oxford (1990), and Rost and Ross (1991) and listening-specific taxonomies of Vandergrift (1992, 1997a, 2003a), Young (1997), and Santos, et al. (2008). Though the listening-specific taxonomies are based to varying degrees on the general taxonomies, the present researcher has adapted the listening-specific taxonomies by combining listening strategies from the three lists after excluding redundancies. Also added to the list are videotext-specific strategies based on emergent data from the coding of the first seven samples of the main study's verbal reports (Appendix A). Next to each strategy identified in the verbal report data, the code was written by hand (e.g. SUM for *Summarization* strategy; codes for each strategy are also found in Appendix A; see Appendixes B, C, and O for coded samples of verbal reports).

Use of Authentic Texts

As White, et al. (2007) write, strategies are goal-oriented and the action context (i.e. learning situation) affects these goals and thus strategy use varies widely according to the context. This notion has "strongly encouraged strategy researchers to conduct their studies in authentic contexts that allow subjects to pursue real goals" (p. 103). This has particular resonance in the discussion of listening texts. While some listening strategy researchers have used materials produced particularly for L2 learners (Goh, 1998, 2002; Young, 1997), others have used

authentic materials that have not been manipulated to control for level of vocabulary or speech rate (Cross, 2009; Gruba, 2006). The study reported by the same group of researchers in both Graham, et al. (2010) and Santos, et al. (2008) used both types of listening texts.

As Vandergrift (2007) points out, “The ultimate goal of listening instruction is to help L2 listeners understand the target language in everyday situations” (p. 199). He goes on to suggest that exposing learners to authentic texts and natural speech rates “is preferred by L2 learners and can be beneficial for listening development” (p. 200) when listening without the threat of evaluation (Vandergrift, 2002, 2003b; Mareschal, 2007). Jensen and Vinther (2003) concur, arguing that authentic forms, contexts, and speech rates should not be sacrificed in the interest of simplifying L2 listening for the language learner. Derwing and Munro (2001) found that listeners did not alter their ratings of “too fast” or “too slow” when researchers manipulated the rate of speech of their study’s listening texts.

Based on the arguments of White, et al. (2007) and Vandergrift (2007), in the present study, authentic videotexts have been chosen for use with participants. In Chapter 3, these short, documentary-style texts’ discourse patterns and other salient characteristics will be discussed in more detail.

Summary and Conclusion

The theoretical foundation of LLS research has been that of cognitive theory derived from information-processing models of learning. Though O’Malley and Chamot (1990) detailed a model used by many earlier LLS researchers, Macaro (2004, 2006) provided a revised, contemporary version that accounts for many of the criticisms and weaknesses of the earlier model.

The second section summarized and critiqued studies that examined listening strategies in relation to the variables of listening proficiency, bottom-up and top-down processing, and

linguistic knowledge. Few studies investigating learners' listening strategy use have attempted to determine subjects' levels of linguistic knowledge, and, unlike the present study, none have done so using videotexts as research materials.

The third section focused on the use of videotexts in L2 listening comprehension research in general and listening strategy research in particular. Gruba's pioneering study (2004) was examined in detail and his seven-part framework of strategy use with news videotexts was critiqued and evaluated. Dual-coding theory was also outlined due to its explanatory power of how videotext is comprehended.

The final section dealt with LLS elicitation methods with a particular focus on listening strategies. The most appropriate data collection method was shown to be immediately retrospective verbal reports given during both subject- and researcher-controlled pauses in authentic listening texts. The issues of training and prompting, language choice, and transcribing and coding data also require careful consideration by researchers before embarking on a study that includes verbal reports as a method of collecting data.

The following chapter will introduce the methods and procedures that the present study uses to select and group participants, and collect, process and analyze data. Research predictions will also be explicitly stated based on existing literature and a pilot study.

Chapter III

Methods and Procedures

This study identifies the listening strategies employed by native Mandarin-Chinese speaking ELLs as they attempt to comprehend short, documentary-style news videotexts. In addition, the relationship of strategy use to subjects' listening proficiency levels and linguistic knowledge were investigated in order to determine how strategy-use patterns vary according to these variables. In order to explore strategy use, the data collection measures summarized in Table 3.1 were conducted in the order presented, and are detailed later in this chapter.

Table 3.1.
Data Collection Measures Used in the Current Study

Measure	Type of Measure	Reason for Measure	Additional Information
Background questionnaire	Mostly quantitative (yes/no, multiple choice, and short answer questions)	To gather subjects' demographic information and history of English-language listening and videotext viewing habits	Translated into Chinese
Oxford Online Placement Test (OOPT)	Quantitative	To divide subjects into groups according to listening proficiency and linguistic knowledge	Two sections of multiple choice questions: *Listening* and *Use of English* (grammar and vocabulary knowledge)
Immediately retrospective verbal reports	Quantitative (number of strategies used),	To identify and collect data on the use of listening strategies	
Post-videotext written free recall of idea units	Quantitative (number of units)	To help determine the relationships among linguistic knowledge, listening proficiency and numbers of idea units recalled	

A pilot study was conducted in order to verify validity and reliability of the methods and procedures of data collection. After a description of the two sets of pilot study procedures and the changes made after reviewing pilot study results, the rest of this chapter describes the (a) selection of sample, (b) instrumentation, (c) procedures, (d) variables and hypotheses, and (e) research design and data analysis.

The Pilot Study

Two subjects participated in this critical part of the development of the procedures and instrumentation used in the operational study. Key changes resulting from the pilot study are described in this section, with other alterations reserved for explanation in the Instrumentation and Procedures sections below.

Participants.

Both participants were native Mandarin Chinese speakers. The first participant ("Amy") was a 37-year-old female Taiwanese Ph. D. student at a major Midwestern university in America. She had lived in the U.S. for nearly two years and had no prior history of viewing news videotexts in English. The second participant ("Bev") was a 42-year-old female with a bachelor degree and years of both academic and professional training in English. She had never lived abroad and had no experience watching news videotexts in English.

Procedures, instrumentation, and changes.

The first pilot study data collection took place in the U.S. in November 2010. The procedures and instrumentation are summarized below in the order they were carried out:

- Informed consent letter (in English)
- Background questionnaire (in English)
- Practice session of the verbal report protocol (123-second videotext; subject used only English)
- Main session of the verbal report protocol (143-second videotext; subject used only English)

- Eight-question multiple-choice comprehension measure (in English, based on the 143-second videotext)
- Exit interview (in English, for the purpose of improving procedures and instrumentation)

Based on the exit interview, it was judged that the English-language informed consent letter (Appendix E) and the background questionnaire (Appendix D) should be translated into Mandarin Chinese for the sake of comprehensibility by this study's participants. For the short-answer questions of the background questionnaire, subjects were still asked to write their answers in English as much as possible for the benefit of the study's researcher. This was judged not to be problematic as all participants had at least a lower intermediate level of English writing ability, which was all that was required to answer these four to eight questions. The translation of both documents was carried out by an experienced Mandarin Chinese-to-English translator with a master's degree in Teaching English to Speakers of Other Languages (TESOL). It was later double-checked by two other experienced Mandarin Chinese-to-English translators. Changes to specific questions on the background questionnaire are found in the Instrumentation section below.

The other major change due to the first subject's results concerned the comprehension measure used with the 143-second (main) videotext. While the subject's verbal report indicated a deep understanding of what she saw and heard in the videotext, she was only able to answer three of the eight multiple-choice questions correctly. Though she admitted that she rarely did well on such comprehension measures, the researcher judged that the limited number of multiple-choice questions deemed appropriate for such a short videotext could not adequately measure true comprehension by study subjects. As described in Chapter 2, a comprehension measure in which subjects write down all the idea units they could remember from the main videotext was chosen instead and pilot tested with the second participant. Like with the verbal reports, subjects are told that they can use either English or Mandarin Chinese or a combination

of both languages. Two native Mandarin-Chinese university English teachers created a negotiated translation of the few examples of written Chinese on the recalls that they and the researcher then used to create rating scores. The other two raters were trained by the researcher to match what subjects wrote to the three different types of idea units from the videotext (Appendixes H, I, and J) and an inter-rater reliability coefficient is reported in Chapter Three. A later section of this chapter offers more explanation of the three types of idea units.

The second pilot study data collection took place in Taiwan in February 2011. The procedures and instrumentation are summarized below in the order they were carried out:

- Informed consent form (in Mandarin Chinese)
- Background questionnaire (in Mandarin Chinese)
- Practice session of the verbal report protocol (123-second videotext; subject used only English)
- Main session of the verbal report protocol (143-second videotext; subject used only English)
- Idea unit comprehension measure (based on the 143-second videotext; subject wrote only in English)
- Exit interview (in English, for the purpose of improving procedures and instrumentation)

Two major changes stemmed from the second data collection. First, the method of stopping the videotext to allow for subjects to verbalize was changed after the second pilot session. The transcript from the second subjects' verbal report (Appendix C) shows that she only stopped the recording twice and spoke only three times (including at the conclusion of the 143-second videotext). Nine separate instances of strategy use consisting of five different strategies were identified. The transcript from the first subjects' verbal report (Appendix B) shows that she stopped 11 times and spoke a total of 12 times, with 15 instances of strategy use consisting of nine different strategies. While the first subject may simply have used more strategies, it is difficult to ignore the large number of additional opportunities that her pausing behavior gave her to verbalize her thought processes. The second subjects' pausing behavior was judged not to be completely representative of instances when she should have paused, as the transcript shows she

struggled at both comprehending the videotext and remembering to stop the videotext to verbalize her thoughts. While this does not negate the validity of the verbal report she made, it did convince the researcher that quite possibly there were missed opportunities for verbalizations at points of misunderstanding or of other strategy use. Chapter 2 (i.e. Data Elicitation) described the two methods of stopping listening texts during verbal reports: researcher chosen points and participant chosen points. However, no research reviewed for the present study allowed for both types of stopping the listening text in order to facilitate subject verbalizations. The notebook computer used in this study allowed the researcher to stop the videotext at predetermined natural discourse boundaries such as transition points (Appendix F) while also allowing the subject to stop the videotext more frequently as necessary for complete reporting of thought processes. In the operational study, this stopping by both parties was done in a nearly seamless way: The subject used the wireless mouse to stop the videotext and the researcher used the touch pad below the spacebar on the keyboard to stop the videotext. This solution allowed the best of both stopping methods; for subjects, they had the freedom to stop when they naturally became aware of thought processes, while the researcher was able to stop the videotext at natural discourse markers to avoid a subject "skipping over" opportunities to verbalize as the second pilot subject appeared to do. Subjects in the operational study sometimes said nothing during researcher-chosen pauses. This situation was not problematic as the researcher simply assured the subject that there was no problem and simply requested that the subject continue with the next section of the videotext.

Second, the idea unit comprehension measure was changed from the initial conception in two ways: the input method for subjects' writing of the idea units, and an increased flexibility of the scoring (i.e. matching) of idea units identified by subjects. The researcher originally prepared legal-sized, ruled notebook paper for the subject to write idea units on. However, as the

researcher read the instructions for the comprehension measure to the subject, Bev expressed the desire to type her answers into the computer rather than hand-write the answers onto the notebook paper. The researcher realized that typing answers would remove the ambiguity of trying to interpret subjects' handwriting. Thus, for the operational study, subjects were asked to type their answers (i.e. idea units) into a MS Word software file, which was then saved by the researcher for later analysis.

The second pilot study subject identified six out of a total of 39 possible idea units for the main videotext (Appendix G). As can be seen in the subject's coded answer page (Appendix K), some of her responses were linked to more than one idea unit from the videotext. For example, the answer "He said that this way people can save lots of money," was linked to three possible idea units in the videotext: (Number 29) "not having a mortgage or rent is great," (number 30) "Not paying much utilities is awfully nice," and (number 31) "I pay less than $100 per year in utilities in this house." The subject would still get just one point for what she wrote, but this would not penalize her for not matching one single idea unit exactly. In effect, subjects got credit for more of a summarized answer rather than for just a strictly interpreted match of exact details within single idea units of the videotext. When raters agreed on at least one idea unit matching what a subject wrote, then that identified idea unit was counted in the subject's final score on the recall.

Selection of Sample

Participants.

The 27 subjects for this study were Taiwanese adults (ages 26 to 52 years) whose native language is Mandarin Chinese. They are former students of the researcher at a large, Taiwan-based international bank who were judged to be in the (lower) intermediate to advanced levels in their listening proficiency. Highest educational degree achieved was nearly evenly split: 14 hold

bachelor's degrees and 13 hold master's degrees. Total length of time studying the English language or using English in content classes (both formally and informally) ranged from eight to 33 years. Each year in which any type of English-language study was undertaken could be counted by individuals. None of the subjects reported any hearing or vision deficiencies and all subjects have a high interest in learning English. Compared to the average adult in Taiwan, the participants have a much higher general proficiency level in English.

Sampling procedures.

The location and pool of potential participants were chosen as being representative of highly educated, professional adults in Taiwan, as they are more likely to continue to be interested in English-language learning and skill development as post-baccalaureates. The institution requested that students not be randomly selected or compelled to participate, and thus volunteers were elicited (i.e. a convenience sample). The researcher sent a carefully constructed description of the study to 47 potential participants. This careful wording was necessary so as not to reveal the primary aim of identifying the listening strategies subjects use to comprehend videotexts, and thus run the risk of influencing the types of strategies subjects would use. Of the initial 47 potential subjects contacted, 27 agreed to participate in the study.

The researcher judged that his familiarity with the participants, while not risk free, would overall be positive for the study's results. Though the possibility existed that a few subjects may have attempted to "give the researcher what he wanted," with careful wording of the instructions to subjects, this risk was reduced (see Procedures section in this chapter). Due to their familiarity with the researcher, it is likely that they were more relaxed during the verbal report one-to-one sessions. Learners have often commented on the anxiety associated with L2 listening and its effect on their performance (Horwitz, 2001). Since there was a post-videotext viewing

comprehension measure (i.e. the written free recall of idea units), the reduction of subject anxiety played a potentially important role for increasing the validity of the measure.

Instrumentation

Four instruments – a background questionnaire, the Oxford Online Placement Test (OOPT), two short documentary-style news videotexts, and post-videotext viewing free recall of idea units – are used in the current research. The pilot study was conducted to assure the validity and reliability of the data collection procedures, and adjustments to the background questionnaire, verbal report protocol, and post-videotext viewing comprehension measure were made following the pilot study with two subjects. A description of the instruments and more detailed explanations of specific changes made to each as a result of the pilot study data collection sessions are included in the subsections below.

The background questionnaire.

The purpose of the background questionnaire (Appendix D) was to collect individual demographic data such as age, gender, and hearing or vision problems as well as general English-language learning histories and more specific information about the use of English-language listening and videotext materials. The major aim of this data collection was twofold: to provide a more comprehensive picture of participants and to have information about listening and videotext materials use by subjects that could be useful in interpreting the results of the study.

Upon conclusion of the piloting of the background questionnaire, three questions were revised and two new questions added. During the pilot study's exit interview, one subject was confused by the original wording of Question 4 (now Question 6), "Have you ever lived in an English-speaking country or studied English in another country?" The subject had lived in the United States on two occasions, something not accounted for in the answer choices. Thus, the answer choice, "Yes, which country? _____ And for how long? _____" was

changed to be, “Yes, which country or countries? _____ And for how much total time? _____? In Question 6a (now question 9a), “When did you or do you watch news videos in English?” one of the answer choices was found to be incomplete as it did not include a reference to past viewing experience. Thus, “I continue to watch news videos in English” was changed to be “I have watched news videos in English for _____ years and continue to watch them.” Question 7a (now question 10a) “What other types of English-language listening materials have you listened to?” led directly to the researcher deciding to have the questionnaire translated into Mandarin-Chinese for ease of interpretation for subjects. One subject had difficulty interpreting the time period referred to in the question, and thus was uncertain about whether the question covered the present, past or both. This verb-tense issue would not be a problem to interpret in the subjects’ native Mandarin-Chinese. Thus, after adjustments w ere made to the English-language version, the questionnaire was professionally translated and double-checked by further pilot testing and bilingual expert opinions.

The two completely new questions were added due to pilot study subject comments and researcher review. While questions were asked about the amount of time subjects lived and/or studied abroad, and about specific English-language materials used, no question asked about the total number of years subjects had spent learning English. Thus the question, “How many total years of formal and informal English learning have you had?” was added to the questionnaire after Question 3b. In Taiwan, it is common for students from kindergarten-age to university-age to study in special language and/or content-subject schools after their regular school day finishes or on weekends. Also, the number of years of English education mandated by the Ministry of Education has increased over the past 30 years. Thus, there is a large degree of variation in years of English learning among participants in this study who vary in age from 26 to 52. Since number of years studying English may correlate with level of linguistic knowledge and/or

listening proficiency level, it was judged that this information could be important in interpreting the current study's results. Also, it was decided that a question concerning the highest level of education completed by subjects was useful for describing participants more comprehensively. Thus, the question, "What is the highest level of education you have achieved?" was added after Question 4, and includes answer choices from bachelor degree completion to post-doctorate degree completion. It should be noted that a minimum of a bachelor's degree is necessary to be employed at the bank the participants are employed at.

The Oxford Online Placement Test.

The OOPT was used to evaluate subjects in the present study according to linguistic knowledge (i.e. grammar and vocabulary knowledge) and listening proficiency. Oxford University Press developed the OOPT between 2007 and 2010 in order to provide a valid and reliable measure of learners' knowledge of grammar, vocabulary and "how learners use that knowledge in order to understand the meaning in communication" primarily to aid university and private language programs in dividing students by proficiency level for a variety of language classes (www.oxfordenglishtesting.com, accessed November 7, 2010). The OOPT is a multiple-choice-question, computer-adaptive test (CAT), meaning that it adapts to the ability level of each test taker. This is accomplished by selecting items for test takers based on how they answered the previous question. Getting the question correct results in the next question being more difficult; likewise, getting the question wrong means that the following question will be easier.

This system helps reduce one of the main sources of uncertainty that can be controlled for with test results, namely, "would [test-takers] have done better (or worse) if they had met different items?" (Pollitt, 2009). A fixed (paper-based) test never gains any knowledge about the test-taker's proficiency level, and thus has little control over this type of uncertainty. However, as a test-taker answers questions on the OOPT, each question contributes a little more

information about her level until questions that are "just right" for her are found (technically, those questions that she has a 50 percent chance of getting right, and thus also a 50 percent chance of getting wrong). At the end of this process of "fixing" the test-taker's level, the remaining uncertainty – the *standard error* or *residual uncertainty*, is reported. For the OOPT the residual uncertainty will normally be five units (Pollitt, 2009). In other words, if a test-taker scored 65 on the OOPT (placing her in the B2 level – see Appendixes N-Q), her real score could fall between 60 and 70. According to Alastair Pollitt (2009), there would be about a one-in-six chance of misclassifying a test-taker who is one standard error above (or below) a level boundary (i.e. within five units of the boundary between B2 and B1, or a score of 60, for example). Thus if six test-takers were reported to be above a boundary within five units, then probably one of them actually falls below that boundary (i.e., has been misclassified).

The question bank was extensively pilot tested to link questions to the different proficiency levels of the Common European Framework Reference (CEFR, for more information, see the Council of Europe website at http://www.coe.int/t/dg4/linguistic/CADRE_EN.asp), a widely accepted description of what individuals are able to do while operating in a language. The CEFR has six different levels ranging from basic (*beginner*) to advanced (*proficient user – mastery* level): A1, A2, B1, B2, C1, and C2. Grammar knowledge and listening scale descriptions can be found in Appendix A and B of James Purpura's article (2009) *The Oxford Online Placement Test: What does it measure and how?* (available for download at: http//:oxfordenglishtesting.com). Because it is a CAT, the time required to complete the test is much shorter than traditional pencil-and-paper tests. During pilot testing, it was found that test takers required 30 to 60 minutes to complete the test. As a comparison, the (listening and reading) Test of English for International Communication (TOEIC) requires 120 minutes to complete.

The test as a whole has been pilot tested with more than 19,000 students in more than 60 countries (www.oxfordenglishtesting.com, accessed November 7, 2010). The test is divided into two sections: *Use of English* and *Listening*. The first section tests knowledge of grammatical forms, knowledge of explicit and implicit (vocabulary) meaning, and both grammatical forms and meaning together. This section of the test corresponds to *linguistic knowledge* as used in the current study for dividing subjects for analysis of listening strategy use. The second section tests the understanding of meaning in oral texts consisting of short dialogues followed by a single four-option, multiple-choice question, and longer dialogues and monologues followed by one or two such questions. Thus, the second part of the OOPT corresponds to the other parameter used in this study to divide subjects, i.e. listening proficiency.

Scores are reported on a scale of 0-to-120, with 20 points corresponding to each of the six CEFR levels. Thus, a score of 30 would place the test taker in the middle of the A2 level. The test is scored immediately by means of computer software and made available as an overall score and for the two individual sections. The computer-based test allows imposing a time limit on the test takers, and a limit of 80 minutes was chosen by the researcher as allowing a generous amount of time to complete the test, though only two subjects required more than 60 minutes to finish. Also, the total amount of time taken to complete each section is included with the reported scores on a web site that is accessible by the test administrator, which in this case is the current researcher. Subjects' scores on each of the two sections of the OOPT were used to allow analysis according to levels of linguistic knowledge and listening proficiency. The procedures used to deliver the OOPT to research subjects are described in the following section, along with the procedures for the other instruments used in the current study.

The short, documentary-style videotexts.

As Cross (2009) pointed out in his study identifying and then teaching listening strategies to advanced Japanese ELLs, the discourse features that characterize the videotexts chosen for instruction or research are extremely important to consider. Cross summarized challenges to successful listening as follows:

- Unfamiliar patterns of discourse, vocabulary, speech rates, prosody, and syntactic structures;
- A high density of factual information;
- Disorienting visual cuts; and
- Discrepancies between aural and visual information (p. 152).

Difficulties may also occur because of a lack of prior knowledge, "familiar vocabulary that becomes unfamiliar in connected speech or was not expected in the given context, no opportunity to negotiate meaning, and unfamiliar contexts and cultural norms" (Meinhof, 1998; cited in Cross, 2009, p. 152).

A regular discourse pattern is easily discernible after viewing the 14 videos (as of December 1, 2010) in the *Second Act: Real stories celebrating life, passion and reinvention* series created by Yahoo! News (http://vitaility.yahoo.com/). Two of these videos were chosen for the present study: the stories of Mark Kirkland (123 seconds long and used as the verbal report training videotext) and Jay Shafer (143 seconds long and used as the operational videotext for the verbal report and free recall comprehension measure; see Appendix F for a transcript). Table 3.2 summarizes the discourse patterns for the two videotexts.

Table 3.2.
Discourse Patterns for Mark Kirkland and Jay Shafer Videotexts

Discourse feature	Kirkland Videotext/time	Shafer Videotext/time
Topic related images; voiceover of main subjects speaking about himself and his new career	Video image of the Canwich; video image of the bakery that produces the Canwich; Kirkland introduces himself and his invention/10 sec.	Video image of pink flowers. close-up images of parts of his tiny house, Shafer enters the front door, further image of whole house; Shafer introduces self and tiny house/12 sec.
Interview-style video images of main subjects (i.e. chest to top of head) alternated with other images both related and unrelated to what subject talks about	Kirkland sitting in his home office; other images include: patent for the Canwich, a mountain of used tires, Kirkland working at his desk, cans and machines containing Canwiches, Canwiches being produced at the bakery/65 sec.	Shafer sits in front of his house; other images include: interior of house, Shafer with house under construction, Shafer in kitchen, U-Haul truck pulling his house, Shafer working on house design, other houses Shafer has designed and built/60 sec.
"Expert" speaking about the main subject (interview-style video images alternated with voice-over with other images both related and unrelated to what speaker says)	Kirkland's wife, Susan; other images include: Canwich cans, a family portrait, Kirkland with his son at home; Kirkland opening a Canwich can/20 sec.	Trathen Heckman, sustainability educator; other images include: other tiny houses, Shafer working and moving around in his house/30 sec.
Interview-style video images of main subjects alternated with other images both related and unrelated to what subject talks about	Interview-style video mixed with other images; Kirkland relates difficulties he has faced in bringing his product to market; fade to black/28 sec.	Interview-style video mixed with other images including Shafer filling a water tank from an outdoor reservoir, sitting on front porch talking to a man, both men looking at a house design inside Shafer's house, then exiting the front door, fade to black/41 sec.

Both videos begin with images lasting several seconds that directly relate to the topic of the respective videotexts and a voiceover by the subjects of the videos introducing themselves and their "reinvented" lives. For the Mark Kirkland videotext, that means video of his invention, i.e. the Canwich, a sandwich in a can, as well as those of the bakery that produces them. In the Jay Shafer videotext, the viewer sees close-up images of his very small house. Next, the viewer sees interview-style images (i.e. chest to top of head) of each subject in their respective videotext

speaking about their new careers and how they became involved in pursuing these new fields. In both videotexts, video images alternate with these interview-style images that are both related and unrelated with what each speaker talks about. After these introductory sections, which last slightly more than half the length of each videotext, a second speaker begins talking about each subject, their relationship with that person, and the context of their expertise that enables them to offer insights into the topic of each videotext (i.e. Mark Kirkland's wife and a sustainability educator who knows Jay Shafer, respectively). This section lasts 20 seconds in the Mark Kirkland videotext and 30 seconds in the Jay Shafer videotext, and the images accompanying each speaker matches the context of their speech to differing degrees. The final section is the subject of each videotext speaking about the challenges he has faced (Mark Kirkland) or how changing careers has positively impacted his life (Jay Shafer). Images in this final section are again both related and unrelated to what the speaker says.

Few written words appear in the two videotexts. In both videotexts, viewers see the respective names of both speakers in each video superimposed on the video image next to the person as he or she speaks. In addition, in the Mark Kirkland video, the viewer sees a sign with the name of the bakery that produces the Canwich, the United States patent for his invention, the name *Canwich* on the side of aluminum cans at five different points in the video, and words on two other aluminum cans in one brief shot. In the Jay Shafer video, viewers additionally see the nameplate on the door of his home (*Tumbleweed*). Thus, there is very little written text to inform the viewer, unlike other types of news videotexts that often contain a large amount of superimposed headlines and other written support information. Thus the video image and aural channel rather than any reading skill are involved in decoding the videotexts' meanings.

Slightly longer pauses between topics or speakers and cuts to different types of images signal transitions for the viewer. Sentences are typically simple in construction, generally with

one main clause and, in several instances, an introductory phrase and/or subordinate clause. The sentences are also nearly all active rather than passive, and said in a positive, declarative, and informal manner with frequent contractions. Lexis, or vocabulary, is usually simple and non-technical, as the informal style would imply, but there are occasional uses of idiomatic phrases (e.g. “escape the rat race,” “from scratch,” a hundred years “down the road,” “banking on a dream”), though very little slang; the only two examples of slang are from the Mark Kirkland videotext: “his mind never turns off” and “killer application.”

Pronunciation for all four speakers in the videotexts is what is usually considered to be the “standard” Midwest American accent. This is the most common North American accent heard by viewers of news broadcasts originating in this region of the world. Common prosodic patterns are also evident, with a higher pitch accompanying the start of sentences, a falling pitch signaling the end of sentences and distinct pauses separating sentences. As Cross (2009) also found, “kinesic patterns often reflect these prosodic elements, e.g. slight lowering of the head as intonation falls, slight opening of the mouth to inhale creating a pause, and a slight raise of the head with a high key” (p. 157). The average speaking rate was approximately three words per second, which was considered moderate by the pilot study subjects.

Pilot study participants also commented in the exit interview that though challenging, both videotexts’ topics were highly interesting. This was seen as a key point, for difficult but uninspiring topics could lead to “giving up” or “tuning out” the speakers and thus impede the subjects’ from providing a verbal report that is as complete as possible. From the pilot study’s verbal reports, it was clear that subjects were working hard to comprehend the videotexts as completely as possible.

Besides having high-interest value, the short, documentary-style news videotexts used in this study were found to be appropriate to use in this study for the following reasons: the

regularity of discourse and intonation patterns, clear sentence-boundary pauses, kinesic cues from the body movements and facial expressions of speakers, and visual images that do not create discrepancies with the audio channel.

The post-videotext free recall measure.

As mentioned above, the initial piloting of this study included an eight-question, multiple-choice test administered after the subject viewed the videotext and delivered her verbal report. Before the second pilot subject's data were collected, the multiple-choice measure was dropped in favor of a *written free recall* measure. Again, the purpose of this comprehension measure is to aid in answering Research Questions Three through Five. In a listening task *free recall* (Cross, 2009; Leeser, 2004; Vandergrift 2007), subjects attempt to write down everything they remember from the text. These recall answers are then "analyzed for the number of correct *idea units*, which will determine the level of listening success" (italics added, Vandergrift, 2007, p. 192). As stated in Chapter One, an *idea unit* is defined as "a single main or subordinate clause, including adverbial and relative clauses" (Carrell, 1985, as cited in Cross, 2009, p. 169). Idea units have been used previously in listening comprehension research (Bacon, 1992; Osada, 2001). As the definition unequivocally delineates an idea unit for the audio-encoded messages contained in the videotext, it was judged that the researcher alone could unerringly identify the idea units of the videotext used in the operational verbal report.

A total of 39 audio idea units were identified (see Appendix G for original list). However, since information can also be decoded from the still and moving images of the videotext used in this study (See the section on Dual Coding Theory in Chapter Two), it was determined that a second opinion was necessary to aid in identifying the more subjective image-only idea units (IU) and audio-and-image-connected idea units (AU). Thus, in addition to the researcher, a native English-speaking colleague of the researcher independently identified image idea units in two

ways. First, image idea units that had no connection with the audio idea units were identified. Second, image idea units that were related to the audio idea units were separately identified. Following Young (1997), the formula adapted for use in determining the inter-rater reliability coefficients for the above two types of idea units was:

$$\frac{\text{Number of idea units identified the same by both A and B}}{\text{Number of idea units identified by A}}$$

where A represents the rater with the highest number of coded idea units, and B represents the other rater. The minimum acceptable coefficient was set at .80. The researcher identified 18 separate image-only idea units (IU), while the researcher's colleague identified 17 of the same IU and was thus Rater B. Thus, IU were identified with a 94% inter-rater reliability score by the two raters. Since the coefficient score was above the acceptable threshold, the single image-only idea unit that was identified by the researcher but not identified by the researcher's colleague was discussed by the two parties and agreed to belong in the IU category. Thus, 18 separate image-only idea units were ultimately identified (Appendix I).

The idea units that had both audio and image components (i.e. audio and image idea units or A) were identified with an inter-rater reliability score of 90%. The researcher (Rater A) identified 10 AU connected to nine IU, while the researcher's colleague (Rater B) identified nine AU connected to nine IU. The single AU not identified by Rater B as being connected to an IU was discussed by both raters and judged to belong in the audio-and-image idea units (AIU) category. The nine AIU are shown in Appendix J. The results of the above identifications of the different types of idea units led to the creation of three lists: 1) 29 audio-only idea units (AU; Appendix H); 2) 18 image-only idea units (IU; Appendix I); and 3) nine audio-and-image idea units (AIU; Appendix J). The three raters who judged subjects' performance on the free recall of idea units comprehension measure used the above three lists.

Matching what subjects write down with the idea units in the original videotext is also a more subjective judgment since incorrect spelling and grammar do not invalidate a subjects' representation of an idea unit, and even using the same vocabulary as the videotext is not necessary. Also, since subjects were allowed to write their recalls in the language of their choice (i.e. English or Chinese or a combination of both), the flexible coding system discussed in the (above) section describing the pilot study was used by the researcher to train two native Mandarin Chinese speakers who also rated the written free recall measures (see Chapter Four for results). The researcher decided to use the two Chinese speakers' negotiated translations of any recalls written exclusively or partially in Chinese when rating the 27 recalls. The following protocol was used by the two native Mandarin-Chinese speaking raters: 1) Read each recall several times, also viewing the videotext as deemed necessary; 2) translate any necessary written Chinese into English; 3) underline and code the parts of the recalls that correspond to idea units of the three different types. The researcher (i.e. the third rater) followed steps one and three.

The following formula was adapted from Young (1997; see also Murphy, 1985, and Scholfield, 1994):

$$\frac{\text{\# of strategies coded the same by R \& C} + \frac{\text{\# of strategies coded the same by R \& D}}{2}}{\text{\# of strategies coded by R}}$$

where R, C, and D represent the researcher, native-Chinese speaking coder 1, and native-Chinese speaking coder 2, respectively. The minimum acceptable inter-coder reliability coefficient was set at .80. Rater results and final scores for the free recalls are reported in Chapter Four. Finally, it should be noted that one sample coded verbal report (Appendix N) and one sample coded written free recall of idea units (Appendix O) are included.

Procedures

This section includes descriptions of the procedures used to collect the data in this study in the order they will be carried out: Informed consent form and background questionnaire, the Oxford Online Proficiency Test, verbal report protocol, and free recall comprehension measure.

The background questionnaire.

The questionnaire and informed consent form (Appendixes D and E, respectively) were sent via email attachments to participants one week before their scheduled OOPT. In the accompanying email messages, participants were asked to print out and fill out both documents and bring the completed forms to the current researcher at the beginning of the OOPT session. The informed consent form was produced according to suggestions of Bowles (2010), White, et al. (2007) and Gass and Mackey (2005). The researcher made sure that the informed consent forms were signed and dated by all participants prior to taking the OOPT. The researcher asked the participants if they had any questions concerning the questionnaire and/or informed consent form prior to beginning the OOPT.

The researcher quantitatively (for multiple-choice and yes/no answers) and qualitatively (for short response answers) analyzed the background questionnaire. This was done because past experiences with listening materials in general and news videotexts in particular could have influenced participants' performance on the verbal reports and free recall measure. However, subjects did not report any type of extensive viewing of videotexts, so the questionnaire was basically used just to collect demographic information used to describe the subjects.

The OOPT.

As stated previously in this chapter, the OOPT is a CAT that is delivered online. The test taker must have a computer available with internet access and a set of headphones for the listening section of the test. Since the financial institution in Taipei, Taiwan, that is the data

collection site for the OOPT and verbal recall does not have a dedicated computer lab of the size necessary to accommodate 30 participants simultaneously, it was decided to conduct the OOPT in smaller groups on four separate occasions. The number of participants taking the test each time varied from six to 10. The researcher considered it important to guarantee uniform testing conditions, and thus did not allow participants to take the OOPT at their own convenience as is possible given the flexibility of delivery. Participants were disallowed the use of aides such as print or electronic dictionaries. As noted earlier in this chapter, a time limit of 80 minutes was placed on the test, allowing more than sufficient time for each test taker to answer the required total number of questions in determining his or her CEFR level. Also the researcher was able to note the time each test taker required to complete each section of the test. Upon completion of the test, each participant was shown their results and given a copy of the grammar knowledge and listening scale descriptions (Appendixes P and Q; Appendixes N and M give more detailed descriptions).

Verbal report protocol.

As noted in the previous chapter, researchers have judged the need to balance the training provided to participants prior to collecting data during the operational verbal reports (Santos, et al. 2008; Bowles, 2010). The procedures for the verbal reports are included with procedures for the entire study in Appendix L, and in a slightly different form under *Procedures* on the informed consent form (Appendix E). Of special note is the way the research project will be described to participants, since describing listening strategies or even mentioning the phrase *listening strategies* could influence which strategies participants use and/or report on. Thus, it was decided to simply inform subjects that the researcher is investigating how participants attempt to understand (i.e. *process*) short, documentary-style news videotexts. As Bowles suggests, verbal report instructions should:

- reiterate the reason the participants are being asked to think aloud;
- provide instructions about how they should think aloud; and
- include a warm-up task during which participants practice thinking aloud and have time to ask the researchers any questions about the process before beginning the operational study (Bowles, 2010, p. 114).

Subjects were given an English-language version of instructions and asked to read along silently as the researcher read the instructions to them at the appropriate junctures in the verbal report session. As mentioned in Chapter 2 and as can be seen in Appendix J, subjects were instructed that while they should primarily think aloud in English, if they felt unable to express themselves in that language, they could also use Mandarin Chinese (which would be translated into English at a later time prior to transcription). Transcription and coding were carried out by the researcher. A *code/recode* system (Young, 1997) was used in which the researcher randomly coded seven of the 27 total verbal reports (approximately 26% of the total number, a similar percentage as Young, 1997, used), and then set aside the verbal reports for six weeks without looking at them. The seven verbal report transcriptions were then coded again and the *intra-coder reliability coefficient* (Young, 1997) is reported in Chapter Four according to the following formula:

$$\frac{\text{\# of strategies coded the same by A in the 1st and 2nd coding}}{\text{\# of strategies coded by A in the 1st coding}}$$

The minimum acceptable level for the intra-coder reliability coefficient is set at .90, which is higher than the .80 level of the inter-rater reliability coefficients, because a lower level of variability must be assumed with a single rater. It was decided that if the intra-coder reliability coefficient were at .90 or above for the seven randomly chosen verbal reports, the researcher would then code the other 20 verbal reports. If a coefficient of less than .90 were achieved for the seven verbal reports, the researcher would make adjustments to the coding process and then randomly choose five verbal reports from the remaining 20 verbal reports (25% of the remaining total number of uncoded verbal reports) repeating the above process in order to achieve a

coefficient of .90 or above. As can be seen in Chapter Four, a coefficient greater than 0.90 was achieved and the remaining verbal reports were then coded as planned.

Hypotheses and predictions

This section lists the null hypotheses for the five research questions being investigated and makes predictions for expected results. Null hypotheses follow each listed research question. Thereafter, predictions are made based on prior research when possible. It is important to note that in their review of listening strategy research (2007), Macaro, et al., state that the idea that using more strategies leads to more successful comprehension "has now generally been rejected" (p. 168; see also Santos, et al., 2008). Thus, if no relationship between numbers of strategies used and linguistic knowledge and listening proficiency is found (i.e. Research Questions One, Two, and Five), a qualitative examination of how strategies are used differently and in what combinations they are used may be necessary.

1. Is there a relationship between strategy use and linguistic knowledge according to number and type of strategies used?

Null hypothesis: There is no relationship between strategy use and linguistic knowledge according to number and type of strategies used.

Graham, et al. (2010) found that subjects with lower linguistic knowledge were less likely to use certain strategies or strategy combinations effectively than subjects with higher linguistic knowledge. However, the researchers pointed out that high linguistic knowledge levels were not always associated with effective strategy use. Also, in the 2008 article by the same researchers regarding the same study, Santos, et al. noted that for many strategies, there was little quantitative difference in use by different groups of subjects.

A prediction for Research Question One based on prior research is difficult to make due to the extremely limited listening strategy research that has used linguistic knowledge as an independent variable. However, since researchers like Vandergrift (1997b) and Macaro et al.

(2007) have recognized "that limited linguistic knowledge may be *the* underlying reason for differences in strategy use" (Macaro et al., 2007, p. 170, italics added), this researcher predicts that a relationship between variables will be found.

2. Is there a relationship between strategy use and listening proficiency according to number and type of strategies used?

Null hypothesis: There is no relationship between strategy use and listening proficiency according to number and type of strategies used.

O'Malley et al. (1989) found that more skilled listeners used more strategies, but Young (1997) found no relationship between listening proficiency and numbers of strategies used. Also, Osada (2001) determined that the less successful listeners were, the more they relied on bottom-up processing. While Vandergrift (2003a) found that more successful listeners used more metacognitive strategies than less successful listeners, O'Bryan and Hegelheimer (2009) found the opposite to be true, though the latter study used a small sample size (n=4). Chang (2009) reported that the major difference between lower and higher proficiency listeners was not in the number of strategies employed, but in the preferential order and how they were used. Because of these conflicting findings, this researcher will follow the conclusions of Macaro, et al. (2007) and Graham, et al. (2010) and predict that no (quantitative) relationship will be found among these variables.

3. Is there a relationship between linguistic knowledge and the number of audio-only, image-only and a combination of verbal and image idea units recalled?

Null hypothesis: There is no relationship between linguistic knowledge and the number of audio-only, image-only and a combination of verbal and image idea units recalled.

Since no prior studies have examined the relationship between linguistic knowledge and comprehension of videotexts using the three types of idea units as the current study has, making predictions based on the different types of idea units recalled from this text type difficult.

However, working under the assumption that higher levels of linguistic knowledge lead to more successful strategy use and thus better comprehension (i.e. prediction for Research Question One), this researcher will predict a relationship does exist between linguistic knowledge and the number of idea units recalled for one or more of the above types.

4. Is there a relationship between listening proficiency and the number of audio-only, image-only, and a combination of verbal and image idea units recalled?

Null hypothesis: There is no relationship between listening proficiency and the number of audio-only, image-only, and a combination of verbal and image idea units recalled.

Since listening proficiency by definition is tied to superior comprehension of spoken language (i.e. the aural or verbal message). The current researcher predicts that at least for audio-only and possibly for a combination of audio-and-image idea units, higher levels of listening proficiency will correlate with the recall of significantly more idea units of those types. Subjects with lower levels of listening proficiency may initially depend more on the images within the videotext (see discussion of Gruba, 2004, in Chapter Two). Thus, it is further predicted that such subjects will recall image-only idea units at a significantly higher rate than subjects with higher levels of listening proficiency.

5. Do the percentage of audio-only, image-only, and a combination of audio-and-image idea units recalled differ according to the number and type of listening strategies used?

Null hypothesis: The percentage of audio-only, image-only, and a combination of audio-and-image idea units recalled do not differ according to the number and type of listening strategies used.

Only one listening comprehension study using videotext the current researcher is aware of has looked at such relationships. Chien and Wei (1998) reported significant differences in strategy use in terms of both quantity and type, as related to listening comprehension success. However, it could be argued that the use of regression analysis (e.g. ANOVA) with such a small sample size (n = 18) lacks sufficient explanatory power. Graham, et al. (2010) more recent

findings reinforced Macaro's (2004) comment that for strategies, "their effectiveness or noneffectiveness derives from the way they are used and combined in tasks and processes" (p. 325) rather than in the raw number of strategies used. Thus it is predicted that no significant relationships will be found between types of idea units recalled and number and types of strategies used.

Research Design and Data Analysis

As stated in the *Purpose of the Study* section in Chapter 1, the present study is a predominantly quantitative project. While some qualitative data was collected through the background questionnaire, data from the Oxford Online Placement Test, the verbal report protocol, and the free written recall of idea units were all analyzed quantitatively for the present study. For all parts of the study, data analysis was carried out in a variety of ways.

For the background questionnaire, quantitative data (i.e. yes/no, gender, multiple choice answers) was entered into the Microsoft Office Excel software program and used primarily for describing the participants in this study. Qualitative data (i.e. answer explanations, short answers) was collected for possible use in Chapter 5 (i.e. Discussion) to help interpret anomalous or particularly interesting results of individual subjects. In the end, this secondary purpose was not actually used, being better suited for a qualitative analysis of the data which could be carried out in the future.

For the OOPT, the scores were immediately calculated by an Oxford University Press software program and made available to the test administrator (i.e. the current researcher) upon conclusion of each test. These scores were then accessible only to the researcher.

Subjects' verbal reports were transcribed (Leow, 2001b; Leow & Bowles, 2005) and coded (Appendix A), and frequency counts of strategies were conducted for each subject (Appendix Q). Kendall's tau_a (see below) was used in order to determine whether or not strategy

use differs quantitatively among subjects in order to answer Research Questions One, Two and Five.

For the written free recall comprehension measure, the number of audio-only (AU), image-only (IU) and audio-and-image (AIU) idea units successfully identified by subjects were divided by the total number of idea units of each type in the Jay Shafer videotext. This resulted in three separate decimal scores, plus an additional score for recall of total idea units (see Appendixes H, I, and J). Kendall's tau_a was used with these four idea unit scores to answer Research Questions Three, Four, and Five.

Data Analysis: Kendall's tau_a.

While regression analysis was initially used on the verbal report and written free recall data, it was determined that Kendall's tau_a was a more appropriate analysis method for the data collected in this research study for several reasons. The most important reason for moving from (parametric) regression models to (non-parametric or distribution-free) Kendall's tau_a was that the limited amount of data 27 subjects could provide resulted in the tests of and checks on the assumptions of the regression models lacking sufficient power for the results to be reliable (i.e. trusted). Kendall's tau_a is an association between two variables (Kendall, 1938; Kendall & Gibbons, 1990; Newson, 2002). The software package Stata (version 11.2, February, 14, 2012) published by StataCorp (http://www.stata.com) was used to calculate the Kendall's tau_a statistic.

Author of the somersd software package that includes calculations for Kendall's tau_a, Roger Newson (2002) wrote:

> Rank-based statistical methods are sometimes called "nonparametric" statistical methods. However, they are usually in fact based on population parameters, which can be estimated using confidence intervals around the corresponding sample statistics. Traditionally, these sample statistics are used for significance tests of the hypothesis that the population parameter is zero. However, statisticians increasingly recommend confidence intervals in preference to p-values alone… (p. 45).

Kendall's tau_a allows confidence intervals to be determined for the two variables or, to put it another way, the range of the probability of concordance (i.e. agreement) or discordance (i.e. disagreement) within confidence limitations. In the current study, the confidence level is set to 0.9, in line with the p-value of 0.1. The values given for Kendall's tau_a range from −1 (100% negative relationship) to +1 (100% positive relationship). A value of zero indicates the absence of a relationship between the two variables. Furthermore, when using a distribution-free inference either as a test or estimation, "the methods are based on functions of the sample observations whose corresponding random variable has a distribution which does not depend on the specific distribution function of the population from which the sample is drawn" (Gibbons and Chakraborti, 2003, p. 3).

Also, according to Newson (2002), use of Kendall's tau_a gives it several advantages over parametric analyses such as regression techniques because Kendall's tau_a

- assumes little about the distributions of the variables. In other words, whereas significance tests (reported as p-values) assume a symmetrical distribution of variables' data points around the zero point, Kendall's tau_a does not;
- does not assume the variables have a linear relationship;
- is robust with outlying data points;
- can be interpreted as a probability;
- can also be reported using significance levels; and
- allows results to be stated in plain English.
  (adapted from Newson, 2002)

Using an example from Newson (2002), may give a better idea of how Kendall's tau_a can be used. If two medical statistics lecturers both mark the same exam papers, and Kendall's tau_a between their marks is 0.7, then this means that, given two randomly chosen exam papers and asked which of the two is better, the two lecturers are 70 percent more likely to agree than disagree. The reverse could also be stated: The two lecturers are 30 percent more likely to disagree than to agree.

The confidence interval (CI) can also be determined for the statistic. Thus, if the above result were reported as "95% CI, 0.67 to 0.72," This would be interpreted as having "95 percent confidence that the two lecturers were at least 67 percent more likely to agree than to disagree, and possibly as much as 72 percent more likely to agree than to disagree," with the average agreement level being 70 percent (Newson, 2002, p. 47). Also, this result is more informative than simply giving the result as "significantly positive," as would be the case in the traditional use of Kendall's tau_a to test the null hypothesis that the corresponding population parameter is zero. In other words, providing confidence intervals is more useful than simply reporting results for significance tests, though as mentioned before, both can be determined using the Kendall's tau_a statistic.

Using the present study, an example drawn from the actual results could be helpful at this point for a clearer understanding of the reporting method. For Research Question Five, one result in Chapter Four is reported as follows: "Kendall's tau_a between top-down and bottom-up strategies and audio-only idea units is 0.47. This means that for two randomly chosen subjects, the subject who used more top-down strategies was 47 percent more likely to recall a *lower* percentage of audio-only idea units than a subject who used fewer top-down strategies (90% CI, 0.28 to 0.65, p-value < 0.01)."

Finally, a confidence interval has two more advantages over hypothesis testing. First, a CI can help determine which hypotheses are compatible with the data if the null hypothesis is *not* compatible with the data. Second, it can help determine what other hypotheses are *also* compatible with the data if the null hypothesis *is* compatible with the data. These final two points are important for the Recommendations for Future Research section of Chapter Five. A null hypothesis will be rejected if the p-value is less than or equal to 0.1.

Chapter Four

Results

First, this chapter reports the results of the Oxford Online Placement Test (OOPT) used to determine the 27 study subjects' linguistic knowledge (i.e. Use of English section score) and listening proficiency (Listening section score). Next, the inter-rater reliability coefficient is given for the written free recalls of idea units. This is followed by the intra-rater reliability coefficient for the immediate retrospective verbal report. Finally, the results for the analyses of the five research questions are given. Discussion of the results is located in Chapter Five.

OOPT Results

The subjects' scores on the two sections of the OOPT were used to differentiate the subjects according to their linguistic knowledge and listening proficiency. Table 4.1 summarizes the results. Note that subjects' scores on the free written recall of idea units, rounded to three decimal places, are also summarized on the right side of the table under the headings "AU," "IU," and "AIU." An explanation of idea unit scores is given in the next section.

As mentioned in Chapter Three, the 0-to-120 point scale of the test is divided into six equal levels of 20 points each, with each level corresponding to one of the six levels on the Common European Framework of Reference (CEFR) scale: 0-19 (A1), 20-39 (A2), 40-59 (B1), 60-79 (B2), 80-99 (C1), 100-120 (C2). As can be seen on Table 4.1, most subjects are in the "B levels," which could also be called intermediate levels, though six subjects also had (higher intermediate-advanced) C-level scores and four subjects' Listening scores fell within the "pre-intermediate," or A-level range. The median for the Use of English section was 65, and for Listening was 62.

Table 4.1. OOPT Scores, CEFR Levels, and Free Recall Scores

Name	UofE score[1]	L score[2]	CEFR[3]	AU*	IU*	AIU*
Joan	62	57	B2/B1	0.138	0.389	0.333
Lois	65	73	B2/B2	0.103	0.276	0.222
Steve	66	72	B2/B2	0.035	0.000	0.333
Henry	59	28	B1/A2	0.035	0.056	0.222
Tina	80	62	B2/B2	0.069	0.111	0.333
Kevin	63	37	B2/A2	0.035	0.389	0.222
Frank	56	61	B1/B2	0.276	0.111	0.222
Ruby	71	89	B2/C1	0.172	0.333	0.444
Roger	42	56	B1/B1	0.069	0.000	0.222
Jerry	56	56	B1/B1	0.207	0.056	0.444
Scott	50	56	B1/B1	0.103	0.222	0.333
David	73	86	B2/C1	0.172	0.167	0.222
Lisa	79	82	B2/C1	0.103	0.298	0.222
Rita	58	97	B1/C1	0.276	0.000	0.333
Judy	51	74	B1/B2	0.172	0.056	0.333
Jane	49	60	B1/B2	0.138	0.000	0.333
Sara	67	50	B2/B1	0.069	0.167	0.333
Anna	81	77	C1/B2	0.103	0.056	0.444
Brian	47	52	B1/B1	0.069	0.276	0.222
Paul	79	24	B2/A2	0.069	0.222	0.222
Lori	82	74	C1/B2	0.310	0.276	0.444
Mary	54	43	B1/B1	0.069	0.333	0.444
Keith	62	72	B2/B2	0.172	0.000	0.444
Ruth	58	66	B1/B2	0.207	0.056	0.444
James	66	17	B2/A1	0.069	0.333	0.333
Larry	76	57	B2/B1	0.000	0.389	0.222
Rose	72	61	B2/B2	0.035	0.333	0.111

[1]Use of English; [2] Listening; [3]Use of English level/Listening level (Common European Framework Reference); *AU = audio-only idea unit score; IU = image-only idea unit score, AIU = audio-and-image idea unit score

Note: All names are pseudonyms.

Inter-rater Reliability Coefficient for Written Free Recalls of Idea Units

As detailed in Chapter Three, the inter-rater reliability coefficient for the free recall comprehension measure was determined for the three raters. Using the formula from Chapter Three, the coefficient was found to be .85 (.8488), which is above the pre-set minimum of .80. All disagreements were discussed by the three raters and agreed upon by consensus so that final scores for total idea units and each of the three types of idea units(i.e. audio-only idea units, or AU; image-only idea units, or IU, and audio-and-image idea units, or AIU) could be awarded to subjects. As can be seen in Table 4.1, the three results on the right side of the table are given as decimal scores, with the number of idea units written by subjects divided by the total number of idea units for each type.

Intra-rater Reliability Coefficient for Immediate Retrospective Verbal Reports

The researcher of this study rated the verbal reports, as explained in Chapter Three. Seven of the 27 total verbal reports were rated and then re-rated six weeks later (Young, 1998). An intra-rater reliability coefficient of .91 (.9108) was figured according to the formula given in Chapter Three. This is above the pre-set minimum of .90. Rating and re-rating the seven randomly chosen verbal reports also allowed the researcher to finalize the list of listening strategies used by subjects (Appendix A). Also during the rating (coding) and re-rating process, new strategy pairs were identified that were found to be useful in differentiating when subjects were referring to strategic processes related to the audio or image information. These are noted in Appendix A. After the seven randomly chosen verbal reports were re-coded, the remaining 20 verbal reports were coded. Totals for each strategy used by subjects are found in Appendix Q.

Results for Research Questions

As described in Chapter Three, Kendall's tau_a is calculated for each set of variables for each of the five research questions. The significance test was set at the 0.1 level. All results are reported for two randomly chosen subjects from the total sample (n = 27).

For the Kendall's tau_a statistic, the chance that a certain result will be observed is reported as both a (percentage) confidence interval and the point estimate of that interval, along with the significance level (i.e. p-value). The level of the confidence interval of each result is 0.90, which means that if the study were repeated, a comparison between any two subjects would include the true value of Kendall's tau_a 90 percent of the time. As noted in Chapter Three, the values for Kendall's tau_a range from -1 (100% negative relationship) to +1 (100% positive relationship), with a value of zero indicating the absence of a relationship between the two variables. Results for Research Question One are used to provide detailed examples of how to read the accompanying summary results tables.

As explained near the end of Chapter Three, both significant and non-significant results are discussed in Chapter Five because both types of results may have interesting implications for both future research projects and educational purposes. Summaries of the results can be found in Tables 4.2 to 4.6. Each summary table is listed at the end of the appropriate section.

Results for Research Question One.

Research Question One is restated below, followed by paragraph-form results for the Kendall's tau_a analyses, and finally the summary Table 4.2.

1. Is there a relationship between strategy use and linguistic knowledge according to number and type of strategies used?

Kendall's tau_a for linguistic knowledge and total strategies.

Kendall's tau_a between linguistic knowledge (as measured by the Use of English section on the OOPT) and total strategies is 0.13. This means that for two randomly chosen subjects, the subject with higher linguistic knowledge was 13 percent more likely to use more total strategies than a subject with lower linguistic knowledge (90% CI, -0.10 to 0.36, p-value = 0.35). It would also be correct to say that the subject with higher linguistic knowledge was 13 percent more likely to use more strategies than to use fewer strategies. The first manner of reporting will be used for the remainder of the results (i.e. a comparison of two randomly chosen subjects). As can be seen by the reported p-value, this result is not statistically significant at the 0.1 level.

Kendall's tau_a for linguistic knowledge and cognitive/metacognitive strategies.

Kendall's tau_a between linguistic knowledge and cognitive and metacognitive strategies is 0.05. This means that for two randomly chosen subjects, the subject with higher linguistic knowledge was five percent more likely to use more cognitive strategies than a subject with lower linguistic knowledge (90% CI, -0.17 to 0.27, p-value = 0.71). Also, a subject with higher linguistic knowledge was five percent more likely to use *fewer* metacognitive strategies than a subject with lower linguistic knowledge (90% CI, -0.17 to 0.27, p-value = 0.71). This result is also not statistically significant at the 0.1 level.

Kendall's tau_a for linguistic knowledge and top-down/bottom-up strategies.

Kendall's tau_a between linguistic knowledge and top-down and bottom-up strategies is 0.21. This means that for two randomly chosen subjects, the subject with higher linguistic knowledge was 21 percent more likely to use *more* top-down strategies than a subject with lower linguistic knowledge (90% CI, -0.02 to 0.44, p-value = 0.13). Also, a subject with higher linguistic knowledge was 21 percent more likely to use *fewer* bottom-up strategies than a subject with lower linguistic knowledge (90% CI, -0.02 to 0.44, p-value = 0.13). While not quite

statistically significant at the 0.1 level, the pre-set significance level was nearly achieved, with implications that are discussed in Chapter Five.

Table 4.2.

Summary of Results for Research Question One

	Kendall's tau_a (point estimate, 90% CI)	Significance (0.1 level)
Research Question One		
Linguistic knowledge and Total strategies	13%	0.35
Linguistic knowledge and Cognitive strategies	5%	0.71
Linguistic knowledge and Metacognitive strategies	5%	0.71
Linguistic knowledge and Top-down strategies	21%	0.13
Linguistic knowledge and Bottom-up strategies	21%	0.13

Note: See Appendix A for a list of strategies used overall by subjects, and Appendix Q for strategy totals for each subject. Kendall's tau_a is the point estimate between the two end points of the confidence interval (CI).

Results for Research Question Two.

Research Question Two is restated below, followed by summary Table 4.3, and then paragraph-form results for the Kendall's tau_a analyses.

2. Is there a relationship between strategy use and listening proficiency according to number and type of strategies used?

Kendall's tau_a for listening proficiency and total strategies.

Kendall's tau_a between listening proficiency (as measured on the Listening section of the OOPT) and total strategies is 0.28. This means that for two randomly chosen subjects, the subject

with higher listening proficiency was 28 percent more likely to use *more* total strategies than a subject with lower linguistic knowledge (90% CI, 0.03 to 0.52, p-value = 0.06). This result is statistically significant at the 0.1 level.

Kendall's tau$_a$ for listening proficiency and cognitive/metacognitive strategies.

Kendall's tau$_a$ between listening proficiency and cognitive and metacognitive strategies is 0.09. This means that for two randomly chosen subjects, the subject with higher listening proficiency was nine percent more likely to use *fewer* cognitive strategies than a subject with lower listening proficiency (90% CI, -0.17 to 0.35, p-value = 0.71). Also, a subject with higher listening proficiency was nine percent more likely to use *more* metacognitive strategies than a subject with lower listening proficiency (90% CI, -0.17 to 0.27, p-value = 0.71). These results are not statistically significant at the 0.1 level.

Kendall's tau$_a$ for listening proficiency and top-down/bottom-up strategies.

Kendall's tau$_a$ between listening proficiency and top-down and bottom-up strategies is 0.20. This means that for two randomly chosen subjects, the subject with higher listening proficiency was 20 percent more likely to use *fewer* top-down strategies than a subject with lower listening proficiency (90% CI, 0.01 to 0.39, p-value = 0.09). Also, a subject with higher listening proficiency was 20 percent more likely to use *more* bottom-up strategies than a subject with lower listening proficiency (90% CI, 0.01 to 0.39, p-value = 0.09). These results are statistically significant at the 0.1 level.

Table 4.3.

Summary of Results for Research Question Two

	Kendall's tau_a (point estimate, 90% CI)	Significance (0.1 level)
Research Question Two		
Listening proficiency and total strategies	28%	0.06*
Listening proficiency and cognitive strategies	9%	0.57
Listening proficiency and metacognitive strategies	9%	0.57
Listening proficiency and top-down strategies	20%	0.09*
Listening proficiency and bottom-up strategies	20%	0.09*

Note: See Appendix A for a list of strategies used overall by subjects, and Appendix Q for strategy totals for each subject. Kendall's tau_a is the point estimate between the two end points of the confidence interval (CI). *statistically significant results.

Results for Research Question Three.

Research Question Three is restated below, followed by summary Table 4.4, and then paragraph-form results for the Kendall's tau_a analyses.

3. Is there a relationship between linguistic knowledge and the number of audio-only, image-only and a combination of audio-and-image idea units recalled?

Kendall's tau_a for linguistic knowledge and total idea units.

Kendall's tau_a between linguistic knowledge and total idea units is less than 0.01. This means that for two randomly chosen subjects, the subject with higher linguistic knowledge was

less than one percent more likely to recall more total idea units than a subject with lower linguistic knowledge (90% CI, -0.29 to 0.30, p-value = 0.99). Not only is this result not statistically significant, but there is also almost no relationship at all between subjects' linguistic knowledge and the total percentage of idea units subjects recalled.

Kendall's tau_a for linguistic knowledge and audio-only idea units.

Kendall's tau_a between linguistic knowledge and audio-only idea units is 0.09. This means that for two randomly chosen subjects, the subject with higher linguistic knowledge was nine percent more likely to recall a *lower* percentage of audio-only idea units than a subject with lower linguistic knowledge (90% CI, -0.14 to 0.31, p-value = 0.52). This result is not statistically significant at the 0.1 level.

Kendall's tau_a for linguistic knowledge and image-only idea units.

Kendall's tau_a between linguistic knowledge and image-only idea units is 0.19. This means that for two randomly chosen subjects, the subject with higher linguistic knowledge was 19 percent more likely to recall a *higher* percentage of image-only idea units than a subject with lower linguistic knowledge (90% CI, -0.01 to 0.39, p-value = 0.11). While not quite statistically significant at the 0.1 level, the pre-set significance level was nearly achieved, with implications that are discussed in Chapter Five.

Kendall's tau_a for linguistic knowledge and audio-and-image idea units.

Finally, Kendall's tau_a between linguistic knowledge and audio-and-image idea units is 0.01. This means that for two randomly chosen subjects, the subject with higher linguistic knowledge was one percent more likely to recall a *higher* percentage of audio-and-image idea units than a subject with lower linguistic knowledge (90% CI, -0.23 to 0.24, p-value = 0.97). Not only is this result not significant, but a Kendall's tau_a barely above zero also indicates that there

is almost no relationship between a subject's linguistic knowledge and the percentage of audio-and-image idea units identified, with implications discussed in Chapter Five.

Table 4.4.

Summary of Results for Research Question Three

	Kendall's tau_a (point estimate 90% CI)	Significance (0.1 level)
Research Question Three		
Linguistic knowledge and total idea units	< 1%	0.99
Linguistic knowledge and audio-only idea units	9%	0.52
Linguistic knowledge and image-only idea units	19%	0.11
Linguistic knowledge and audio-and-image idea units	1%	0.97

Note: See Appendixes H to J for time-ordered lists of the three different types of idea units. Kendall's tau_a is the point estimate between the two end points of the confidence interval (CI).

Results for Research Question Four.

Research Question Four is restated below, followed by the summary table for the research question and then paragraph-form results for the Kendall's tau_a analyses.

4. Is there a relationship between listening proficiency and the number of audio-only, image-only and a combination of audio-and-image idea units recalled?

Kendall's tau_a for listening proficiency and total idea units.

Kendall's tau_a between listening proficiency and total idea units is 0.16. This means that for two randomly chosen subjects, the subject with higher listening proficiency was 16 percent more likely to recall a *higher* percentage of total idea units than a subject with lower listening

proficiency (90% CI, -0.06 to 0.37, p-value = 0.23). This result is not statistically significant at the 0.1 level.

Kendall's tau_a for listening proficiency and audio-only idea units.

Kendall's tau_a between listening proficiency and audio-only idea units is 0.39. This means that for two randomly chosen subjects, the subject with higher listening proficiency was 39 percent more likely to recall a *higher* percentage of audio-only idea units than a subject with lower listening proficiency (90% CI, 0.24 to 0.55, p-value < 0.01). This result is statistically significant at the 0.1 level.

Kendall's tau_a for listening proficiency and image-only idea units.

Kendall's tau_a between listening proficiency and image-only idea units is 0.17. This means that for two randomly chosen subjects, the subject with higher listening proficiency was 17 percent more likely to recall a *lower* percentage of image-only idea units than a subject with lower listening proficiency (90% CI, -0.06 to 0.40, p-value = 0.21). This result is not statistically significant at the 0.1 level.

Kendall's tau_a for listening proficiency and audio-and-image idea units.

Finally, Kendall's tau_a between listening proficiency and audio-and-image idea units is 0.15. This means that for two randomly chosen subjects, the subject with higher listening proficiency was 15 percent more likely to recall a *higher* percentage of audio-and-image idea units than a subject with lower listening proficiency (90% CI, -0.07 to 0.36, p-value = 0.25). This result is not statistically significant at the 0.1 level.

Table 4.5.

Summary of Results for Research Question Four

	Kendall's tau_a (point estimate, 90% CI)	Significance (0.1 level)
Research Question Four		
Listening proficiency and Total idea units	16%	0.23
Listening proficiency and Audio-only idea units	39%	< 0.01*
Listening proficiency and Image-only idea units	17%	0.21
Listening proficiency and Audio-and-image idea units	15%	0.25

Note: See Appendixes H to J for time-ordered lists of the three different types of idea units. Kendall's tau_a is the point estimate between the two end points of the confidence interval (CI). *statistically significant results.

Results for Research Question Five.

Research Question Five is restated below, followed by the summary table for the research question and then paragraph-form results for the Kendall's tau_a analyses.

5. Does the percentage of audio-only, image-only and audio-and-image idea units recalled differ depending on the number and type of listening strategies used?

Kendall's tau_a for total strategies and total idea units.

First, Kendall's tau_a between total strategies and total idea units is 0.34. This means that for two randomly chosen subjects, the subject who used more total strategies was 34 percent more likely to recall a *higher* percentage of total idea units than a subject who used fewer total strategies (90% CI, 0.09 to 0.60, p-value = 0.03). This result is statistically significant at the 0.1 level. Note, however, that the operational videotext used in this study is not necessarily representative of all short, documentary news videotexts as far as the distribution of different

types of idea units. Readers should keep this in mind when considering results for Research Question Five.

Kendall's tau_a for total strategies and audio-only idea units.

Kendall's tau_a between total strategies and audio-only idea units is 0.28. This means that for two randomly chosen subjects, the subject who used more total strategies was 28 percent more likely to recall a *higher* percentage of audio-only idea units than a subject who used fewer total strategies (90% CI, 0.10 to 0.47, p-value = 0.02). This result is statistically significant at the 0.1 level.

Kendall's tau_a for total strategies and image-only idea units.

Next, Kendall's tau_a between total strategies and image-only idea units is 0.01. This means that for two randomly chosen subjects, the subject who used more total strategies was one percent more likely to recall a *higher* percentage of image-only idea units than a subject who used fewer total strategies (90% CI, -0.25 to 0.28, p-value = 0.94). This result is not statistically significant at the 0.1 level, and indicates that there is almost no relationship between number of strategies used and percentage of image-only idea units recalled.

Kendall's tau_a for total strategies and audio-and-image idea units.

Finally, Kendall's tau_a between total strategies and audio-and-image idea units is 0.35. This means that for two randomly chosen subjects, the subject who used more total strategies was 35 percent more likely to recall a *higher* percentage of audio-and-image idea units than a subject who used fewer total strategies (90% CI, 0.19 to 0.51, p-value < 0.01). This result is statistically significant at the 0.1 level.

Kendall's tau_a for top-down/bottom-up strategies and total idea units.

First, Kendall's tau_a between top-down and bottom-up strategies and total idea units is 0.15. This means that for two randomly chosen subjects, the subject who used more top-down

strategies was 15 percent more likely to recall a *lower* percentage of total idea units than a subject who used fewer top-down strategies (90% CI, -0.09 to 0.39, p-value = 0.29). Also, the subject who used more bottom-up strategies was 15 percent more likely to recall a higher percentage of total idea units than a subject who used fewer bottom-up strategies (90% CI, -0.09 to 0.39, p-value = 0.29). These results are not statistically significant at the 0.1 level.

Kendall's tau_a for top-down/bottom-up strategies and audio-only idea units.

Kendall's tau_a between top-down and bottom-up strategies and audio-only idea units is 0.47. This means that for two randomly chosen subjects, the subject who used more top-down strategies was 47 percent more likely to recall a *lower* percentage of audio-only idea units than a subject who used fewer top-down strategies (90% CI, 0.28 to 0.65, p-value < 0.01). Also, the subject who used more bottom-up strategies was 47 percent more likely to recall a *higher* percentage of audio-only idea units than a subject who used fewer bottom-up strategies (90% CI, 0.28 to 0.65, p-value < 0.01). These results are statistically significant at the 0.1 level.

Kendall's tau_a for top-down/bottom-up strategies and image-only idea units.

Next, Kendall's tau_a between top-down and bottom-up strategies and image-only idea units is 0.36. This means that for two randomly chosen subjects, the subject who used more top-down strategies was 36 percent more likely to recall a *higher* percentage of image-only idea units than a subject who used fewer top-down strategies (90% CI, 0.17 to 0.56, p-value < 0.01). Also, the subject who used more bottom-up strategies was 36 percent more likely to recall a *lower* percentage of image-only idea units than a subject who used fewer bottom-up strategies (90% CI, 0.17 to 0.56, p-value < 0.01). These results are statistically significant at the 0.1 level.

Kendall's tau_a for top-down/bottom-up strategies and audio-and-image idea units.

Finally, Kendall's tau_a between top-down and bottom-up strategies and audio-and-image idea units is 0.32. This means that for two randomly chosen subjects, the subject who used more

top-down strategies was 32 percent more likely to recall a *lower* percentage of audio-and-image idea units than a subject who used fewer top-down strategies (90% CI, 0.10 to 0.54, p-value = 0.02). Also, the subject who used more bottom-up strategies was 32 percent more likely to recall a higher percentage of audio-and-image idea units than a subject who used fewer bottom-up strategies (90% CI, 0.10 to 0.54, p-value = 0.02). These results are statistically significant at the 0.1 level.

Kendall's tau$_a$ for cognitive/metacognitive strategies and total idea units.

First, Kendall's tau$_a$ between cognitive and metacognitive strategies and total idea units is 0.03. This means that for two randomly chosen subjects, the subject who used more cognitive strategies was three percent more likely to recall a *lower* percentage of total idea units than a subject who used fewer cognitive strategies (90% CI, -0.18 to 0.24, p-value = 0.80). Also, the subject who used more metacognitive strategies was three percent more likely to recall a higher percentage of total idea units than a subject who used fewer metacognitive strategies (90% CI, -0.18 to 0.24, p-value = 0.80). These results are not statistically significant at the 0.1 level and indicate that there is very little relationship between cognitive and metacognitive strategy use and the number of total idea units recalled.

Kendall's tau$_a$ for cognitive/metacognitive strategies and audio-only idea units.

Next, Kendall's tau$_a$ between cognitive and metacognitive strategies and audio-only idea units is 0.04. This means that for two randomly chosen subjects, the subject who used more cognitive strategies was four percent more likely to recall a *lower* percentage of audio-only idea units than a subject who used fewer cognitive strategies (90% CI, -0.20 to 0.29, p-value = 0.77). Also, the subject who used more metacognitive strategies was four percent more likely to recall a higher percentage of audio-only idea units than a subject who used fewer metacognitive strategies (90% CI, -0.20 to 0.29, p-value = 0.77). These results are not statistically significant at

the 0.1 level and indicate that there is very little relationship between cognitive and metacognitive strategy use and the number of audio-only idea units recalled.

Kendall's tau$_a$ for cognitive/metacognitive strategies and image-only idea units.

Next, Kendall's tau$_a$ between cognitive and metacognitive strategies and image-only idea units is 0.01. This means that for two randomly chosen subjects, the subject who used more cognitive strategies was one percent more likely to recall a *higher* percentage of image-only idea units than a subject who used fewer cognitive strategies (90% CI, -0.22 to 0.25, p-value = 0.92). Also, the subject who used more metacognitive strategies was one percent more likely to recall a *lower* percentage of image-only idea units than a subject who used fewer metacognitive strategies (90% CI, -0.22 to 0.25, p-value = 0.92). This result is not statistically significant at the 0.1 level, and indicates that there is almost no relationship between percentage of cognitive and metacognitive strategies used and percentage of image-only idea units recalled.

Kendall's tau$_a$ for cognitive/metacognitive strategies and audio-and-image idea units.

Finally, Kendall's tau$_a$ between cognitive and metacognitive strategies and audio-and-image idea units is 0.02. This means that for two randomly chosen subjects, the subject who used more cognitive strategies was two percent more likely to recall a *lower* percentage of audio-and-image idea units than a subject who used fewer cognitive strategies (90% CI, -0.20 to 0.23, p-value = 0.89). Also, the subject who used more metacognitive strategies was two percent more likely to recall a *higher* percentage of audio-and-image idea units than a subject who used fewer metacognitive strategies (90% CI, -0.20 to 0.23, p-value = 0.89). Not only is this result not statistically significant at the 0.1 level, but it also indicates that there is almost no relationship between percentage of cognitive and metacognitive strategies used and percentage of audio-and-image idea units recalled.

Table 4.6.

Summary of Results for Research Question Five

	Kendall's tau_a (point estimate, 90% CI)	Significance (0.1 level)
Research Question Five		
Total strategies and Total idea units	34%	0.03*
Total strategies and Audio-only idea units	28%	0.02*
Total strategies and Image-only idea units	1%	0.94
Total strategies and Audio-and-image idea units	35%	< 0.01*
Top-down strategies and Total idea units	15%	0.29
Top-down strategies and Audio-only idea units	47%	< 0.01*
Top-down strategies and Image-only idea units	36%	< 0.01*
Top-down strategies and Audio-and-image idea units	32%	0.02*
Bottom-up strategies and Total idea units	15%	0.29
Bottom-up strategies and Audio-only idea units	47%	< 0.01*
Bottom-up strategies and Image-only idea units	36%	< 0.01*
Bottom-up strategies and Audio-and-image idea units	32%	0.02*
Cognitive strategies and Total idea units	3%	0.80

Cognitive strategies and Audio-only idea units	4%	0.77
Cognitive strategies and Image-only idea units	1%	0.92
Cognitive strategies and Audio-and-image idea units	2%	0.89
Metacognitive strategies and Total idea units	3%	0.80
Metacognitive strategies and Audio-only idea units	4%	0.77
Metacognitive strategies and Image-only idea units	1%	0.92
Metacognitive strategies and Audio-and-image idea units	2%	0.89

Note: See Appendixes H to J for time-ordered lists of the three different types of idea units, Appendix A for a list of strategies used overall by subjects, and Appendix Q for strategy totals for each subject. Kendall's tau_a is the point estimate between the two end points of the confidence interval (CI). *statistically significant results

Conclusion

This chapter reported: 1) the results of the OOPT for all subjects; 2) inter-rater reliability coefficients for the written free recall comprehension measure; 3) the intra-rater reliability coefficient for the immediate retrospective verbal report; and 4) the Kendall's tau_a statistical analysis results for each of the five research questions investigated in this study. The next chapter consists of summaries and discussion of results for each of the five research questions, suggestions for future research projects concerning listening strategies and videotext, educational implications (dependent on further supporting evidence from future research), and an overall conclusion.

Chapter Five

Conclusions

Summary and Discussion of Major Findings

This final chapter is divided into eight sections. Five of these are summary-and-discussion sections based on the results for the research questions investigated in this study. The sixth section makes recommendations for future listening strategy and videotext research. The seventh (smaller) section offers limited educational implications of this exploratory study. The chapter ends with a short conclusion.

Summary and Discussion: Research Question One

Research question one investigated the relationship between linguistic knowledge and five strategy categories: total, cognitive, metacognitive, top-down, and bottom-up strategies. Contrary to predictions, none of the five analyses proved to be statistically significant. However, the trend was positive for all five strategy categories (i.e. a subject with higher linguistic knowledge was more likely to use more strategies in each category than a subject with lower linguistic knowledge). Also, as can be seen in Table 4.2, the relationship between linguistic knowledge and top-down/bottom-up strategies was nearly significant at the 0.1 level. A comparison between this result and the relationship between listening proficiency and top-down/bottom-up strategy use has more interesting implications. The discussion of this comparison can be found in the section *Recommendations for Future Research* below.

The predictions for results for this research question were that significant relationships would be found between linguistic knowledge and one or more of the five strategy categories, but none was found in the analyses. There may indeed be no relationship between linguistic knowledge and the number of strategies used when subjects attempt to comprehend short,

documentary-style news videotexts. However, the support used for making the above prediction came largely from Macaro et al. (2007). While those researchers wrote "that limited linguistic knowledge may be *the* underlying reason for differences in strategy use" (p. 170, italics added), there is more than a *quantitative* element involved. Macaro et al. (2007) were actually focusing more on the *qualitative* use of strategies. In other words, it is *how* learners deploy strategies rather than *how many* they deploy that leads to the success or lack of success in using strategies, and how learners use listening strategies may be due at least partially to their level of linguistic knowledge. This result actually provides more impetus to conduct a qualitative analysis of the data to see if a significant qualitative relationship exists where a significant quantitative one did not. It is important to stress again that text and task types have been shown to greatly affect which strategies learners use, how they use the strategies and in which combinations they use those strategies. In other words, with a different text and/or task type, learners' linguistic knowledge might significantly affect the numbers and types of listening strategies they use. Thus, along with qualitative analyses, more text and task types should be investigated using the same methods as the current study to see if similar or different results occur.

Summary and Discussion: Research Question Two

Contrary to predictions, more significant results were found for the relationship between listening proficiency and the five categories of listening strategies. The Kendall's tau_a statistic between listening proficiency and total strategy use was 0.28. In other words, a subject who had higher listening proficiency was from three percent to 53 percent more likely to use more total listening strategies than a subject with lower listening proficiency ($p = 0.06$; see scatter plot in Appendix P4). This result supports findings from O'Malley et al. (1989), and is different than those of Young (1997) and Chang (2009). When compared to the results for Research Question

One, listening proficiency had a stronger relationship with total strategy use than linguistic knowledge did.

There was also a significant relationship ($p = 0.09$) between listening proficiency and top-down/bottom-up strategies (see scatter plot in Appendix P6). Again, since top-down and bottom-up strategy categories are mutually exclusive, the results of the analysis can be stated in different ways. For example, a subject with a higher listening proficiency was 20 percent more likely to use more bottom-up strategies than a subject with lower listening proficiency (and 20 percent less likely to use more top-down strategies). This makes the reverse also true: that a subject with lower listening proficiency was 20 percent more likely to use more top-down strategies than a subject with higher listening proficiency (and 20 percent less likely to use more bottom-up strategies). These results are opposite those of Osada (2001) and support the hypothesis that more proficient second-language listeners may depend more on their superior bottom-up, decoding skills, i.e. building up knowledge from phonemes to words and phrases and finally to sentences, rather than on using top-down strategies such as inferencing and using prior knowledge to fill in the gaps caused by their less well-developed bottom-up skills.

The relationship between listening proficiency and cognitive/metacognitive strategy use with a Kendall's tau_a of 0.05 or five percent was very weak (see scatter plot in Appendix P5), just as was the relationship between linguistic knowledge and cognitive/metacognitive strategy use (with a Kendall's tau_a of 0.09 or nine percent; see scatter plot in Appendix P2). These results indicate that there was almost no relationship between the number of cognitive or metacognitive strategies used and subjects' levels of linguistic knowledge and listening proficiency.

The researcher predicted that no relationship would be found between listening proficiency and number of strategies used for all five categories. While no significant relationship was found between listening proficiency and use of cognitive and metacognitive

strategies, unlike Vandergrift (2003a) and Goh (1998), significant relationships *were* found between listening proficiency and total, top-down, and bottom-up strategies. Both Macaro, et al. (2007) and Graham, et al. (2010) supported the hypothesis that any differences in strategy use would likely be qualitative (i.e. successful or non-successful use) rather than quantitative. However, since significant differences in numbers of strategies used according to levels of listening proficiency were found, this seems to warrant continued examination of listening strategy research data quantitatively rather than exclusively performing qualitative analyses.

Summary and Discussion: Research Question Three

Research Question Three investigated the relationships between levels of linguistic knowledge and four categories of idea units that subjects wrote down in the free recall comprehension measure: total, audio-only, image-only, and audio-and-image. There was a slightly negative relationship between linguistic knowledge and audio-only idea units (i.e. 0.09 or nine percent more likely for a subject with higher linguistic knowledge to recall *fewer* audio-only idea units). While this was not statistically significant ($p = 0.52$) and was contrary to predictions, when compared to the relationship between listening proficiency and audio-only idea units, the trend may have more interesting implications for future research projects. Thus, this comparison is discussed later in that section.

The relationship between linguistic knowledge and image-only idea units was stronger than the above result, but, contrary to predictions, not quite at the significant level ($p = 0.11$; see scatter plot in Appendix P9). Subjects with higher linguistic knowledge were 0.19 or 19 percent more likely to write down more image-only idea units than subjects with lower linguistic knowledge. This result is strong enough to warrant continued investigation of the relationship between linguistic knowledge and comprehension of information delivered through the visual channel in videotext. The relationship will also be discussed in the later *Recommendations for*

Future Research section along with the relationships between both linguistic knowledge and listening proficiency and audio-only idea units.

Finally, Kendall's tau_a between linguistic knowledge and audio-and-image idea units and linguistic knowledge and recall of total idea units were both extremely low: 0.01 or one percent ($p = 0.97$) and < 0.01 or less than one percent ($p = 0.99$), respectively. This result basically indicates no relationship between linguistic knowledge and the other two variables. In other words, there was no real difference in the number of audio-and-image or total idea units subjects wrote down according to their levels linguistic knowledge.

The prediction that a significant relationship would be found between linguistic knowledge and one or more of the three types of idea units were not supported by the results. The researcher was working under the assumption that higher levels of linguistic knowledge would lead to more successful strategy use and thus better comprehension (i.e. prediction for Research Question One). However, "successful strategy use," at least according to levels of linguistic knowledge, may indeed be a qualitative rather than a quantitative issue, at least for the text and/or task type used in the current study. Thus, the suggestion here, like in the discussion of results for Research Question One, would be for qualitative analyses to be carried out on the verbal report and free recall data to investigate a link between successful strategy use and superior idea unit recall. Further discussion of qualitative and quantitative investigations of these variables is found below in *Recommendations for Future Research*.

Summary and Discussion: Research Question Four

In line with predictions, a very strong, positive relationship was found between listening proficiency and audio-only idea units. Subjects with higher listening proficiency were 0.39 or 39 percent more likely to write down more audio-only idea units than subjects with lower listening proficiency ($p < 0.01$; see scatter plot in Appendix P12). This result strongly supports the

common sense prediction that subjects with higher listening proficiency should be able to gain significantly more information from the aural channel. Further implications are discussed in *Recommendations for Future Research*.

Contrary to predictions, the relationship between listening proficiency and image-only idea units did not reach the significance level. However, the trend was clearly negative (see scatter plot in Appendix P13). In other words, subjects with higher listening proficiency were 0.17 or 17 percent *less* likely to write down more image-only idea units than subjects with lower listening proficiency. This result may still have significant implications for future research when compared to results for the relationships among linguistic knowledge, listening proficiency, and audio-only and image-only idea units, as noted in previous summary and discussion sections.

There were positive though non-significant relationships between listening proficiency and total and audio-and-image idea units, with Kendall's tau_a statistics of 0.16 or 16 percent ($p = 0.23$) and 0.15 or 15 percent ($p = 0.25$), respectively. Again, while not statistically significant, the positive trend for audio-and-image idea units, along with the previously discussed significant relationship between listening proficiency and audio-only idea units, may indicate that subjects process audio-and-image idea units more like audio-only than image-only idea units according to their listening proficiency. In other words, higher listening proficiency subjects could be ignoring information delivered through the visual channel due to their preference and/or skill at gaining information from the aural channel. Implications of this for future research and education are discussed below.

The success of predictions for Research Question Four was mixed. As noted above, the researcher predicted that a significant relationship between listening proficiency and audio-only idea units would be found, and this was strongly supported by the analysis. While the other two predictions were not supported at a significance level, i.e. that a relationship would be found

between listening proficiency and audio-and-image idea units and between (lower) listening proficiency and (more) image-only idea units, the trends did follow expectations. This could indicate a need for further exploration of these relationships as discussed later in this chapter.

Summary and Discussion: Research Question Five

The predictions for all results for Research Question Five were based primarily on the review of listening strategy research by Macaro, et al. (2007), which was also supported by Graham et al. (2010). For second language listeners, those researchers determined that it is not the number of strategies used that determines better comprehension, but the successful or non-successful (qualitative) use of the strategies that facilitates more complete understanding. In other words, the present researcher's prediction was that no significant relationship would be found between strategy types (i.e. total, top-down, bottom-up, cognitive, and metacognitive) and types of idea units that subjects recalled. However, some of the most strongly significant and interesting results in the entire study occurred among the variables of this research question. As mentioned in the *Predictions* section of Chapter Three, Chien and Wei (1998) reported significant differences in strategy use both in terms of quantity and type, as related to listening comprehension success. It could be argued that the use of regression analysis (e.g. ANOVA) with such a small sample size (n = 15) lacks sufficient explanatory power. However, the current study's results are similar quantitatively to Chien and Wei's (1998) findings, though the two studies differed significantly in terms of types of videotext used and unit of analysis and timing of the free recall comprehension measures.

The investigation of the relationships between total strategy use and the three types of idea units yielded three interesting results. First, subjects who used more total strategies were 0.34 or 34 percent ($p = 0.03$) more likely to recall more total idea units than subjects who used fewer strategies (see Appendix P15 for a scatter plot of the data). This is a strong overall

result, but it needs to be confirmed or disconfirmed by future studies using different types of videotexts with subjects having differing characteristics from the present study. Again, it should be noted that when evaluating the significance and generalizability of subjects' overall scores that it is not clear how representative the operational videotext is of short, documentary-style news videotexts as far as the numbers of each of the idea units. The implications of this are discussed later in this chapter.

Second, subjects who used more total strategies were also 28 percent more likely to recall more audio-only idea units than subjects who used fewer total strategies ($p = 0.02$; see Appendix P16 for a scatter plot of the data). Third, subjects who used more total strategies were one percent more likely to recall more image-only idea units than subjects who used fewer total strategies ($p = 0.94$; see Appendix P17 for a scatter plot of the data). This indicates almost no relationship between how many total strategies subjects used and the number of image-only idea units that they recalled. Finally, subjects who used more total strategies were 35 percent more likely to recall more audio-and-image idea units than subjects who used fewer total strategies ($p < 0.01$; see Appendix P18 for a scatter plot of the data).

There were very strong relationships found among top-down and bottom-up strategy use and the recall of the three types of idea units, but not between these two types of strategies and recall of total idea units. Though there was a positive trend for subjects who used more bottom-up strategies to also recall more total idea units, Kendall's tau_a was only 15 percent ($p = 0.29$; see scatter plot in Appendix P23).

First, subjects who used more bottom-up strategies were 47 percent more likely to recall more audio-only idea units than subjects who used fewer bottom-up strategies ($p < 0.01$; see scatter plot in Appendix P23). The bottom-up strategies subjects gave evidence of using in this study were identification of a single word (IDW), identification of a chunk (i.e. two or more

connected words; IDC), translation (TRAN), or replicating ideas from English to Chinese or Chinese to English in a relatively direct way, and (very rarely) vocalization (VOC, i.e. attempting to verbalize unidentified words). Again, all strategies that subjects gave evidence of using can be found in Appendixes A and U.

Second, subjects who used more bottom-up strategies were 36 percent *less* likely to recall more image-only idea units than subjects who used fewer such strategies ($p < 0.01$; see scatter plot in Appendix P25). Since bottom-up listening strategies, or decoding strategies, focus on the comprehension of phonemes (word parts) and single words to build up meaning to the sentential level, it is logical to deduce that subjects who depended more on these strategies would focus less on information being delivered through the visual channel. This result is also in line with information processing theory (Chapter Two), which posits that language learners have limited cognitive resources (i.e. thinking capacity), and thus can become overwhelmed by incoming information. In other words, the subjects in the present study may have used more bottom-up strategies (which they are more comfortable using) to focus on the incoming aural information and ignored more of the visual information due to cognitive constraints. Besides supporting or not supporting the finding that subjects with higher listening proficiency use more bottom-up strategies, future research should also investigate the relationships of the interpretations of a preference for bottom-up strategies (i.e. choice) and the use of more bottom-up strategies due to cognitive constraints (i.e. necessity). One possible way to look into these non-exclusive interpretations would be through the use of carefully constructed surveys together with verbal reports and free recalls using videotexts of various difficulty levels.

Finally, subjects who used more bottom-up strategies were 32 percent more likely to recall more audio-and-image idea units than subjects who used fewer bottom-up strategies ($p = 0.02$; see scatter plot in Appendix P26). Like the results for total strategy use and total idea unit

recall, subjects who used more bottom-up strategies recalled significantly more audio-only and audio-and-image idea units than subjects who used fewer bottom-up strategies. This could indicate that subjects who used more bottom-up listening strategies perceived and processed a message with both aural and visual elements like they did audio-only information. In other words, the information from the visual channel was more often ignored by such subjects than by those who used fewer bottom-up strategies.

The relationships among cognitive and metacognitive strategies and the three types of idea units were nearly nonexistent. Subjects who used more cognitive strategies were four percent ($p = 0.77$) less likely to recall more audio-only idea units, one percent ($p = 0.92$) more likely to recall more image-only idea units, and two percent ($p = 0.89$) less likely to recall more audio-and-image idea units than subjects who used fewer cognitive strategies. These subjects were also three percent ($p = 0.80$) more likely than subjects who used fewer cognitive strategies to recall more total idea units (see scatter plots in Appendixes R19-23).

The above results would be reversed for subjects who used more metacognitive strategies. This finding is counter to a number of results from Vandergrift (1997b, 1998a, 1998b, 2003) and Goh (1998), though listening texts (audio-only) and task types (immediate verbal report only, no comprehension measure) were different than those used in the current study. Finally, it should be noted that the relationships between linguistic knowledge and cognitive/metacognitive strategies and between listening proficiency and cognitive/metacognitive strategies were also quite weak (see discussions of Research Questions One and Two, above). It may be that the type of listening material used in the current study (i.e. short, documentary-style news videotext) is responsible for these different results.

Limitations of the Study

As mentioned repeatedly in the literature of language learner strategy research and in the current study, text and task types have been shown to have a great impact on which strategies are used as well as how often and in what ways they are used. As discussed above, the lack of any strong relationships between cognitive/metacognitive strategy use and all other variables in the current study could indeed result from the use of videotext and/or the use of the written free recall of idea units comprehension measure. Also, the numbers and types of strategies used and the preference for focusing on certain types of information channels (e.g. audio-only) may be dependent on educational or other characteristics of the adult Mandarin-Chinese speaking English language learners who participated in this study. Variables investigated in the five research questions need to be explored by future researchers using different types of videotexts and subjects with different characteristics, as these factors could certainly influence strategy use, linguistic knowledge and listening proficiency, verbal reporting and idea-unit recall.

Finally, an issue that has plagued learner strategy research since the very beginning may have affected the current study: The unit-of-analysis issue. Returning briefly to a statement-and-response between researchers mentioned in Chapter Two, Vandergrift (1998a) judged that to have success, listeners needed to overcome limited cognitive resources by being strategic. Macaro, et al. (2007) however, stated the difficulty of what Vandergrift proposed as attempting to separate "strategy-related success from perception/vocabulary-related success," (p. 170). In the current study, bottom-up strategies, especially *identification of word* and *identification of chunk* (overwhelmingly the two most commonly used bottom-up strategies, see Appendix A), could be viewed as perception/vocabulary-related processes as opposed to strategies under the conscious control of study participants. This is possibly due to a disconnect between the listening strategy descriptors used in this study (Appendix A) and the more complete and demanding

description categories in Macaro's (2006) revised framework (Chapter Two). Macaro (2004) also called for the need to describe strategies in terms of a learning goal, learning situation, and a mental action on the part of the learner. Researchers should keep this in mind as strategy inventories are created for study purposes to avoid the dangers of misclassifying subconscious cognitive processes as conscious strategy use. In the end, results for bottom-up strategy use in the current study, which often reached the significance level, should be viewed cautiously because of the above line of reasoning. Future researchers are strongly advised to follow Macaro's framework carefully, as again, learning goals and situations and mental actions (including text and task types) can alter cognitive processes.

Recommendations for Future Research

This section is divided into two parts. The first subsection offers advice to researchers who may plan a similar study about key choices related to the different phases of the project, with a particular emphasis on research methods. The second subsection explores other possible relationships among variables in different research questions that future research could help confirm or disconfirm.

Before continuing, two things should be noted. First, it is possible that topic familiarity allowed some subjects to comprehend the videotext more successfully. The researcher chose the topic for the operational videotext because of an assumed lack of familiarity of the topic among the subjects. Indeed, during the verbal reports, only two subjects reported any knowledge of the "tiny house" movement: one said that he had actually received an email with pictures of Jay Shafer's tiny house, while another simply related being interested in small, energy-efficient housing. The researcher judged that this did not have a significant impact on subjects' comprehension. Future researchers could include a scale of topic familiarity on a post-verbal report/post-comprehension measure questionnaire and compare these results with how

individuals performed on both the verbal report (i.e. number of strategies reported) and the comprehension measure (i.e. if a free written recall of idea units were used, scores on topic familiarity could be compared to numbers of idea units recalled).

Third, occurrences of bottom-up and metacognitive strategies in subjects' verbal reports were much more limited than subjects' use of top-down and cognitive strategies, as can be seen in the list of total strategies used by individual subjects in Appendix Q. The reason for this is not clear. Subjects in this study may simply have natural preferences for top-down and cognitive strategies. Another possibility is that evidence of bottom-up and/or metacognitive strategy use may be more difficult to collect by using immediate retrospective verbal reports. For example, subjects may have mentally repeated words (a bottom-up strategy) they heard in the videotext, but preferred to give a summary (a top-down strategy) when verbalizing. The type of task they were anticipating (i.e. a recall of idea units), may also have influenced their strategy use as it did not require them to identify the exact vocabulary used in the videotext. Future research should both explore these possible explanations and collect data for the different strategy categories, so that comparisons could be made across studies using both similar and different task and text types.

Making key choices for future research projects.

In Chapter Two, one of the clear implications was that researchers have employed an extremely wide variety of methods when investigating listening strategy use. So much so, in fact, that reviewers of research have had a difficult time comparing results (e.g. Hassan, et al. 2005 and Macaro, et al. 2007). This researcher strongly believes that the use of a standardized measure of listening comprehension (e.g. the OOPT) and other carefully supported materials and methods such as written free recall of idea units and immediate retrospective verbal reports sets a benchmark for future research in the areas of listening strategy and videotext research. However,

when preparing for such research projects, several key decisions need to be made and the current project is informative for this process.

First, when choosing videotext for future studies, researchers should carefully determine how much of the total information (i.e. idea units) is delivered in each of the three information channels as differentiated in this study: 29 total audio-only, 18 total image-only, and nine total audio-and-image (Appendixes H-J). For a research project, it would be important to find a sample that had a fairly even split among these three types, especially if only one operational videotext is to be used. This may be difficult to accomplish in a videotext of limited length. However, if the number of one or two types of idea units is comparatively limited, as happened with the 18 total image-only and nine total audio-and-image idea units in this study, it is quite likely that several subjects will not recall *any* idea units of that type and/or that many subjects will receive the same score (see Appendixes R9 and R10 for scatter plot representations of IU and AIU scores, respectively). Finding a more even split among the three types of idea units is particularly important if more qualitative analyses will be used with the data.

Second, during the pilot study, the second of the two subjects only paused six times, and as a result, the researcher judged that there were probably instances of strategy use that the subject did not have the opportunity to report. Thus, this researcher chose to allow both researcher-initiated and subject-initiated pauses in the videotext during which subjects verbally reported their thought processes (i.e. strategy use) while attempting comprehension. This was done to try to achieve a balance between giving subjects enough opportunities to report and the freedom to speak when they themselves were aware of thoughts to report. However, researchers should be prepared for something that occurred several times throughout the verbal reports of the 27 subjects during the operational study, namely that both researcher and subject tried to pause at the same moment. This occasionally caused the repeated starting and stopping of the videotext as

both parties clicked the pause button with the mouse controllers. This was not judged to be a significant distraction for the subject, as the researcher simply reversed the videotext to the point of the first attempted pause and then asked the subject to report his or her thoughts. If future researchers want all subjects to report the same numbers of times and at the same locations in the videotext, then researcher-only pauses should be used. This might be particularly necessary if the study in question was attempting to link (successful or non-successful) strategy use with the recall of idea units. However, overall for the present study, the current researcher believes this "dual-mode" pausing struck the correct balance between opportunity and freedom to report.

Third, the type of comprehension measure used – the written free recall of idea units – is also highly recommended for future research of this type. As with any measure used, the researcher must be very clear in the instructions he or she gives subjects in order to prepare them mentally to be successful on the measure while at the same time not prejudicing subjects for or against the use of particular strategies.

There were two major reasons for choosing a written free recall over other comprehension measures. First, the short length of the videotext (143 seconds) made it very difficult to construct more than a few multiple-choice or open-ended type questions. Second, the above two types of comprehension measures will predispose subjects to using certain strategies over other strategies to a greater degree than a free recall. For example, if a multiple-choice question asks a subject to identify a certain word used in the videotext, then bottom-up strategies and/or the metacognitive strategy of *selective attention* will likely be used by subjects. Note-taking was also prohibited as allowing it would have caused two problems: disrupting the verbal report itself by adding another task to the comprehension process, and predisposing subjects to the strategy of note-taking, probably to the exclusion of other strategies.

To be honest, the use of the written free recall also excluded a few strategies from being applied by subjects. For example, because questions were not available before the comprehension measure, as they would be for short-answer and multiple-choice questions, *selective attention*, or deciding to listen out for certain words or information, could not be used by subjects. Also, metacognitive strategies involved in planning for listening to a text were not employable because participants could not preview comprehension questions or advance organizers. As a further example, subjects made wide use of *summarization* strategies, and it is fairly easy to see why given the nature of the recall task: Subjects were instructed that they needed to remember as many details as they could from the videotext, but not necessarily exact vocabulary, and then write them down. However, the comprehension measure is called *free* for a very good reason: It does very little to limit the types of answers that subjects can give. Not coincidentally, the free recall also does not limit the types of strategies that subjects can use to the degree that other types of comprehension measures do. In any case, future researchers need to carefully weigh how the task used for the videotext will impact the results. Though some researchers may criticize the current study as using a comprehension task (i.e. measure) that is not concurrent with the listening task, the benefits of allowing subjects a high degree of freedom in the strategies they use outweigh the retrospective nature of a free written recall of idea units. In any case, researchers need to be aware of how text and task types can influence which strategies participants use.

Researchers like Vandergrift (1997b) and Macaro et al. (2007) have recognized "that limited linguistic knowledge may be *the* underlying reason for differences in strategy use" (Macaro et al., 2007, p. 170, italics added). However, Macaro et al. in particular would probably judge any "differences" to be qualitative (successful versus non-successful strategy use) rather than quantitative. Certainly from a quantitative viewpoint, the results of this study showed that

listening proficiency had a stronger relationship with strategy use than linguistic knowledge. This may mean that qualitative analyses are necessary to help pinpoint the role linguistic knowledge plays in listening strategy use.

Though Research Question Five explored the relationship between quantitative strategy use and videotext comprehension (i.e. recall of the three types of idea units), the current study did not investigate how strategies were used in combination nor which strategies led to better or worse comprehension. There are at least two logical next steps for qualitative analyses with the data that has been collected in this study and for data collected in (similar) future research. One type would include evaluating strategy use from subjects' verbal reports according to the success or lack of success of strategies used. For example, verbal report data could be compared to the videotext transcript to determine if bottom-up strategies led to the correct identification of individual words or connected words (i.e. *chunks*) or if the use of top-down cognitive strategies such as summarizing included accurate or inaccurate information. A further qualitative analysis would be linking the strategies subjects used directly to the idea units they were able to recall. This latter analysis would be more difficult since there would not always be verbal evidence that could be linked to each idea unit recalled (i.e. some strategies used would not be reported by a subject because the strategy had been automatized to the point that it was no longer within the subject's conscious control – see Chapter Two).

Finally, a limitation of this study was the relatively small amount of data collected (n = 27). Studies modeled after the present one with more subjects – and thus probably necessitating more researchers being involved as a team – could also lend weight to the quantitative findings if results were similar.

Relationships among variables beyond those explored in the five research questions.

As mentioned in the discussion of the Kendall's tau_a statistic at the end of Chapter Three, confidence intervals can help explore different hypotheses than those initially investigated, whereas statistical hypothesis testing cannot readily do this. In other words, only calculating p-values does not give the richness of the positive or negative ranges of the confidence intervals of the Kendall's tau_a statistic and the general trends they may reveal. Thus, this section examines other relationships between variables among the different research questions in hopes of giving direction to future research projects beyond confirming or disconfirming hypotheses for the five research questions.

Listening proficiency, top-down/bottom-up strategies, and audio-only idea units.

Research Questions Two and Four include listening proficiency as the dependent variable, Research Questions Two and Five also include top-down and bottom-up strategies as independent (Two) and dependent (Five) variables, and Research Questions Four and Five also include the four categories of idea units as independent variables. A closer examination of the relationships among these results reveals interesting implications for future investigations. Table 5.1 summarizes these results (drawn from tables in Chapter Four).

Table 5.1.

Summary of Results for Listening Proficiency, Bottom-up and Top-down Strategy Use, and Audio-only Idea Units

	Kendall's tau_a (point estimate, 90% CI)	Significance (0.1 level)
Listening proficiency and Bottom-up strategy use	20%	0.09*
Listening proficiency and Top-down strategy use	20%	0.09*

Listening proficiency and Audio-only idea unit recall	39%	< 0.01*
Bottom-up strategy use and Audio-only idea unit recall	47%	< 0.01*
Top-down strategy use and Audio-only idea unit recall	47%	< 0.01*

Note: See Appendixes H to J for time-ordered lists of the three different types of idea units, Appendix A for a list of strategies used overall by subjects, and Appendix Q for each subject's strategy totals; *statistically significant results

Table 5.1 shows that subjects with higher listening proficiency were significantly more likely to use more bottom-up strategies and to recall more audio-only idea units than subjects with lower listening proficiency. The table also indicates that subjects who used more bottom-up strategies recalled more audio-only idea units. To put it another way, both higher listening proficiency and use of more bottom-up strategies were strongly related to recalling more audio-only idea units. The results for top-down strategy use are simply the reverse of results for bottom-up strategy use (Chapter Four).

As mentioned in the summary and discussion of Research Question Four, it is not terribly surprising that subjects with higher listening proficiency would be able to recall significantly more audio-only idea units than subjects with lower listening proficiency. However, when paired with the use of bottom-up and top-down strategies (both as independent and dependent variables), a more interesting picture of the interaction of these variables takes shape, for this may reveal more information about *how* subjects are recalling more audio-only idea units, not just that they *are* doing it. Subjects with higher listening proficiency appeared to depend less on top-down strategies while recalling more audio-only idea units. However, as this research was exploratory, further investigation of all these relationships needs to take place.

Linguistic knowledge, top-down/bottom-up strategies, and image-only idea units.

Research Questions One and Three include linguistic knowledge as the dependent variable, Research Questions One and Five also include top-down and bottom-up strategies as

independent (One) and dependent (Five) variables, and Research Questions Three and Five also include the three types of idea units as independent variables. A closer examination of the relationships among these results reveals interesting implications for future research projects. Table 5.2 summarizes these results (drawn from tables in Chapter Four).

Table 5.2.

Summary of Results for Linguistic Knowledge, Top-down and Bottom-up strategies and Image-only Idea Units

	Kendall's tau_a (point estimate, 90% CI)	Significance (0.1 level)
Linguistic knowledge and Top-down strategy use	21%	0.13
Linguistic knowledge and Bottom-up strategy use	21%	0.13
Linguistic knowledge and Image-only idea unit recall	19%	0.11
Top-down strategy use and Image-only idea unit recall	36%	< 0.01*
Bottom-up strategy use and Image-only idea unit recall	36%	< 0.01*

Note: See Appendixes H to J for time-ordered lists of the three different types of idea units, Appendix A for a list of strategies used overall by subjects, and Appendix Q for each subject's strategy totals; *statistically significant results

The first three results only approach the level of significance, but they are all clearly positive. Subjects with higher linguistic knowledge were 0.21 or 21 percent more likely to use more top-down strategies (and thus also 21 percent more likely to use *fewer* bottom-up strategies) than subjects with lower linguistic knowledge. As noted in the previous section, this is almost the opposite result compared to subjects with higher listening proficiency, who were 0.20 or 20 percent more likely to use *fewer* top-down strategies than subjects with lower listening

proficiency. Subjects with higher linguistic knowledge were also 19 percent more likely to recall more image-only idea units than subjects with lower linguistic knowledge.

The final two results in Table 5.2 proved to be very strong relationships. Namely, subjects who used more top-down strategies were 36 percent more likely to recall more image-only idea units than subjects who used fewer top-down strategies. Conversely, subjects using more bottom-up strategies were 36 percent more likely to recall *fewer* image-only idea units than subjects using fewer bottom-up strategies.

Though the relationships between linguistic knowledge and top-down and bottom-up strategies and audio-only idea units are not as strong as between listening proficiency and each of those three (independent) variables, the relationships are quite consistent. Also, subjects using more top-down strategies clearly recalled more image-only idea units (and significantly fewer audio-only idea units). Thus, while listening proficiency overall had a stronger relationship with strategy use *and* idea-unit recall, the consistent confidence range of the relationship between linguistic knowledge and top-down and bottom-up strategies and recall of image-only idea units does have interesting implications when coupled with the strong relationship between top-down/bottom-up strategy use and image-only idea units recall. Future research projects should explore these relationships with subjects having different characteristics (e.g. first languages, age and education, linguistic knowledge and listening proficiency levels) and different videotext types. Also, the fact that linguistic knowledge and listening proficiency are not mutually exclusive categories, but do indeed overlap, should be kept in mind when interpreting results.

Total strategy use, listening proficiency, and idea units.

Listening proficiency and total strategy use were two of the variables in Research Question Two, while total strategy use and each of the three types of idea units were variables in Research Question Five. The results are summarized in Table 5.3.

Table 5.3.

Summary of Results for Total Strategy Use, Listening Proficiency, and Idea Units Recalled

	Kendall's tau_a (point estimate, 90% CI)	Significance (0.1 level)
Listening proficiency and Total strategy use	28%	0.06*
Listening proficiency and Total idea unit recall	16%	0.23
Listening proficiency and Audio-only idea unit recall	39%	< 0.01*
Total strategies used and Total idea unit recall	34%	0.03*
Total strategies used and Audio-only idea unit recall	28%	0.02*
Total strategies used and Image-only idea unit recall	1%	0.94
Total strategies used and Audio-and-image idea unit recall	35%	< 0.01*

Note: See Appendixes H to J for time-ordered lists of the three different types of idea units, Appendix A for a list of strategies used overall by subjects, and Appendix Q for each subject's strategy totals; *statistically significant results

Subjects that had higher listening proficiency were significantly more likely to use more total strategies than subjects with lower listening proficiency. Also, subjects who used more strategies were significantly more likely to recall more total, audio-only and audio-and-image idea units than subjects who used fewer total strategies. As discussed earlier, subjects with higher listening proficiency were also significantly more likely to recall more audio-only idea units than subjects with lower listening proficiency. Two results were somewhat more surprising: 1) that while there was a positive trend for higher listening proficiency subjects to recall more total idea

units, this result was not significant ($p = 0.23$); and 2) that there was almost no relationship between number of strategies used and recall of image-only idea units.

This series of results could indicate several things. First, subjects who have superior listening ability and who also tend to use more strategies in their comprehension attempts, prefer and/or depend more on the aural channel as the source of their information, even when the visual channel is present and delivers independent information, as occurred with the 18 image-only idea units in this study's operational videotext. This type of analysis, while beyond the original scope of the inquiry presented here, could actually be carried out using data already collected by this project. In other words, the current project separated out "visual strategies," such as summarizing image (SUM-I) or personal elaboration of image (PELAB-I) from "auditory strategies," such as summarizing audio (SUM-A) or personal elaboration of audio (PELAB-A). Thus, future analyses using this separation could help clarify the above relationships between variables (see Appendix A for a complete list of strategies subjects used along with the coding key).

Second, the interrelationships of listening proficiency, total strategy use and the recall of the different types of idea units were either significant or positive for higher proficiency levels except for image-only idea units. Again, future studies should examine these relationships both quantitatively and qualitatively with subjects having differing characteristics and with different types of videotexts.

Educational Implications

The exploratory nature of the current research coupled with the limited number of subjects involved ($n = 27$) and the particular characteristics of those subjects significantly limits the generalizability of the results and thus also limits any recommendations for curricular development that can be made based on these results. If results from future research projects

outlined in the previous section supported the findings of the current research, then stronger recommendations could be made.

First, if future results do indicate significant relationships between linguistic knowledge and/or listening proficiency and the strategy and idea unit variables used in the current study, then it would seem worthwhile for listening-skills teachers planning to use videotexts to give students a pre-instruction, *standardized* test like the inexpensive, easy-to-deliver Oxford Online Placement Test (OOPT). This would allow the instructor both to gain insight into the overall class levels and individualize listening comprehension instruction using videotext.

For example, if future research using a variety of videotext types also finds that subjects with higher listening proficiency recall more audio-only idea units through the use of more bottom-up strategies, then someone designing a strategy-use instruction course using videotexts should help subjects with lower listening proficiency develop bottom-up (i.e. decoding) strategies as Vandergrift (2007) suggests. If future research also supports the findings that subjects with higher listening proficiency acquire significantly less information from the visual channel (i.e. image-only idea units), it should also be useful to help subjects with higher listening proficiency pay more attention to information only delivered through that channel. This could be done by initially playing the videotext without the audio track and asking students to apply different strategies to aid their comprehension, including summarizing the content (both verbally and in writing), and connecting the images to personal experience or knowledge of the world (i.e. personal or world elaboration). As can be seen in Appendix Q, subjects made heavy use of these types of strategies.

Conclusion

If asked, most second language teachers would probably agree with Rost (2002) and other researchers in identifying the critical importance of developing learners' listening abilities

to acquire overall second-language abilities. However, since listening comprehension is such an internal process, with few “products” other than comprehension test results and appropriate verbal responses in conversations that could be evaluated, such instructors have often been at a loss as to how to help students nurture listening skills. This research project has primarily attempted to aid researchers in gaining a better understanding of comprehension processes through the lens of learners’ listening strategy use when viewing short, documentary-style news videotexts. A secondary, though quite interesting, contribution of this research has been in the results of three research questions involving the division of the variables from the written free recall comprehension measure into audio-only, image-only, and audio-and-image idea units. If future researchers confirm or disconfirm findings in the current study, both for different types of videotexts and with subjects having different characteristics, then significant progress will have been made in helping second-language listening teachers understand the steps they should take in developing their students’ comprehension abilities when watching and listening to increasingly available videotexts.

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Appendix A

Listening strategies: Codes, strategies, strategy categories, descriptions – 33 total*

Code (TOT)[+]	Cognitive strategy	Metacogitive strategy	Top Down	Bottom Up	Description
CMON (34)		Comprehension monitoring[3]	√		establishing whether one has or has not understood
PROID (2)		Problem identification[2]	√		explicitly identifying the central point needing resolution or identifying a part of the task that hinders successful completion
HMON (2)		Hypothesis monitoring[3]	√		checking whether hypothesis is verified or contradicted by text or subsequent information
HCONF (3)		Hypothesis confirmation[3]	√		confirming that interpretation or hypothesis is correct
SEVAL (3)		Self-evaluation[2]	√		assessing one's own listening ability or knowledge
SA* (0)		Selective attention[3]	√		deciding to listen out for certain items
SELFQ (42)	Self-questioning[3]		√		interrogating self about possible answers or the best way to proceed
SUM[4] (10)	Summari-zation[1]		√		making an oral summary of the information presented in a listening task (referring to a combination of audio and image information or indeterminate type of information referred to in the videotext)
SUM-A[4] (109)	Summari-zation (audio)		√		making an oral summary of the information presented in a listening task (referring to image information in the videotext)
SUM-I[4] (64)	Summari-zation (image)		√		making an oral summary of the information presented in a listening task (referring to image information in the videotext)
NDED (12)	Negative deduction[3]		√		deducting based on what is not heard
REPR (1)	Reprise[1]		√		telling the "speakers" that they did not get the message across
WELAB[4] (50)	World elaboration[2]		√		using knowledge gained from experience of the world (referring to a combination of audio and image information or

					indeterminate type of information referred to in the videotext)
WELAB-A[4] (10)	World elaboration (audio)		√		using knowledge gained from experience of the world (referring to audio information in the videotext)
WELAB-I[4] (14)	World elaboration (image)		√		using knowledge gained from experience of the world (referring to image information in the videotext)
PELAB[4] (36)	Personal elaboration[2]		√		referring to prior experience personally (referring to a combination of audio and image information or indeterminate type of information referred to in the videotext)
PELAB-A[4] (2)	Personal elaboration (audio)		√		referring to prior experience personally (referring to audio information in the videotext)
PELAB-I[4] (21)	Personal elaboration (image)		√		Referring to prior experience personally (referring to image information in the videotext)
GROUP* (0)	Grouping[1]		√		classifying information such as words or concepts according to their meaning or according to the listeners' own organization
LINF* (0)	Linguistic inferencing[2]		√		using known words in an utterance to fill in missing information
VINF* (0)	Voice inferencing[2]		√		using pitch, volume and/or tone of voice to fill in missing information
EXINF (28)	Extra-linguistic inferencing[2]		√		using background sounds and relationships between speakers in an oral text, or concrete situational referents [including video images] to fill in missing information
BPINF (6)	Between-parts inferencing[2]		√		using information beyond the local sentential level to fill in missing information
HFORM (24)	Hypothesis formation[3]		√		suggesting a possible answer or interpretation
INT[4] (22)	Integration[3]		√		drawing together two or more pieces of information to reach a conclusion

INT-A[4]* (0)	Integration (audio)		√		drawing together two or more pieces of information from the audio to reach a conclusion
INT-I[4] (6)	Integration (image)		√		drawing together two or more pieces of information from images to reach a conclusion
FEED (9)	Feedback[1]		√		giving comments about the aural text
IDW (37)	Identification of word[3]			√	identifying (i.e. verbally repeating) a word
IDC (45)	Identification of chunk[3]			√	identifying (i.e. verbally repeating) a chunk (i.e. two or more connected words)
VOC (2)	Vocalization[3]			√	Repeating language from the text (word or phrase) [usually in a halting or questioning way]
TRAN (5)	Translation[2]			√	replicating ideas from one language in another in a relatively direct way
GU° (1)	Gives up[3]				stops trying to comprehend what was heard

Sources: Santos, Graham, & Vanderplank, 2008[3]; Vandergrift, 1997b, 2003[2]; Young 1997[1]. Strategies not marked with superscript are sub-strategies added from the data of the present operational study.

Note: Superscript numbers 1-3 in the table indicate which researchers' list the individual strategies are from.

[4] During the coding of the verbal reports, the top-down, cognitive strategies of summarizing (SUM), world elaboration (WELAB), personal elaboration (PELAB), and integration (INT) were judged by the researcher to be special cases. Each of these strategies was subdivided by adding "audio" or "image" notations. This resulted in three strategies for each original strategy: The strategy used for audio-only information (denoted with the addition of "-A"), image-only information (denoted with the addition of "-I"), and either a combination of audio-and-image information or when the information channel being referred to couldn't be determined (no additional notation).

[+] TOT = Total number of each strategy used in all 27 verbal reports; see Appendix ? for totals by each subject

* Strategies judged by the researcher as possibly being among those that subjects would use during their verbal reports, but that did not actually appear in any verbal report. Thus, subjects gave evidence of using only 28 of the above listed strategies.

° "Gives up" is an avoidance strategy and cannot be categorized as either top-down or bottom-up.

Appendix B

Transcript and coding of Pilot Participant 1 (P1) verbal report

Videotext available at: http://vitality.yahoo.com/

Strategies are listed in red type, mechanics-type comments are in blue type, and researcher comments are in green type; … = short pause (less than one second)

JS = researcher; VT = videotext

(Total length = 8:41, speaking begins 34 seconds into recording – recording software start-up occurred first)

JS: OK. And uh, if you can do the same thing: Read that sentence and then….

P1: Oh, OK.

JS: …and talk about it, and right. Then you can start the video after you've talked about that sentence. (48 second mark)

{Subject reads, "Ten years ago, Jay Shafer downsized to an 89-square-foot house and reinvented both his lifestyle and career in the process."}

(Begins speaking at 58 second mark)

P1: Uh Jay… hmm… Jay changed his life-style and his career-style 10 years ago while he moved to a new house or he renovated his house. OK.

JS: OK.

P1: Then I click?

JS: Mm-hmm. Sure.

VT: My name's Jay Shafer. I'm 45 years old and I live in a tiny house. I named my house Tumbleweed and it's just eight feet by twelve feet. I'm sure there are people out there who think I'm crazy for living so small, but living in this little house has allowed me to totally reinvent my life. I was working as a grocery store clerk. At a certain point, I decided I was going to escape the rat race and build a house from scratch. Having no construction experience, I figured I'd figure... (pauses video)

P1: Um… I don't know… I don't know if he built the house by himself or he bought the house because the house is different, it looks really different (saw images of Jay Shafer's 89-square-foot house). How can he get a house like this? (SELFQ, PROID)

VT: …it out as I went. As a kid, I was living in 4,000 square feet with my family. Between the four of us , doing all the housework, the mortgage, it just seemed like more stuff and more burden than I really wanted... (pauses)

P1: It looks like, uh, um, a more beautiful… what's that? I know some, some Americans who live in a truck or something. This is kind of like that that, but it's more beautiful (PKDED)… and… anyway, I wonder if it is convenient or comfortable to live in this kind of small house, although it it look unique and beautiful (IELAB).

VT: …Ultimately, I wanted to focus more on the things I really wanted to do and not on working for cash so much. It's been very liberating. The first day of living in my tiny house felt like I was finally living with just what I needed and nothing more... (pauses)

P1: What if he… get married and have more children? Will he choose to live this kind of small house? (SELFQ)

VT: …It felt really natural to me. It wasn't very long after I finished building my first house that this became a business… (pauses)

P1: Oh, so he… built his house. Oh, and he even draw the uh… designed… design…. He even designed his own house and he built his own house. (CMON)

VT: …People seemed interested in my house, so I decided to start building and designing little places… (pauses)

P1: Oh, so that's kind of his job… because he… he built his first one and people interested in that and then he started to build the house for other people. (SUM)

VT: …Jay's small homes have a really great style; they feel more spacious than they are. My name is Trathen Heckman. I've been working in sustainability education for about a decade. I think Jay teaches people a lot about small living because he is living it. A man who lives in houses that are less than… (pauses)

P1: Actually, Taiwan has this kind of small apartment, but I don't think it's really comfortable and convenient. Um… espe… especially when you live in the United States… so many place to… to live… unlike in Taiwan, people doesn't have many places to um… [I don't know] to live, so we are forced to live in this kind of small house. But I don't know why people would like to do that in the United States. (WELAB)

VT: … a tenth the size of the average American house is an incredible message by itself, but then he does it in a very graceful and elegant and inspiring way, so it really shifts people's perception about the quality of life that can be associated with living with less… (pauses)

P1: Well, I think it's special to live in this kind of small house, but I still don't know why he would like to do that. Like what I said before, if you have so many spaces around you, why you choose to live in this kind of sss… small space spaces? (SELFQ) Uh, like this bed is too… the the ceiling is too uh too low. So, {sighs}… I don't know, it makes me feel stressful. (IELAB)

VT: …There are a lot of advantages to living in a small house; foremost, I suppose not having a mortgage or rent is great. Not paying much utilities is awfully nice. I pay less… (pauses)

P1: Oh, now I know one reason is paying less utility… bills. (CMON)

VT: … I pay less than $100 per year in utilities in this house. I never thought… (pauses)

P1: This is true. I I think this is true because I think the bill is too… the bills that I pay for uh for a month is too big. I don't I don't think I use that kind of… I I use that much water or… something, but the bill is too big (PELAB). But anyway {questioning tone} if you live in this kind of small house, you still… the water… the water that you use still the same. It… it doesn't make you save money. Maybe you save you can save the… uh the heater the fee of the heater…. But you didn't… no I don't think, you save some other kind of utili… uh some other kind of fee, bills. (WELAB)

VT: … I'd be an entrepreneur in anything, but it's my passion to design small houses. There is a lot of excess going on, a lot of extra waste, and I'm happy… (pauses)

P1: But I think my sons will will love that. When they see this kind of small house, it's kind of like uh… a tree house {sounds proud she thought of this term}. Uh… they will love to explore in this kind of small house (PELAB).

VT: … to propose the opposite. I could never go back to living big. Living small has changed my life dramatically, and I couldn't ask for anything better. (end of videotext)

P1: OK… um, it's finished?

JS: If you have anything else, you can keep talking if you want to.

P1: No, no. But I, well, from this film I don't think he… he state his um, his interested in… his interest in building this small house… well. Why would he want to do that? Oh, uh why…. If that helps him to make money, then I can understand, but why would he want to live in this kind of small house (REP).

JS: OK.

P1: OK.

JS: Great.

---END---

(15 separate instances of strategy use; 9 different strategies used)

Appendix C

Transcript and coding of Pilot Participant 2 (P2) verbal report

(Total length = 10:07)

JS: OK, I think it is [recording]…. So let me go to this view [on computer screen]. OK and anytime you're ready…

P2: OK

JS: …you can begin. And remember, try to… try to leave the mouse there.
P2: Right, this is also there. I should….

JS: Yeah.
(Video starts at 40 second mark)

VT: My name's Jay Shafer. I'm 45 years old and I live in a tiny house. I named my house Tumbleweed and it's just eight feet by twelve feet. I'm sure there are people out there who think I'm crazy for living so small, but living in this little house has allowed me to totally reinvent my life. I was working as a grocery store clerk. At a certain point, I decided I was going to escape the rat race and build a house from scratch. Having no construction experience, I figured I'd figure it out as I went. As a kid, I was living in 4,000 square feet with my family. Between the four of us, doing all the housework, the mortgage, it just seemed like more stuff and more burden than I really wanted. Ultimately, I wanted to focus more… (pauses).

P2: {laughing} Right, you forget [to pause the videotext]. Um, OK. This one's really more interesting. And… and… and… I did forgot the thing about the pausing. OK, I'm ready.

JS: It's OK.

P2: Then….

JS: Anything so far?

P2: Anything? Well… I want to know how… how… um… right, um… I really like this small house. It's everything so organized, which… I love it very much [PELAB]. And actually, I was watching it so closely to understand what kind of things he's putting in his house [IELAB].

VT: … on the things I really wanted to do and not on working for cash so much. It's been very liberating. The first day of living in my tiny house felt like I was finally living with just what I needed and nothing more. It felt really natural to me. It wasn't very long after I finished building my first house that this became a business. People seemed interested in my house, so I decided to start building and designing little places. Jay's small homes have a really great style; they feel more spacious than they are. My name is Trathen Heckman. I've been working in sustainability education for about a decade. I think Jay teaches people a lot about small living because he is living it. A man who lives in houses that are less than a tenth the size of the average American house is an incredible message by itself, but then he does it in a very graceful and elegant and

inspiring way, so it really shifts people's perception about the quality of life that can be associated with living with less. (pauses)

P2: {laughing} Hmm… OK, after the first pause, then the second… OK, the second part I noticed he's starting, uh… he's starting a business by designing this kind of small houses for other people [SUM]. And the second speaking… no, speaker, I forgot his name, he's talking about how good this is for education of other people… something like that [SUM].

JS: OK.

VT: There are a lot of advantages to living in a small house; foremost, I suppose not having a mortgage or rent is great. Not paying much utilities is awfully nice. I pay less than $100 per year in utilities in this house. I never thought I'd be an entrepreneur in anything, but it's my passion to design small houses. There is a lot of excess going on, a lot of extra waste, and I'm happy to propose the opposite. I could never go back to living big. Living small has changed my life dramatically, and I couldn't ask for anything better. (end of videotext)

P2: OK, when he said that he didn't need to pay any mortgage or something, then… there's one thing that crossed my mind is where he can park his small houses? Right? [SELFQ] He need… however, he need to find out where to park the houses.

JS: OK.

P2: OK.

JP: OK… is that it?

P2: {laughing}

JP: Is there anything else?

P2: Anything else? Well, it's a good business, maybe. But I don't think in America people will really like it. If he can combine his business with something related to the charity things, maybe for poor people or something, that's… um… not really charity thing, it's like, he can do his business at the same time, maybe it's related to the people really who needs it because from this video I can see it's more like… *shake* [chic] thing. [WELAB] You know? His design for this house looks very beautiful. It more looks like for promotion or something. It's like….

JS: sh… *chic*, you said.

P2: Right. Chic.

JS: Uh-huh.

P2: That for me, I think… for people who can… uh… afford this kind of pretty style of small houses, possibly they don't want such a small houses [PELAB]. Maybe for traveling, but what I think is…. It's like, OK, it's like this: If you're rich, right? You don't even think about if you want a small or big house. Right. And… but I know for some people if they like to traveling,

maybe they like this kind of small house. There's already have that kind of… hey? I forgot the name. That kind of… how do you call that? Tragaling… no, tra…. OK, this kind of… UHHH! {frustrated} [indecipherable speech]

JS: It's OK. Just use words that you know to describe what you're thinking about.

P2: OK, I'll try.

JS: Yeah.

P2: It's like… uh… I think it's coming up… hmm… The house you can use for traveling, there's um… the big one, so… and small one. Normally for camping, right? But some people live there [WELAB]. But from this video, it's a little bit different. A new design of that kind of… AAAAA! {frustrated, hits table with fist} OK, I forgot.

JS: It's OK.

P2: Totally. But you know what I'm talking about right?

JS: Sure.

P2: So I think his market may be that kind of particular group of people. They've already loved like camping or traveling around with their… AHHH! Tra… hey? [indecipherable speech] OK.
JS: Trailer? Well, that's kind of… yeah. That could be….

P2: Right. Then there's another… another word…. OK, I forgot.

JS: That's OK. No problem.

P2: Anyway, and so what I'm thinking, normally there's two extreme. Three maybe. I have already said, right? People who like travel… or they just go… or they really live on that. Many of them are really poor people, right? I think. They cannot afford a real land or something [WELAB]…. So….

JS: OK. That's fine.

P2: That word! Trailer? Um… no. Trailer, right? No? {laughs}

JS: It's OK, Bev. We can talk about it later.

P2: Alright.
---END---

(9 separate instances of strategy use; 5 different strategies used)

Appendix D

Background Questionnaire Research ID# _____

Dear participant,

I would like to understand your English-learning experiences. Please help me by answering the following questions. The information you provide can help me understand the experience you bring to listening comprehension activities. The results of this study may help you and future generations of English-language learners better understand listening processes and eventually improve listening skills. The questionnaire should take about five minutes to complete. Please try to be as detailed as possible in answering the questions. If you have any questions while completing the questionnaire, please ask me. Thank you very much for your time.

Jason Slimon
Ph. D. candidate, C&T (TESOL)
The University of Kansas

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1. Gender: ☐ male ☐ female

2. Age: _____ years old

3a. Do you have any hearing problems? ☐ Yes ☐ No

3b. Do you have any vision problems? ☐ Yes ☐ No

4. How many total years of formal and informal English learning have you had? _____

5. What is the highest level of education that you have achieved?

☐ Bachelor degree ☐ Master degree ☐ Doctoral degree ☐ Post-doctoral study

1. Have you ever lived in an English-speaking country or studied English in another country? (Besides countries such as the U.S., Canada, England, Australia, and New Zealand, you should also include places such as Hong Kong, Singapore, South Africa and the Philippines. If in doubt, please write the country's name.)

☐ Yes, which country or countries? _____
And for how much total time? _____

☐ No

7. Were you raised in an environment in which English was consistently spoken?

☐ Yes, please explain: _____ ☐ No

8. Have you watched or do you watch news videos in English (TV and/or internet-based)?

☐ Yes (continue with Questions 9a, 9b, and 9c below)

☐ No (go to Question 10a)

9a. When did or do you watch news videos in English?

☐ More than 10 years ago ☐ 5 to 10 years ago ☐ 1 to 4 years ago

☐ Less than 1 year ago

☐ I have watched news videos in English for _____ years and continue to watch them.

9b. How often did you or do you watch news videos per week?

☐ Less than 1 hour ☐ 1 to 2 hours ☐ 2 to 3 hours ☐ other amount _____

9c. Please describe the news videos that you watched before and/or watch now.

_____

_____

10a. What other types of English-language listening materials have you listened to or watched? (Choose all that apply.)

☐ Radio program ☐ Listening activities for a class ☐ Video activities for a class

☐ None ☐ Other _____

10b. When did you or do listen to or watch the materials from 10a?

☐ More than 10 years ago ☐ 5 to 10 years ago ☐ 1 to 4 years ago

☐ Less than 1 year ago ☐ I continue to watch news videos in English.

10c. How long did you or do you listen to or watch the materials from 10a?

☐ Less than 1 hour ☐ 1 to 2 hours ☐ 2 to 3 hours ☐ other amount _____

10d. Where did you listen to or watch the materials from Question 10a?

☐ In a classroom only ☐ Outside a classroom only

☐ Both inside and outside a classroom ☐ Other _____

This is the end of the questionnaire. Thank you again for your cooperation!

Appendix E

INFORMED CONSENT STATEMENT

INTRODUCTION

The Department of Curriculum & Teaching at the University of Kansas supports the practice of protection for human subjects participating in research. The following information is provided for you to decide whether you wish to participate in the present study. You may refuse to sign this form and not participate in this study. You should be aware that even if you agree to participate, you are free to withdraw at any time. If you do withdraw from this study, it will not affect your relationship with this unit, the services it may provide to you, or the University of Kansas.

PURPOSE OF THE STUDY

This research project investigates the listening processes of native Mandarin-Chinese speakers while they view short, documentary-style news videos delivered online (by computer). The results of this study will be used to contribute to the development of English-language listening programs and the future research of listening processes.

PROCEDURES

Several days before your scheduled Oxford Online Placement Test (OOPT) session, you will receive a short questionnaire from the researcher. You will be asked to fill it out and bring the completed questionnaire with you to the testing session. The questionnaire should take about 15 minutes to complete.

In groups of six to ten, you will take the OOPT (30-40 minutes). You will sit in front of a computer connected to the internet. Using individual passwords, you will sign into the testing website and begin the exam. Audio headsets will be used during the listening portion of the test so that a quiet testing environment is maintained. The researcher will be present to monitor the exam session and answer any questions you have before the test begins. Upon completion of the test, scores will be shared with you and the CEFR level descriptors will be handed out so that you will better understand the ability level that the test score indicates. Your test scores will remain confidential and will not affect you personally or professionally. Upon completion of the OOPT, you will be asked to schedule a one-to-one verbal report session (see below) with the researcher.

At the beginning of the one-to-one verbal report session, the researcher will explain the verbal report protocol to you. You will be able to pause the video whenever you desire, and during those pauses, you will talk about what you are thinking as you try to understand the video. The first (123 second) video will be used in a practice session which will be recorded using digital audio-recording software (as a hardware test). You may ask questions or for clarification when finished. At this point, you will complete the second verbal report session while watching a similar 143-second news video, recorded as before. You will then be asked to write down everything you remember based on the contents of the news video just completed. The total time for the above procedures is estimated to be from 40 to 60 minutes.

RISKS

There are no known risks associated with the above procedures, but if you feel uncomfortable at any time and ask to stop, the researcher will certainly comply.

BENEFITS

By participating in this pilot study, you are aiding this researcher in his attempt to improve the foundation of knowledge related to listening comprehension research.

PAYMENT TO PARTICIPANTS

There is no payment for participating in this study, just the heartfelt thanks of the researcher.

PARTICIPANT CONFIDENTIALITY

Your name will not be associated in any publication or presentation with the information collected about you or with the research findings from this study. Instead, the researcher will use a study number or a pseudonym rather than your name. Your identifiable information will not be shared unless required by law or you give written permission.

Permission granted on this date to use and disclose your information remains in effect indefinitely. By signing this form you give permission for the use and disclosure of your information for purposes of this study at any time in the future.

REFUSAL TO SIGN CONSENT AND AUTHORIZATION

You are not required to sign this Consent and Authorization form and you may refuse to do so without affecting your right to any services you are receiving or may receive from the University of Kansas or to participate in any programs or events of the University of Kansas. However, if you refuse to sign, you cannot participate in this study.

CANCELLING THIS CONSENT AND AUTHORIZATION

You may withdraw your consent to participate in this study at any time. You also have the right to cancel your permission to use and disclose further information collected about you, in writing, at any time, by sending your written request to: Jason Slimon, (street address deleted), Lawrence, KS 66044

If you cancel permission to use your information, the researcher will stop collecting additional information about you. However, the researcher may use and disclose information that was gathered before he received your cancellation, as described above.

QUESTIONS ABOUT PARTICIPATION

Questions about procedures should be directed to the researcher listed at the end of this consent form.

PARTICIPANT CERTIFICATION:

I have read this Consent and Authorization form. I have had the opportunity to ask, and I have received answers to, any questions I had regarding the study. I understand that if I have any additional questions about my rights as a research participant, I may call (785) 864-7429 or (785) 864-7385, write the Human Subjects Committee Lawrence Campus (HSCL), University of Kansas, 2385 Irving Hill Road, Lawrence, Kansas 66045-7568, or email mdenning@ku.edu.

I agree to take part in this study as a research participant. By my signature I affirm that I have received a copy of this Consent and Authorization form.

_____ _____

Type/Print Participant's Name Date

_____

Participant's Signature

Researcher Contact Information

(deleted)

This study was approved by the Human Subjects Committee of Lawrence on _____, ___ 2011. This approval will remain in effect for one year after the approval date.

Appendix F

Shafer videotext transcript, separated by discourse markers (7 sections)

My name's Jay Shafer. I'm 45 years old and I live in a tiny house. I named my house Tumbleweed and it's just eight feet by twelve feet. I'm sure there are people out there who think I'm crazy for living so small, but living in this little house has allowed me to totally reinvent my life.

I was working as a grocery store clerk. At a certain point, I decided I was going to escape the rat race and build a house from scratch. Having no construction experience, I figured I'd figure it out as I went.

As a kid, I was living in 4,000 square feet with my family. Between the four of us, doing all the housework, the mortgage, it just seemed like more stuff and more burden than I really wanted. Ultimately, I wanted to focus more on the things I really wanted to do and not on working for cash so much. It's been very liberating.

The first day of living in my tiny house felt like I was finally living with just what I needed and nothing more. It felt really natural to me. It wasn't very long after I finished building my first house that this became a business. People seemed interested in my house, so I decided to start building and designing little places.

Jay's small homes have a really great style; they feel more spacious than they are. My name is Trathen Heckman. I've been working in sustainability education for about a decade. I think Jay teaches people a lot about small living because he is living it. A man who lives in houses that are less than a tenth the size of the average American house is an incredible message by itself, but then he does it in a very graceful and elegant and inspiring way, so it really shifts people's perception about the quality of life that can be associated with living with less.

There are a lot of advantages to living in a small house; foremost, I suppose not having a mortgage or rent is great. Not paying much utilities is awfully nice. I pay less than $100 per year in utilities in this house.

I never thought I'd be an entrepreneur in anything, but it's my passion to design small houses. There is a lot of excess going on, a lot of extra waste, and I'm happy to propose the opposite. I could never go back to living big. Living small has changed my life dramatically, and I couldn't ask for anything better.

Appendix G

Jay Shafer "Tiny House" videotext: Audio idea units (AU; complete transcript)

39 separate idea units total (10 audio idea units with connection to image idea units underlined; see Appendixes H and I)

A1. My name's Jay Shafer.

A2. I'm 45 years old

A3. and I live in a tiny house.

A4. I named my house Tumbleweed

A5. and it's just eight feet by twelve feet.

A6. I'm sure there are people out there who think I'm crazy for living so small,

A7. but living in this little house has allowed me to totally reinvent my life.

A8. I was working as a grocery store clerk.

A9. At a certain point, I decided I was going to escape the rat race

A10. and build a house from scratch.

A11. Having no construction experience, I figured I'd figure it out as I went.

A12. As a kid, I was living in 4,000 square feet with my family.

A13. Between the four of us, doing all the housework, the mortgage, it just seemed like more stuff and more burden than I really wanted.

A14. Ultimately, I wanted to focus more on the things I really wanted to do and not on working for cash so much.

A15. It's been very liberating.

A16. The first day of living in my tiny house felt like I was finally living with just what I needed and nothing more.

A17. It felt really natural to me.

A18. It wasn't very long after I finished building my first house that this became a business.

A19. People seemed interested in my house

A20. so I decided to start building and designing little places.

A21. Jay's small homes have a really great style;

A22. they feel more spacious than they are.

A23. My name is Trathen Heckman.

A24. I've been working in sustainability education for about a decade.

A25. I think Jay teaches people a lot about small living because he is living it.

A26. A man who lives in houses that are less than a tenth the size of the average American house is an incredible message by itself,

A27. but then he does it in a very graceful and elegant and inspiring way,

A28. so it really shifts people's perception about the quality of life that can be associated with living with less.

A29. There are a lot of advantages to living in a small house;

A30. foremost, I suppose not having a mortgage or rent is great.

A31. Not paying much utilities is awfully nice.

A32. I pay less than $100 per year in utilities in this house.

A33. I never thought I'd be an entrepreneur in anything,

A34. but it's my passion to design small houses.

A35. There is a lot of excess going on, a lot of extra waste,

A36. and I'm happy to propose the opposite.

A37. I could never go back to living big.

A38. Living small has changed my life dramatically,

A39. and I couldn't ask for anything better.

Appendix H

Jay Shafer "Tiny House" videotext: Audio-only idea units (AU)

29 separate idea units total (10 audio idea units with connection to image idea units have been removed from this list and the AU renumbered)

A1. My name's Jay Shafer.
A2. I'm 45 years old
A3. I'm sure there are people out there who think I'm crazy for living so small,
A4. but living in this little house has allowed me to totally reinvent my life.
A5. I was working as a grocery store clerk.
A6. At a certain point, I decided I was going to escape the rat race
A7. Having no construction experience, I figured I'd figure it out as I went.
A8. As a kid, I was living in 4,000 square feet with my family.
A9. Ultimately, I wanted to focus more on the things I really wanted to do and not on working for cash so much.
A10. It's been very liberating.
A11. The first day of living in my tiny house felt like I was finally living with just what I needed and nothing more.
A12. It felt really natural to me.
A13. People seemed interested in my house
A14. Jay's small homes have a really great style;
A15. they feel more spacious than they are.
A16. My name is Trathen Heckman.
A17. I've been working in sustainability education for about a decade.
A18. I think Jay teaches people a lot about small living because he is living it.
A19. A man who lives in houses that are less than a tenth the size of the average American house is an incredible message by itself,
A20. but then he does it in a very graceful and elegant and inspiring way,
A21. so it really shifts people's perception about the quality of life that can be associated with living with less.
A22. There are a lot of advantages to living in a small house;
A23. foremost, I suppose not having a mortgage or rent is great.
A24. I never thought I'd be an entrepreneur in anything,
A25. There is a lot of excess going on, a lot of extra waste,
A26. and I'm happy to propose the opposite.
A27. I could never go back to living big.
A28. Living small has changed my life dramatically,
A29. and I couldn't ask for anything better.

Appendix I

Image-only idea units, no connection to audio idea units (and with a distinct difference among images); 18 total

IU40. The opening image shows a bed of pink flowers. (exterior shot)

IU41. Jay Shafer is entering the front door of his tiny house. (exterior shot)

IU42. Jay Shafer is sitting in front of his tiny house. (exterior shot, facing camera one shot talking, one shot not talking)

IU43. This is a view of Jay Shafer's living room. (interior shot, still image)

IU44. This is a view of Jay Shafer's kitchen. (interior shot, still image)

IU45. This is a view of Jay Shafer's bathroom. (interior shot, still image)

IU46. Jay Shafer is doing the dishes in his kitchen.

IU47. This is a view of shelves (in peak of roof/bedroom). (interior shot, still image)

IU48. This is a view of Jay Shafer's shelves. (interior shot, still image)

IU49. A U-Haul truck is pulling Jay Shafer's tiny house on a road. (exterior shot, still image)

IU50. Trathen Heckman is talking. (interior shot, facing camera)

IU51. Jay Shafer is typing on a laptop in his living room. (interior shot)

IU52. Jay Shafer is putting things on his shelves and in his closet. (interior shot)

IU53. This is a view down into Jay Shafer's kitchen from the loft (bedroom). (interior shot)

IU54. Jay Shafer is taking a ladder to loft out and climbing up. (interior shot)

IU55. This is a view of Jay Shafer's loft bedroom. (interior shot, still image)

IU56. Jay Shafer is talking to a man on the front porch of his tiny house.

IU57. Jay Shafer is exiting his tiny house through the front door. (exterior image)

Appendix J

Audio-and-image (connected) idea units (AIU) – 9 total

(number of AU listed first then IU described in parentheses; underlining if only part of AU or IU corresponds temporally with IU or AU respectively. Relevant notes follow a semicolon within parentheses. Nine total AIU, but note that two AU are connected to one IU in AIU 65):

AIU 58. I live in a tiny house[3]. (JS entering front door of his tiny house.)

AIU 59. I named my house Tumbleweed[4], (image of house name on a sign)

AIU 60. it's just eight feet by twelve feet[5]. (further view of whole exterior of tiny house)

AIU 61.Having no construction experience, I figured I'd figure it out as I went[10]. (still shot of JS hanging out of window frame of his house under construction)

AIU 62. Between the four of us, *doing all the housework,* the mortgage, it just seemed like more stuff and more burden than I really wanted[13]. (video image of JS doing dishes; part of AU directly related to IU is in italics)

AIU 63. It wasn't very long after building my first house that <u>this became a business</u>[18]<u>.</u> (JS working on design of a house)

AIU 64. I decided to start building and designing little places[20]. (exterior views of tiny houses: one similar to JS's, "box house" on stilts' little blue house w/mountain views behind)

AIU 65. Not paying much *utilities* is awfully nice[31]. I pay less than one hundred dollars per year in *utilities* in this house[32]. (JS filling kitchen container with water from an outside tap; directly related word "utilities" in *italics*)

AIU 66. but it's my passion to design small houses[34]. (JS showing a design to a man in his living room – shifts to close-up view; temporally, the video image actually occurs a few seconds later, during AIU 35 and 36)

Appendix K

Pilot study subject 2 (P2) written free recall answer page
(using only original 39 AU listed in Appendix G):

The first speaker of this video is about a 42 years old grocery clerk[8], who designed his first small house[17], which only 1/10 of normal people house[24].

He thought people did not need that much space.

He's travelling with this small house for promoting this kind of life style.

He said that this way people can save lots of money [29 30 or 31] and its environment friendly too.
ls kind of the small house is a very good education[26].

The first speaker started his business by designing this kind of small houses[17 or 18].

Appendix L

Study procedures

Informed consent, questionnaire, and OOPT:

1. About a week prior to the OOPT exam session, subjects will receive an informed consent form via email which includes a brief description of the project (attached). The subjects will be asked to read it carefully, sign it, and then turn it in to a research assistant (~15 minutes).

2. After receiving subjects' signed informed consent form, and several days prior to the OOPT exam session, the researcher will send a demographic questionnaire to subjects via email designed to collect information on age, gender, past English learning experiences, and English news video watching patterns. Subjects will be asked to fill out the questionnaires prior to arrival for the testing session (~15 minutes) and return them to the researcher at the beginning of the testing session.

3. In two to four groups, participants will take the OOPT (~40 minutes). Each subject will sit in front of a computer connected to the internet. Using individual passwords, subjects will sign into the testing website and begin the exam. Audio headsets will be used during the listening portion of the test so that a quiet testing environment is maintained. The researcher will proctor all testing sessions for the (26) participants. Upon completion of the test, scores will be shared with participants and the CEFR level descriptors will be handed out so that subjects will better understand the ability level that the test score indicates.

The one-to-one verbal report sessions:

4. The researcher will explain the procedures of the verbal protocol to the subject (introductory explanation, 5-10 minutes):

a. A practice session will take place, using an internet-delivered news videotext on a laptop computer connected to an external monitor.
b. During the practice session, the subject will talk about the mental processes used (i.e. what the subject is thinking) while watching and listening to the 123-second long videotext. The purpose is to give subjects practice with what should be reported and how it should be reported. The subject may pause the video at any time, but may not reverse the videotext. The researcher will also pause the videotext at discourse markers (speaker and/or topic transitions) and may need to prompt the subject if no verbalization is forthcoming for long periods while listening or during pauses in the video, with questions such as "What are you thinking now?" (10-15 minutes)
c. The researcher will ask if the subject has any further questions about the process and will provide further instruction concerning the protocol if necessary (~5 minutes).
d. The second news videotext (143 seconds) will then be used. Audio-recording software will be used to record both the audio portion of the video and the subject's verbalizations. (10-15 minutes).
e. Prior to commencing "d" above, the subject will be reminded that he or she will be asked to complete a written free recall of idea units (i.e. the subject writing down all the details he or she can recall) following completion of the operational verbal report (~10-15 minutes). The subject will be asked to type answers in English if possible, but to also use Mandarin-Chinese characters if necessary for accurate expression of recalled ideas. The data from this second video will be transcribed, coded, and analyzed. Free recalls will be

scored by the researcher (after translation of Mandarin-Chinese characters included in the written recall, if any).

4. Total time required by each subject: 110-130 minutes (spread over four data collection sessions).

5. All digital data collected will remain on the password-protected laptop computer of the researcher. Questionnaires will remain in the locked filing cabinet of the researcher. Scores from the OOPT will remain on the password-protected laptop computer of the researcher and on the password-protected English Testing Learning Management System (OLMS) website (researcher access only).

Appendix M

Steps for verbal report of operational study

(Note starting time here: _____)

1. Make sure the informed consent form is signed. Ask, "Do you have any questions about the informed consent form?"
2. Make sure the background questionnaire is filled out. Ask, "Do you have any questions about the background questionnaire?"
3. **Make sure recording software and Second Act internet-delivered video are functioning properly** (practice session recorded as a double-check).
4. Give instructions before the first practice session (**ask subject to read along silently on their page, #1**):
    - "My research is designed to investigate how English language learners process short, documentary-style news videotexts in English. I will ask you to talk aloud when you pause the video. You can use the mouse to pause at any time you want to. However, you cannot reverse the video in order to listen to a part more than once. I will also use the laptop's touch pad to pause the video and would also like you to tell me what you are thinking about the video at those times. What I mean by "talk aloud" is that I want you to say out loud everything that you would say to yourself silently while you think. I would like for you to try to do this only in English, but if you suddenly speak a few words of Chinese naturally, don't worry about it – I can have a few words or phrases translated later. Just act as if you were alone in the room speaking to yourself. Don't try to explain your thoughts, don't talk about whether you like the video or not, and don't write any notes. We will have a practice session first with a video that is on a different topic, but in a similar style as the second video. I may ask you some simple questions if you have paused the video but are silent for a period of time. Do you have any questions at this point? (**Pause, let subject respond**) You will also be able to ask any questions you want after the practice session."
5. **Show subject how to use the mouse to stop/play the video, with emphasis on keeping the cursor on the control bar of the video window so that the subject can quickly stop the video at the desired point.**
6. **Start the audio recording software, making sure it is functioning properly**.
7. Say: "You can start the video now.")
8. Give silent feedback like nodding my head, or "um-hmm".
9. When the video is finished and the subject finishes speaking, stop the recording software and save the recording. Double-check that recording occurred as planned.
10. Ask: "Do you have any questions?" Also, I can point out anything I think is helpful too.
11. Ask, "Would you like to take a short break to use the bathroom or have a drink?"
12. During short break, if any, **prepare the second video and recording software**.
13. When subject is ready, read (**ask subject to read along silently on their page, #2)**:

- Say: “Now you will watch and listen to the actual video I am using for the study. We will do this the same way as before. Afterwards, I will ask you to write down everything you can remember from this video. Do you have any questions?”

14. **Repeat steps 6-9 for this video**.
15. Say: “On the computer keyboard, please type everything you can remember from the video you just watched. Grammar and spelling are not important as long as I can understand the idea you type. Please type Chinese characters if necessary to express your meaning. Do you have any questions before you start?” (**make note of time it takes subject to complete the test: _____**.)
16. When subject finishes the test, **make sure the MS Word file of the subject’s written free recall is saved on the computer.**
17. **Thank the subject again for his or her time and effort**.

Finis (**Note ending time here:_____**)

Appendix N

Coded Verbal Report: Subject 10 ("Jerry")

S Verbal Report

(VT starts at 54 sec.; total time = 9:09)

VT: My name's Jay Shafer. I'm 45 years old and I live in a tiny house. I named my house Tumbleweed and it's just eight feet by twelve feet. (subject pauses)

S : Uh... it's a totally different video [from the practice video] because I see a lot of flowers, tree, and a house, but not a traditional house because it's a little bit smaller and with tires. It's made by wood and it look like it is not located... in uh [laughs] uh downtown so and I need to see a man who say he just live here, so I need to see what he need to tell me.

VT: I'm sure there are people out there who think I'm crazy for living so small, but (subject pauses)

S : Yeah, he said people will think he's crazy and I think he's crazy.

VT: living in this little house has allowed me to totally reinvent my life. I was working as a grocery store clerk. At a certain point, I decided I was going to escape the rat race and build a house from scratch. Having no construction experience, I figured I'd figure it out as I went. (researcher pauses)

JS: How about that last part?

S : You mean this part or the last part?

JS: Well, the part just before I paused.

S Uh- huh. Mm... he this man maybe he just quit uh... quit his work and he is part of this house and he just show some video clip... just show his some some furniture, some wood and carpet or some his kitchen and uh... a very small toilet and maybe a bathroom, but... he will he... he say he think that people will think he is crazy, so I think he will show something he is proud of or some some adventure about his uh... his house. Yeah.

JS: OK.

S OK.

VT: As a kid, I was living in 4,000 square feet with my family. Between the four of us, doing all the housework, the mortgage, it just seemed like more stuff and more burden than I really wanted. Ultimately, I wanted to focus more on the things I really wanted to do and not on working for cash so much. It's been very libera- (subject pauses)

Note: Tally counts for total strategies used and totals for types of strategies used are handwritten at the top of the page. Meanings of codes are given in Appendix A; Totals for each subject for all strategies are given in Appendix Q.

S : Uh... he say the key point, he said he won't want work for just more cash, so maybe he just, like I said before, maybe he just quit his job or he loved the natural life or he he wants... uh something is enough and he wants have a quality life. Something like that.

VT: -ting. The first day of living in my tiny house felt like I was finally living with just what I needed and nothing more. (S, pauses)

S He said he just... when he first time live in the tiny house, he think he just live with what he wants and ah.... I think it's uh... I would call it... maybe it's a honeymoon because he transfer maybe to a totally different life so he will definitely think that's good, but maybe the second day or the third day he will face some inconvenient. Maybe he will lack of electronic or he will lack of water or he will... want to fax or copy something, but he hedon't... he can't because they don't have the fax machine, but... I don't think he will talk about something like that.

VT: It felt really natural to me. It wasn't very long after I finished building my first house that this became a business. People seemed interested in my house, so I decided to start building and designing little places. (researcher pauses)

S : [softly] Oh cool.

JS: OK, how about....

S . Uh... he said he uh love his tiny house and a lot of people are interested in his house too, so maybe someone will ask him to tototo help them to do that, so maybe he just sell his idea or help people to build other house like likelike his and uh... I uhI see a lot of video clip that in maybe different country and different area, so maybe he he earn a lot of money than he did before.

JS: OK.

S OK.

VT: Jay's small homes have a really great style; they feel more spacious than they are. My name is Trathen Heckman. I've been working in sustainability education for about a decade [subject pauses; subject started to talk over the last few words of the videotext before he paused]

S Ah it's a traditional one because after he try to introduce his tiny house, and say the thethe trend point, he ah... a lot of people are interested in his house, then he will find someone, maybe his customer or maybe someone is interested in [it will] try to say good things to this man. And let's see....

VT: a decade. I think Jay teaches people a lot about small living because he is living it. A man who lives in houses that are less than a tenth the size of the average American house is an

incredible message by itself, but then he does it in a very graceful and elegant and inspiring way, so it really shifts people's perception about the quality of life that can be associated with living with less. (researcher pauses)

S What about this?

JS: Yeah.

S : Ah yeah, people think [changes to sing-song voice], "Oh he's good, oh he's a good teacher, uh... graceful life, uh elegant, he just teach us how to live in a tiny house," or maybe the next part he [Trathen Heckman] will say uh, "We just want we just need to to just have things we just need, we don't need to earn lots of money and uh... work too much and we need to focus on our real lives." Something like that. OK.

JS: Yeah. [almost laughing]

S [in whisper] OK.

VT: There are a lot of advantages to living in a small house; foremost, I suppose not having a mortgage or rent is great. Not paying much utilities is awfully nice. I pay less than a hundred dollars per year in utilities in this house. (researcher pauses)

S [laughing] And now he just talking about saving money. He say because you live in a tiny house, and you can save a lot of money. Maybe the the... the electronic fee or you can try to use some natural resource, but I think you don't have internet or other things and you cannot watch... um... watch movie and with a very big... LED TV [laughs] [in] your tiny, so... uh, you save money, yeah. OK.

VT: I never thought I'd be an entrepreneur in anything, but it's my passion to design small houses. There is a lot of excess going on, a lot of extra waste, and I'm happy to propose the opposite. I could never go back to living big. Living small has changed my life dramatically, and I couldn't ask for anything better. (end of video)

S Now after the last part, he just find someone to uh to introduce the man, the thethe teacher and now this part he just try to interact with these people, and... his customer or maybe I say his student maybe say, "Oh I just can't go back to the city life. I love living in a tiny house and uh uh... the man, the teacher just say, "I don't want to be an entrepreneur, I just have uh... passion about the natural life or the tiny house and I'm glad I uh have patience to teach others how to live in a tiny house or design, build a tiny house." Like that.

JS: OK.

Appendix O

Written Free Recall of Idea Units: Subject 11 ("Scott")

A man on this video was introduce his house.

He is 45 and design his own house which is very small.
AU2 AIU58
The tiny house, named TUMBLE or something, is only 8 square feets.
AIU59
In my first sights, the tiny house ~~by beach~~.

And inside the house it has kitchen and living room, and the bedroom on the top.
IU44 IU45 IU55
The house keeper say he can take every thing in the house convienetly and enjoy the free.
A15
The house can save many money because it don't need the utilities.
AIU65
And I also watch another man say 'there are very few USA people used to live so tiny house.'

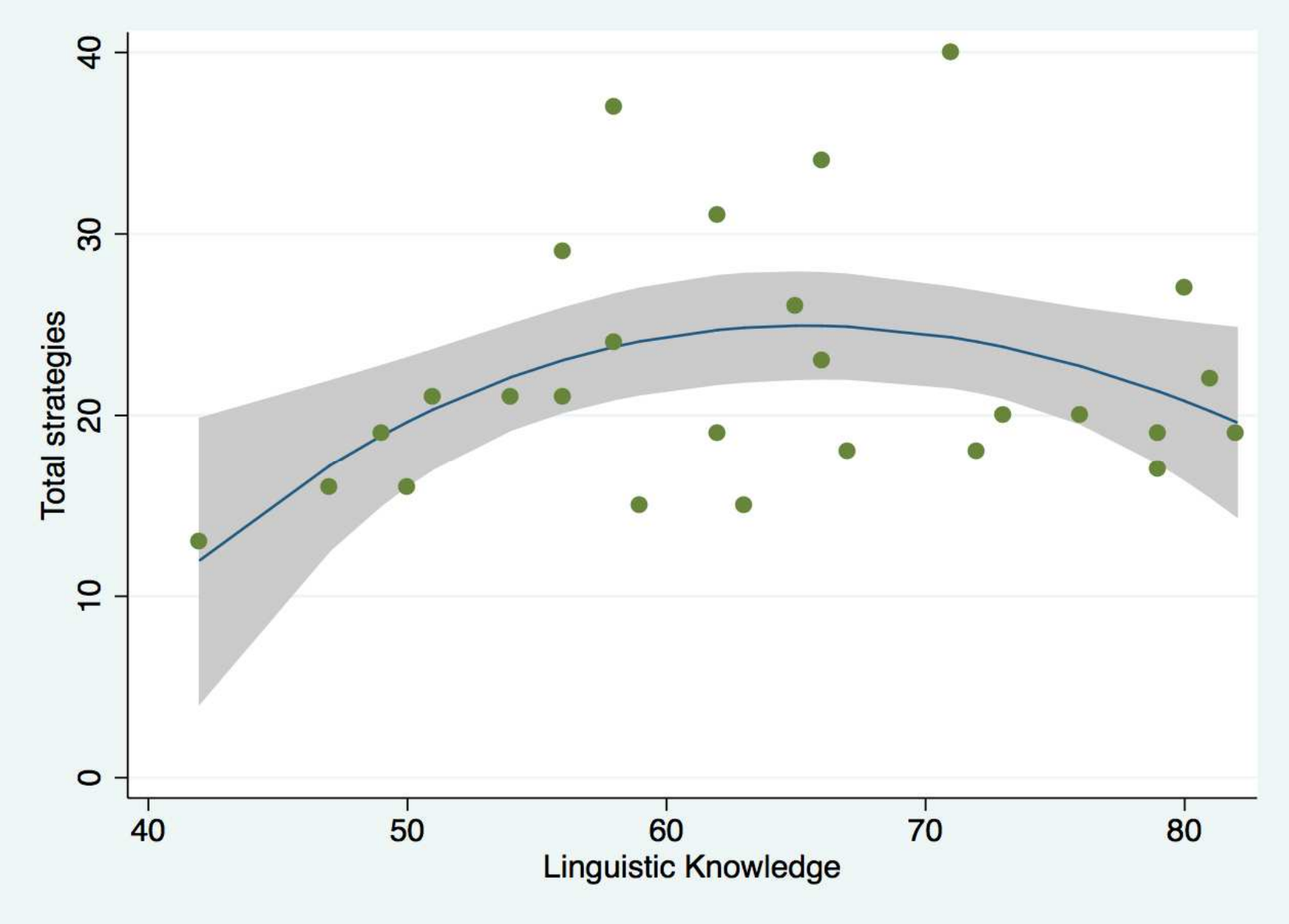
And the second paragraph,the man drive a truck drag his tiny house.
AIU49
I found the house equipped tires.

The man can take the house everywhere he want.

And there are many people began interested by his house.
AU19

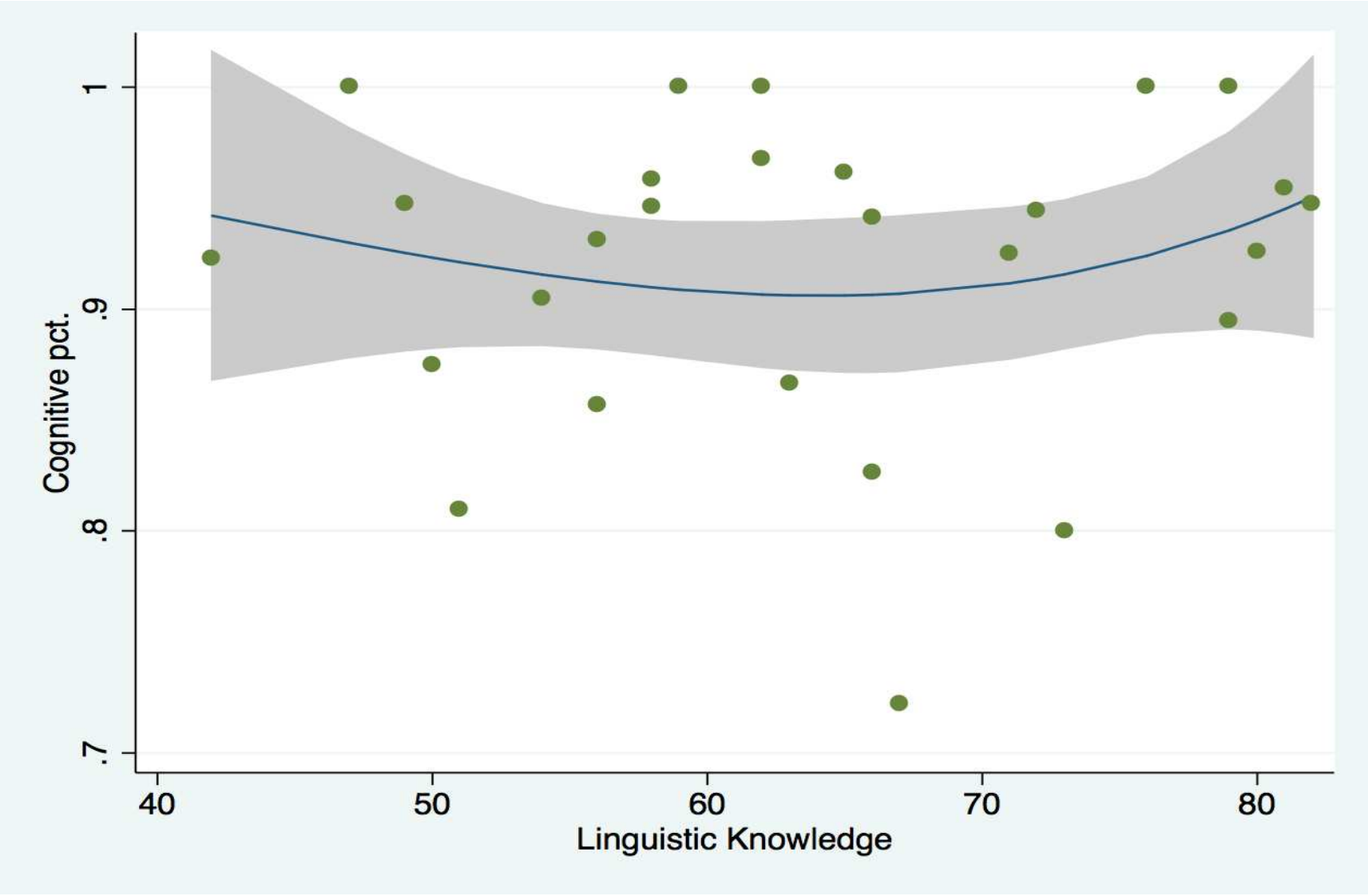
Note: Idea units (i.e. AU, IU, and AIU) for the operational videotext are shown in Appendixes H, I, and J; coded by one of three coders as explained in Chapters Three and Four; codes appear beneath the relevant (underlined) sections of the text; scores for all subjects for the three types of idea units are found on p. 81 of Chapter Four, but are repeated here for this subject for convenience: AU = 0.103 (3 AU out of 29 total); IU = 0.222 (4 IU out of a 18 total); AIU = 0.333 (3 AIU out of 9 total).

Appendix P1. Research Question 1 – Scatter Plot of Linguistic Knowledge and Total Strategy Use*



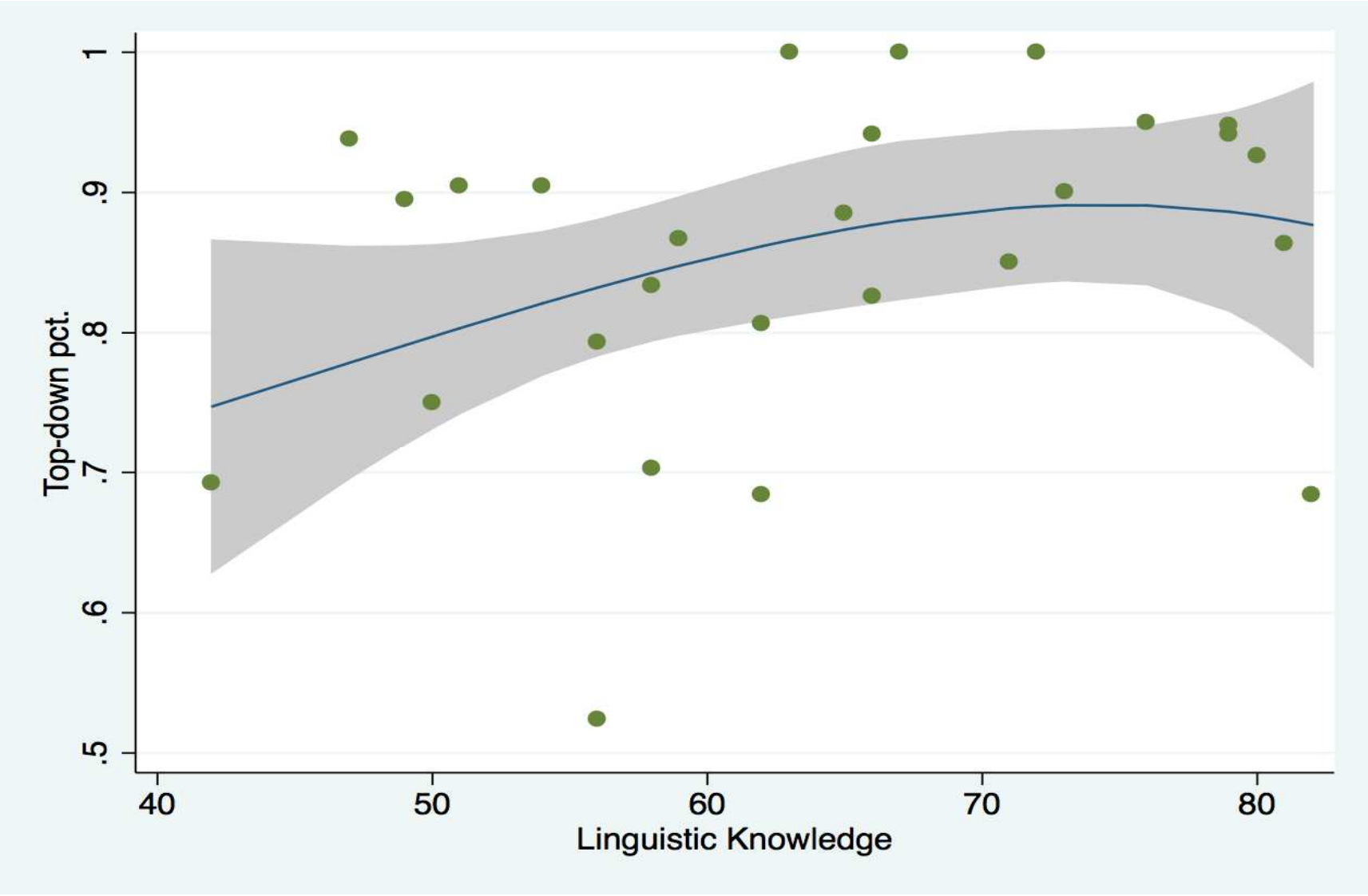
*Linguistic knowledge is subjects' scores (0 to 120) on the Use of English section of the Oxford Online Placement Test (OOPT);
Note: For all scatter plots "pct." stands for "percent." Also, p-values are listed for statistically significant results.

Appendix P2. Research Question 1 – Scatter Plot of Linguistic Knowledge and Cognitive Strategy Use*



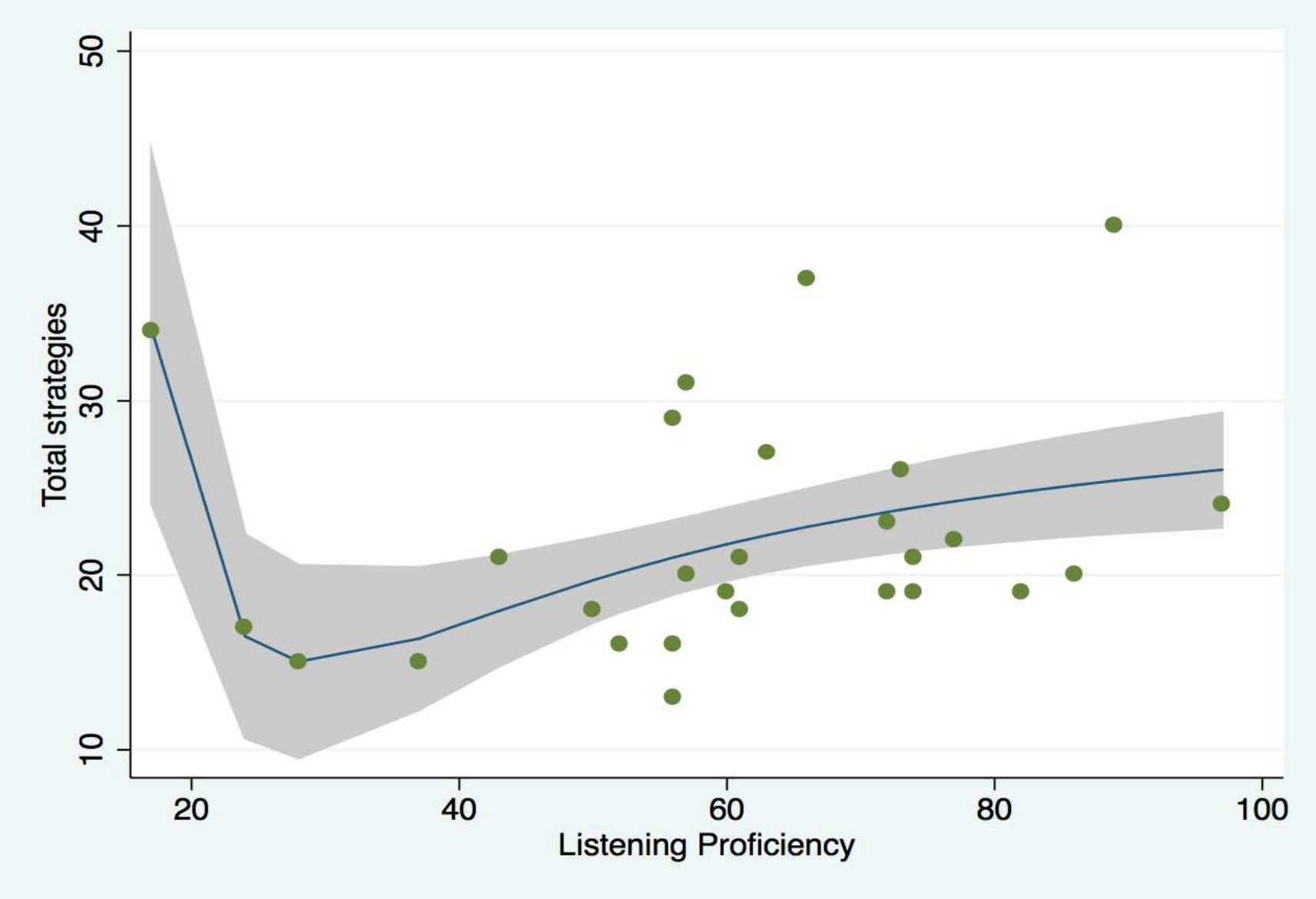
*Linguistic knowledge is subjects' scores (0 to 120) on the Use of English section of the Oxford Online Placement Test (OOPT); metacognitive strategy percent = 1 – cognitive percent (i.e. the line of best fit would be inverted for the metacognitive strategy and linguistic knowledge scatter plot along the vertical axis).

Appendix P3. Research Question 1 – Scatter Plot of Linguistic Knowledge and Top-down Strategy Use*



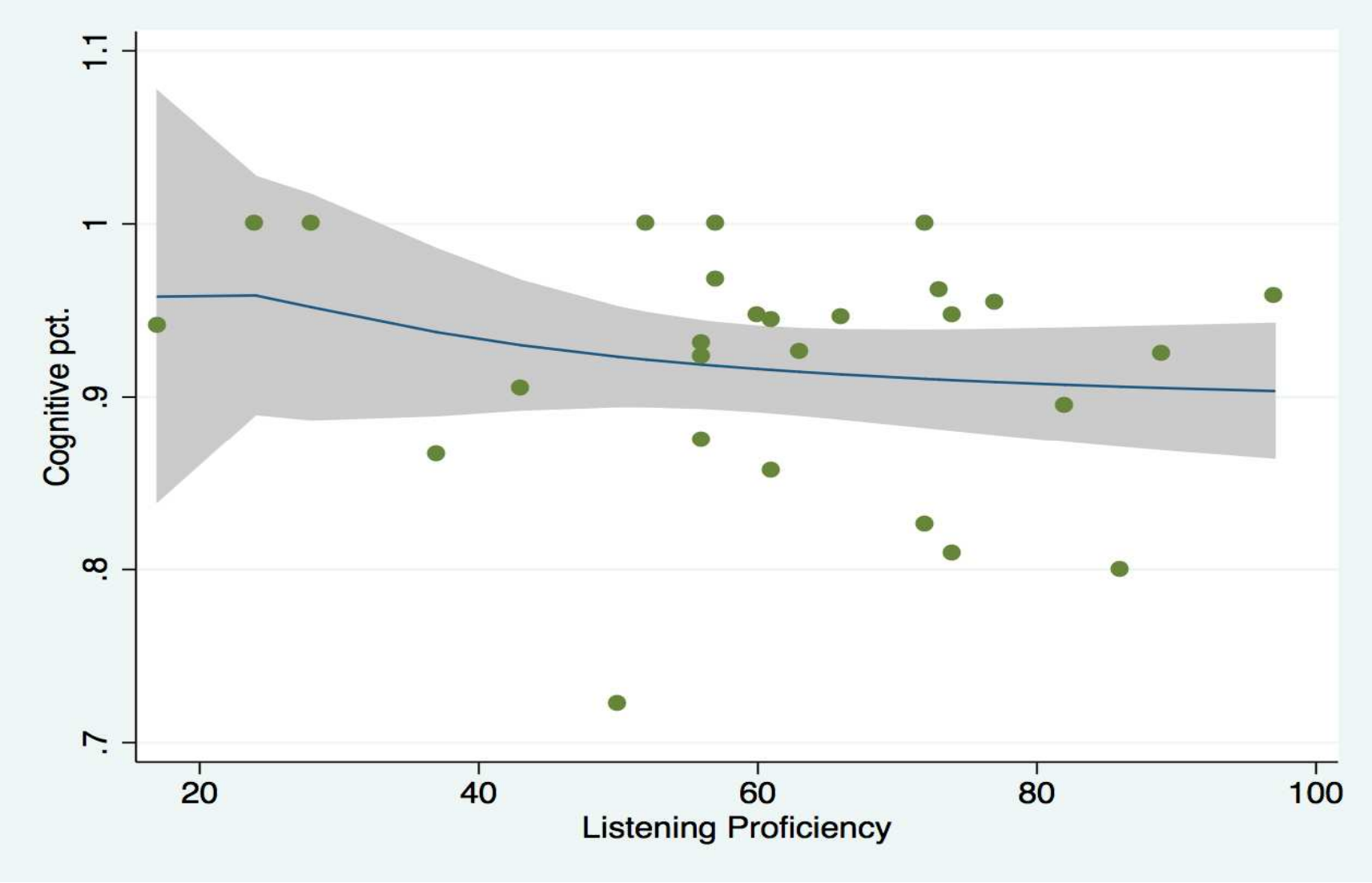
*Linguistic knowledge is subjects' scores (0 to 120) on the Use of English section of the Oxford Online Placement Test (OOPT); bottom-up strategy percent = 1 – top-down strategy percent (i.e. the line of best fit would be inverted for the bottom-up strategy and linguistic knowledge scatter plot along the vertical axis).

Appendix P4. Research Question 2 – Scatter Plot of Listening Proficiency and Total Strategy Use*



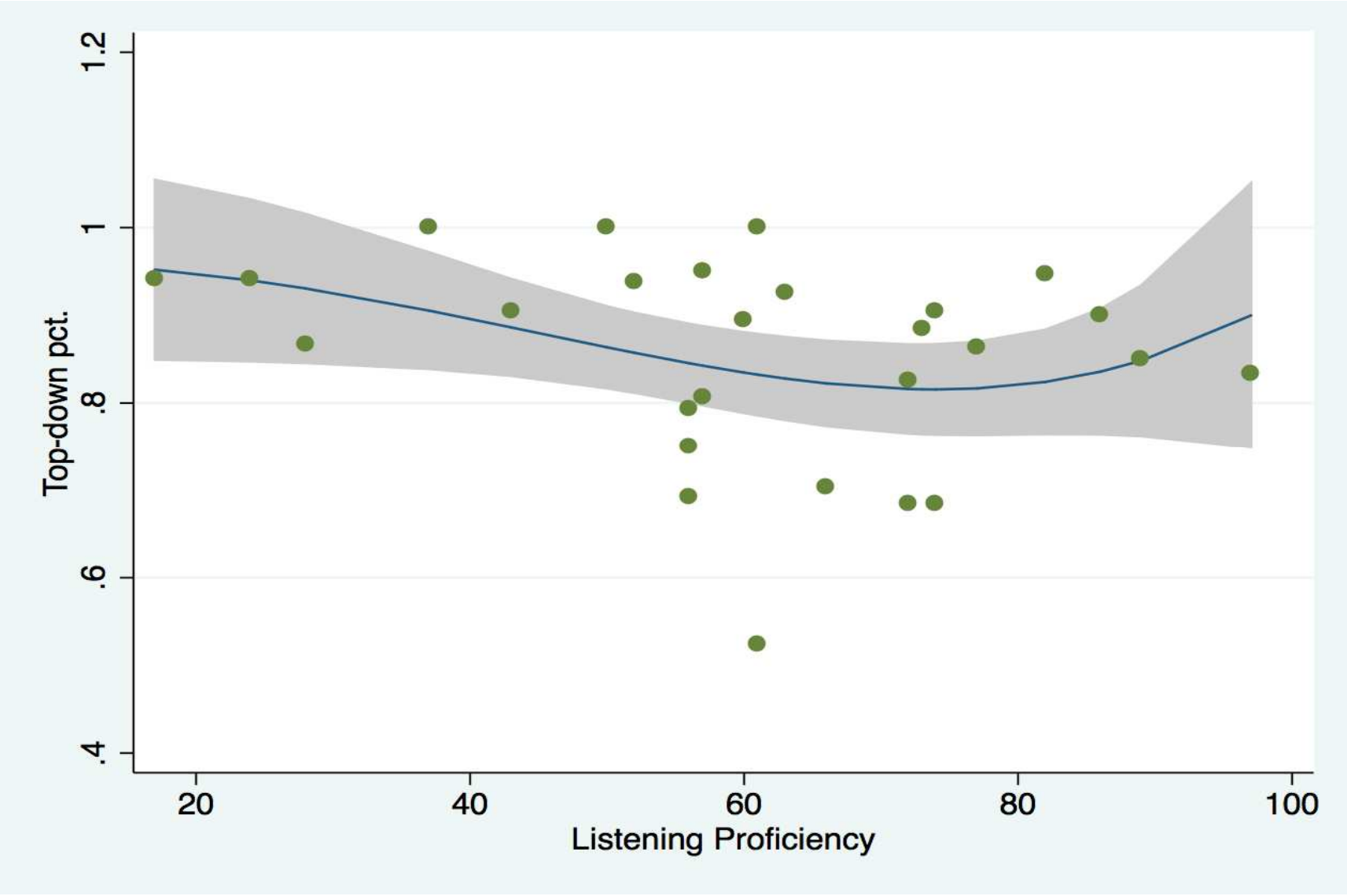
*Listening proficiency is subjects' scores (0 to 120) on the Use of English section of the Oxford Online Placement Test (OOPT); p-value = 0.06.

Appendix P5. Research Question 2 – Scatter Plot of Listening Proficiency and Cognitive Strategy Use*



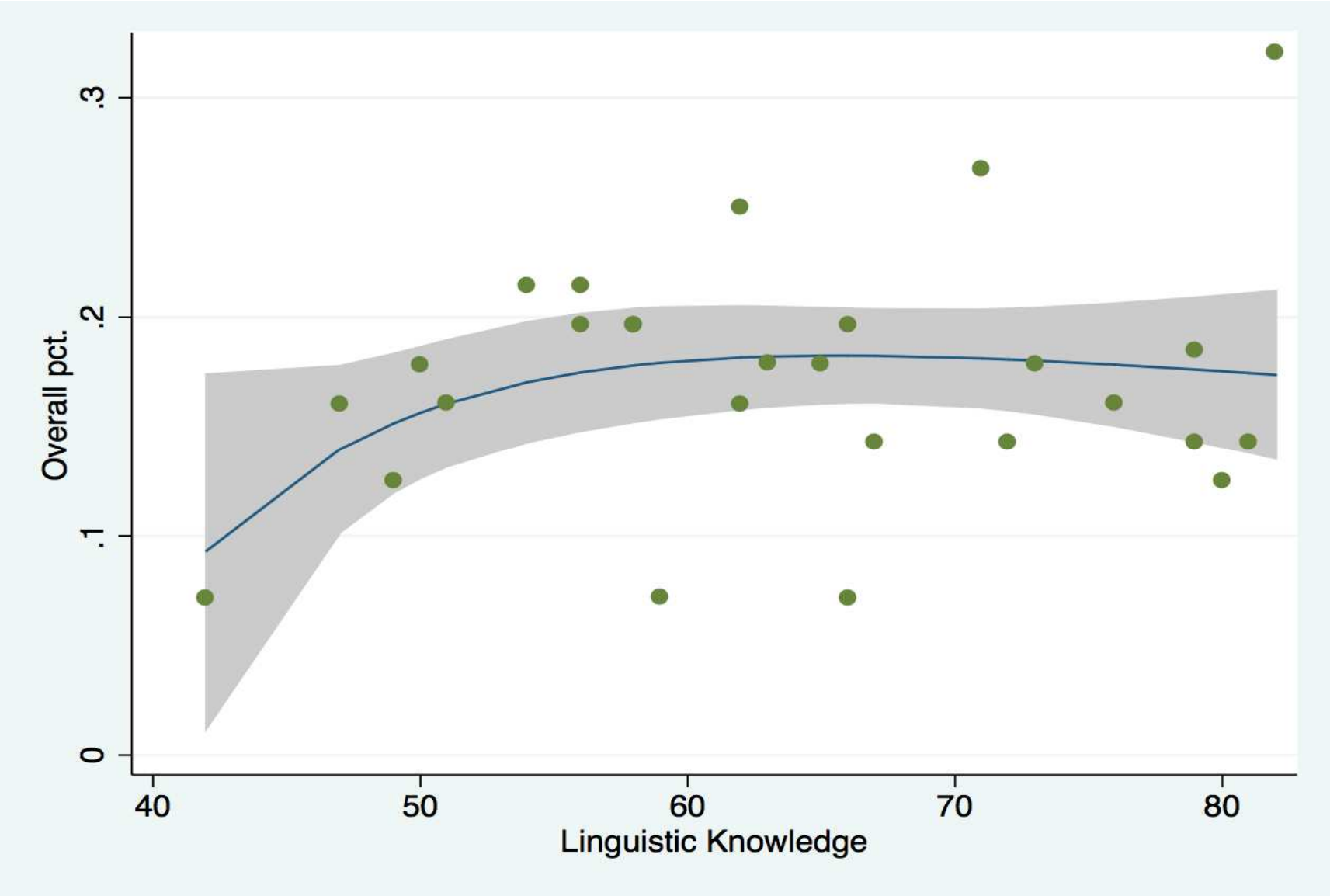
*Listening proficiency is subjects' scores (0 to 120) on the Listening section of the Oxford Online Placement Test (OOPT); metacognitive strategy percent = 1 – cognitive strategy percent (i.e. the line of best fit would be inverted for the metacognitive strategy and listening proficiency scatter plot along the vertical axis)

Appendix P6. Research Question 2 – Scatter Plot of Listening Proficiency and Top-down Strategy Use*



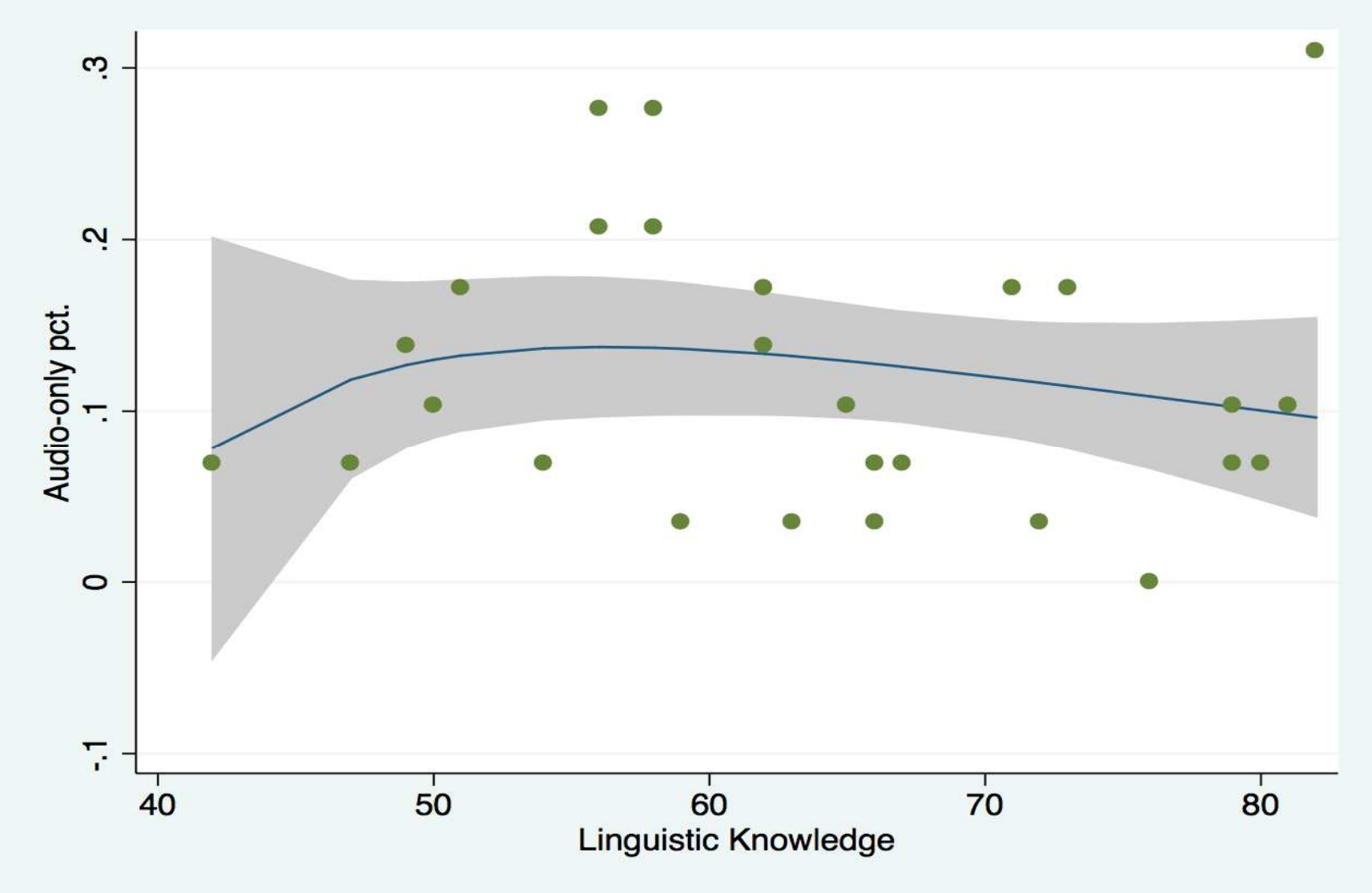
*Listening proficiency is subjects' scores (0 to 120) on the Listening section of the Oxford Online Placement Test (OOPT); bottom-up strategy percent = 1 – top-down strategy percent (i.e. the line of best fit would be inverted for the bottom-up strategies and listening proficiency scatter plot along the vertical axis); p-value = 0.09.

Appendix P7. Research Question 3 – Scatter Plot of Linguistic Knowledge and Overall Idea Unit Recall Score*



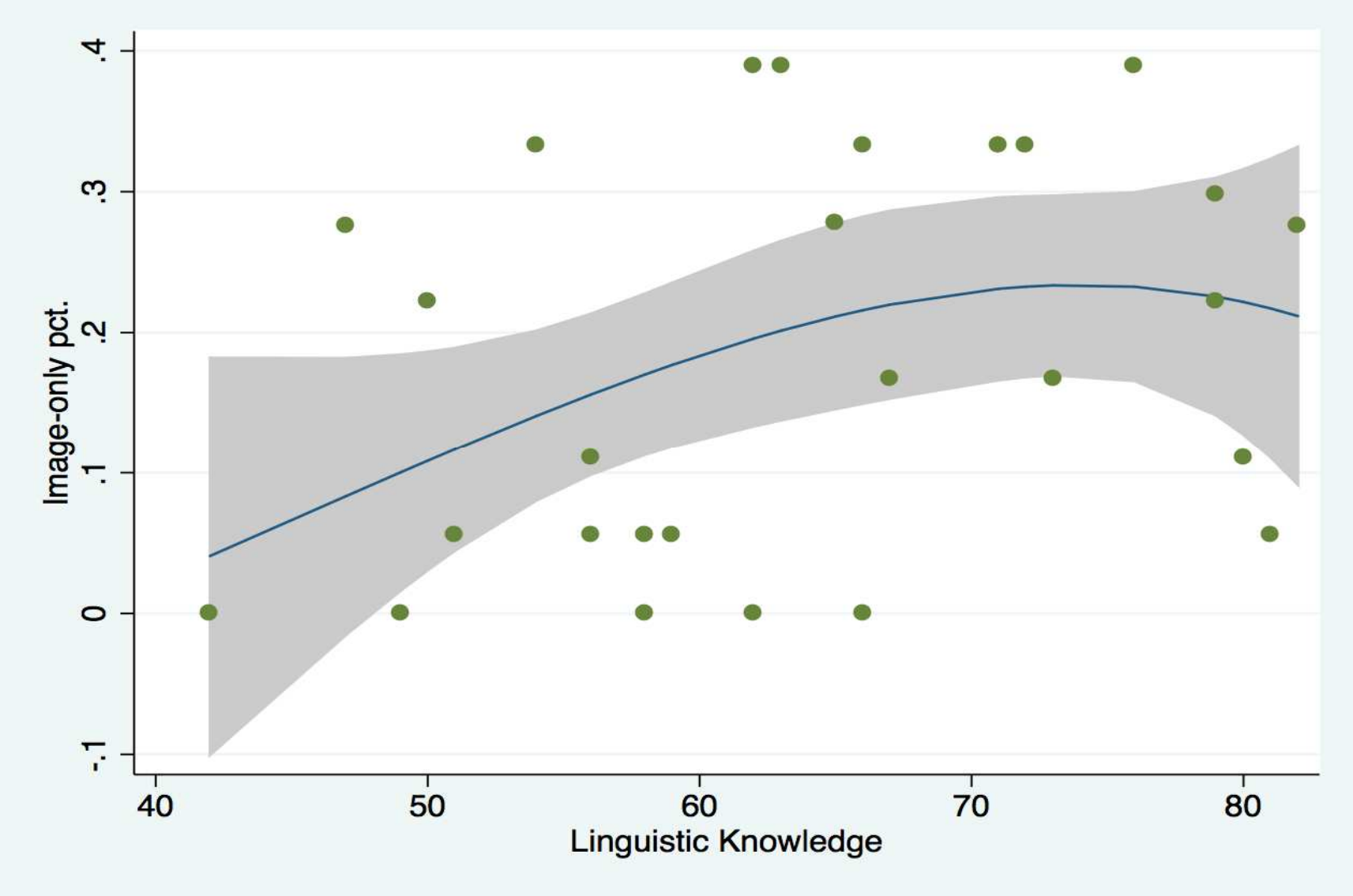
*Linguistic knowledge is subjects' scores (0 to 120) on the Use of English section of the Oxford Online Placement Test (OOPT); idea unit score is out of 56 total idea units.

Appendix P8. Research Question 3 – Scatter Plot of Audio-only Idea Unit Recall Score and Linguistic Knowledge*



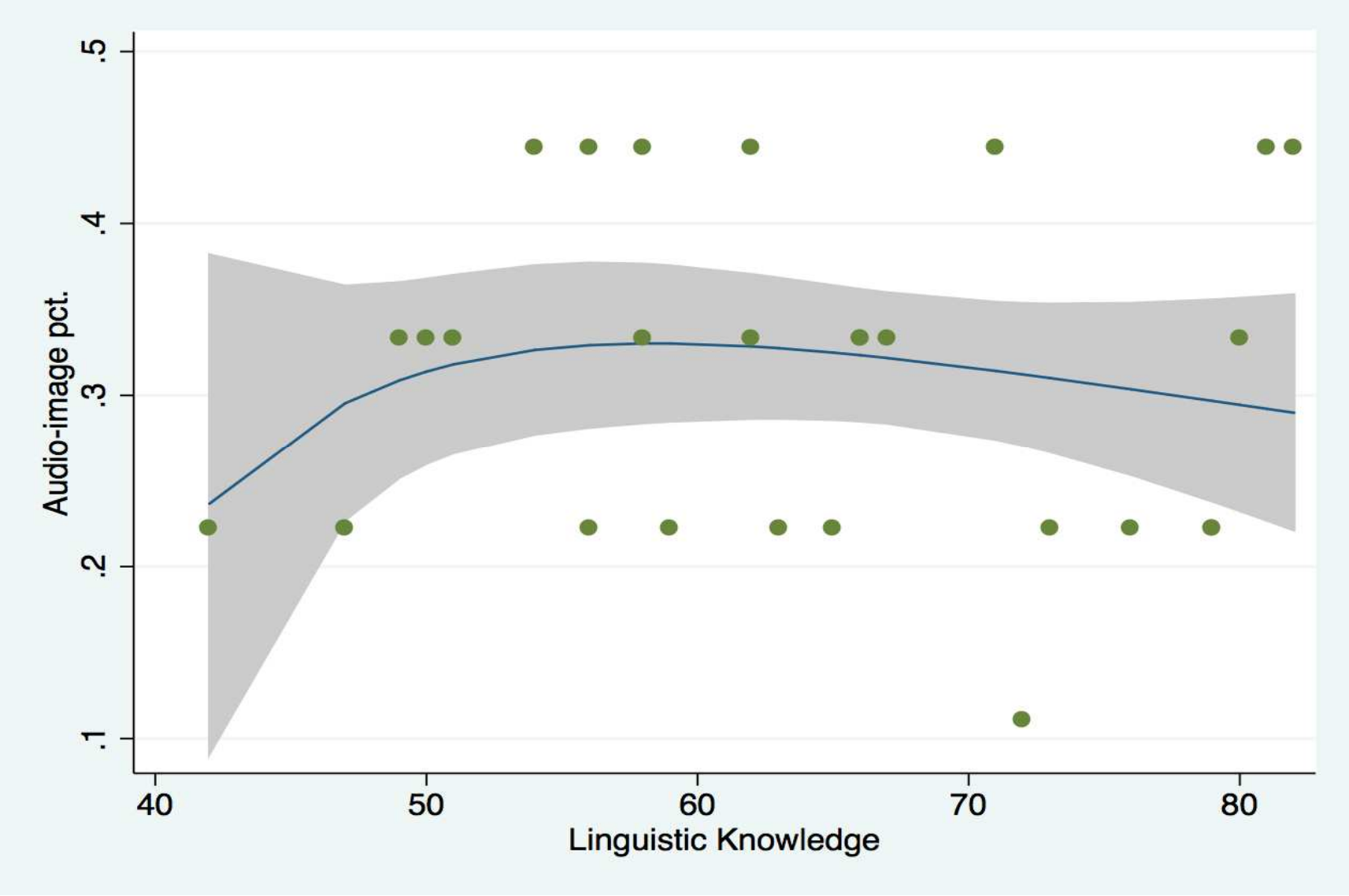
*Linguistic knowledge is subjects' scores (0 to 120) on the Use of English section of the Oxford Online Placement Test (OOPT); idea unit score is out of 29 total audio-only idea units.

Appendix P9. Research Question 3 – Scatter Plot of Linguistic Knowledge and Image-only Idea Unit Recall Score*



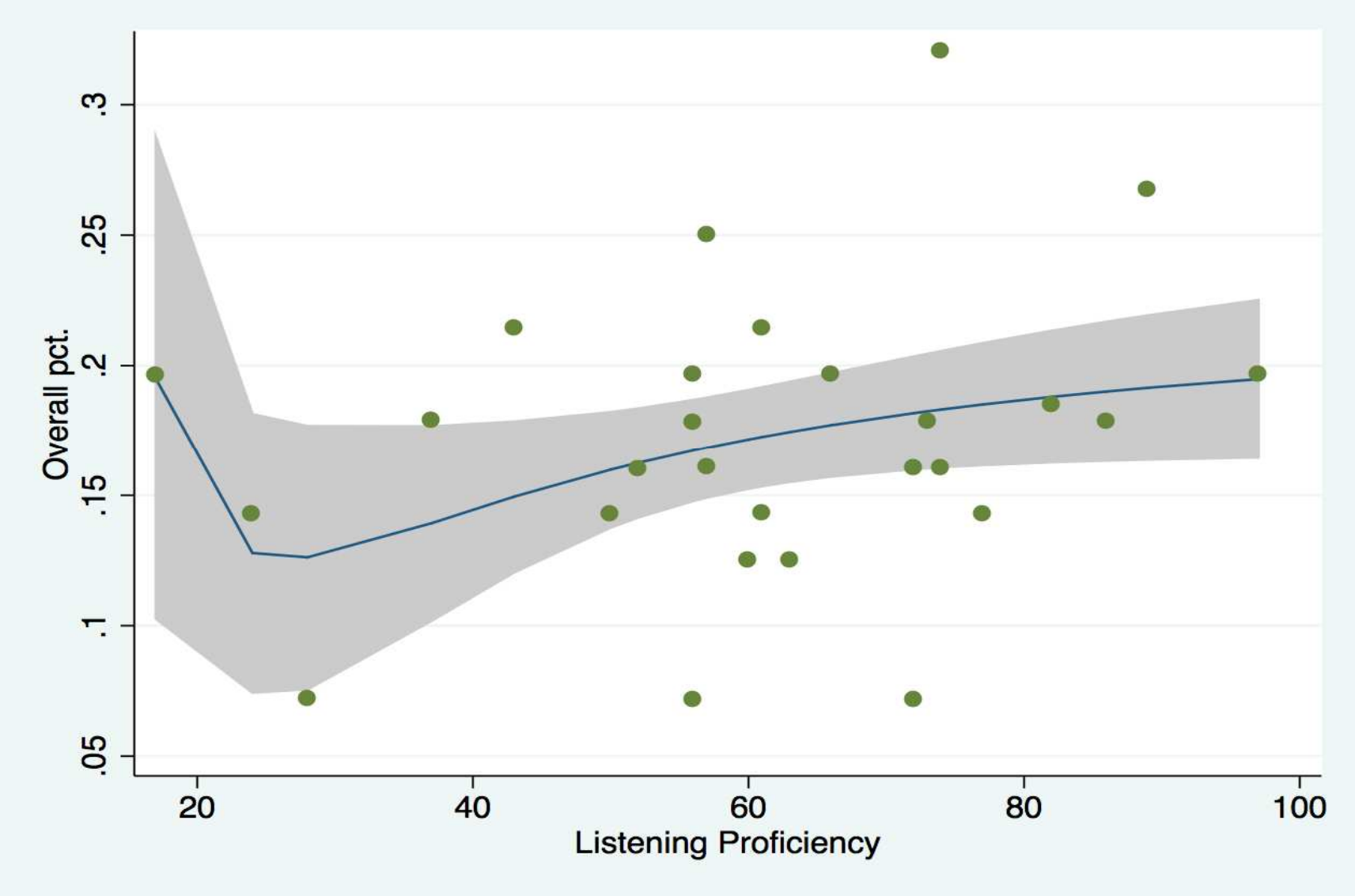
*Linguistic knowledge is subjects' scores (0 to 120) on the Use of English section of the Oxford Online Placement Test (OOPT); idea unit score is out of 18 total image-only idea units.

Appendix P10. Research Question 3 – Scatter Plot of Linguistic Knowledge and Audio-and-Image Idea Unit Recall Score*



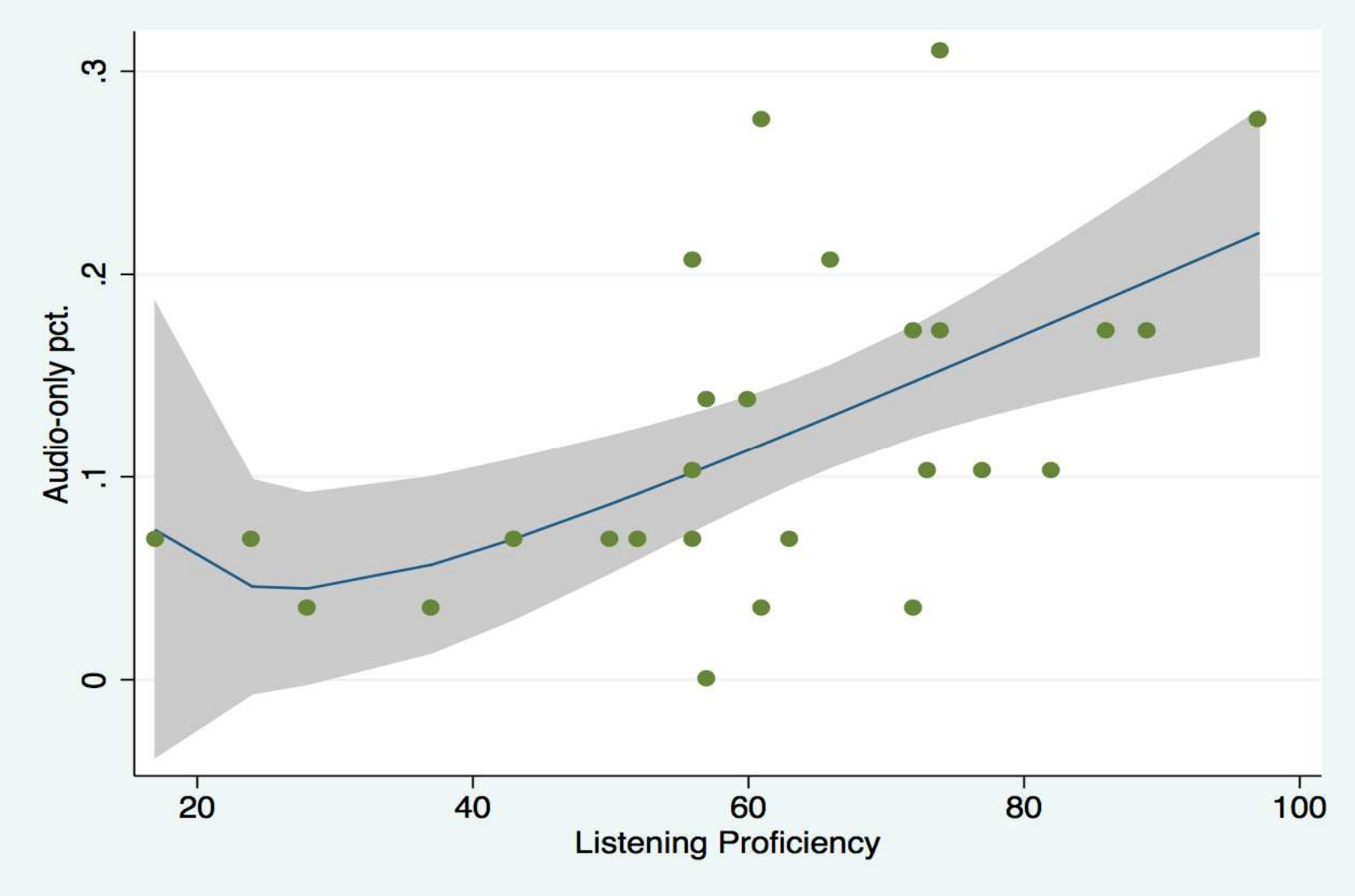
*Linguistic knowledge is subjects' scores (0 to 120) on the Use of English section of the Oxford Online Placement Test (OOPT); idea unit score is out of nine total audio-and-image idea units.

Appendix P11. Research Question 4 – Scatter Plot of Listening Proficiency and Overall Idea Unit Recall Score*



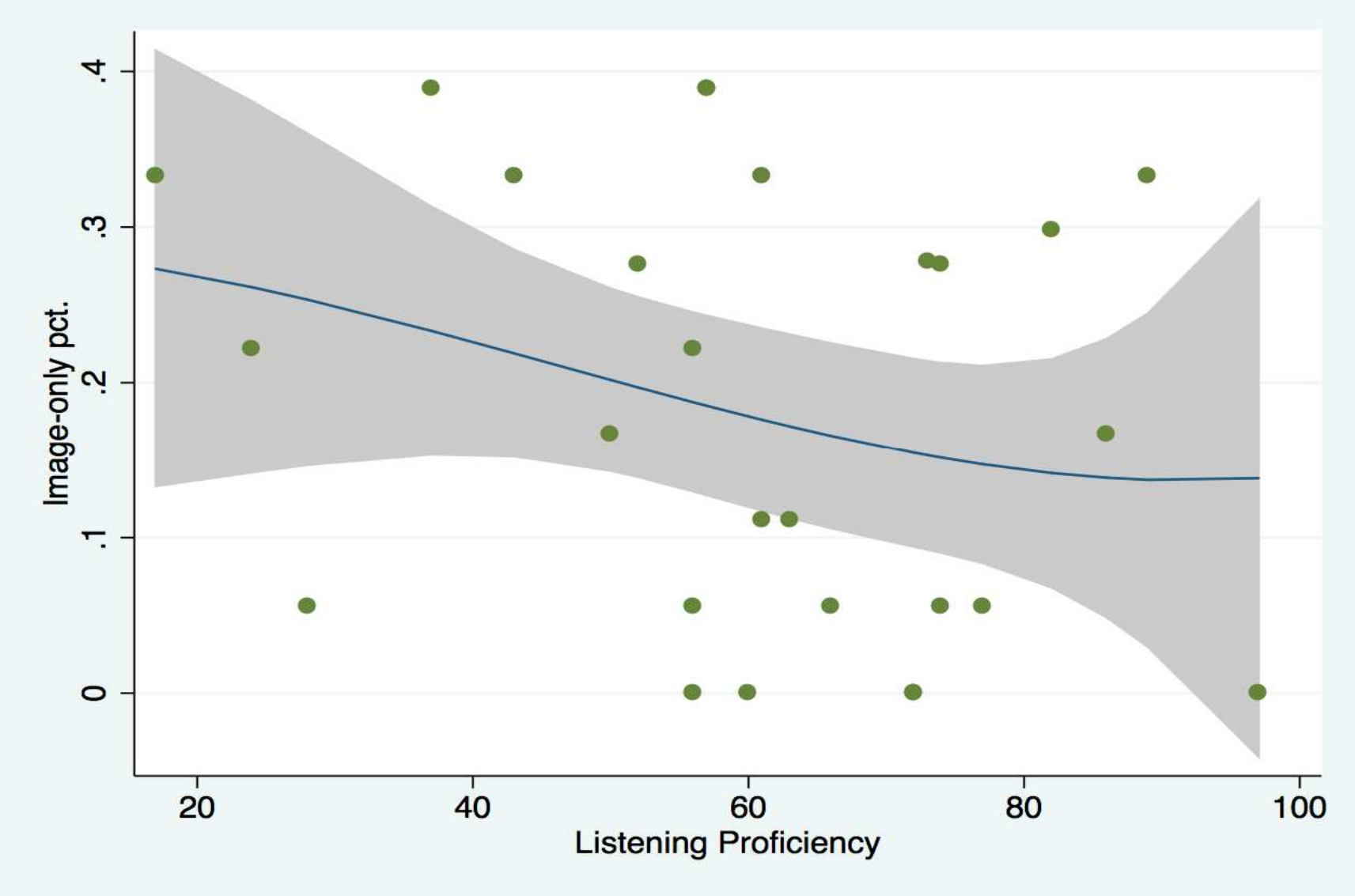
*Listening proficiency is subjects' scores (0 to 120) on the Listening section of the Oxford Online Placement Test (OOPT); idea unit score is out of 56 total idea units.

Appendix P12. Research Question 4 – Scatter Plot of Listening Proficiency and Audio-only Idea Unit Recall Score*



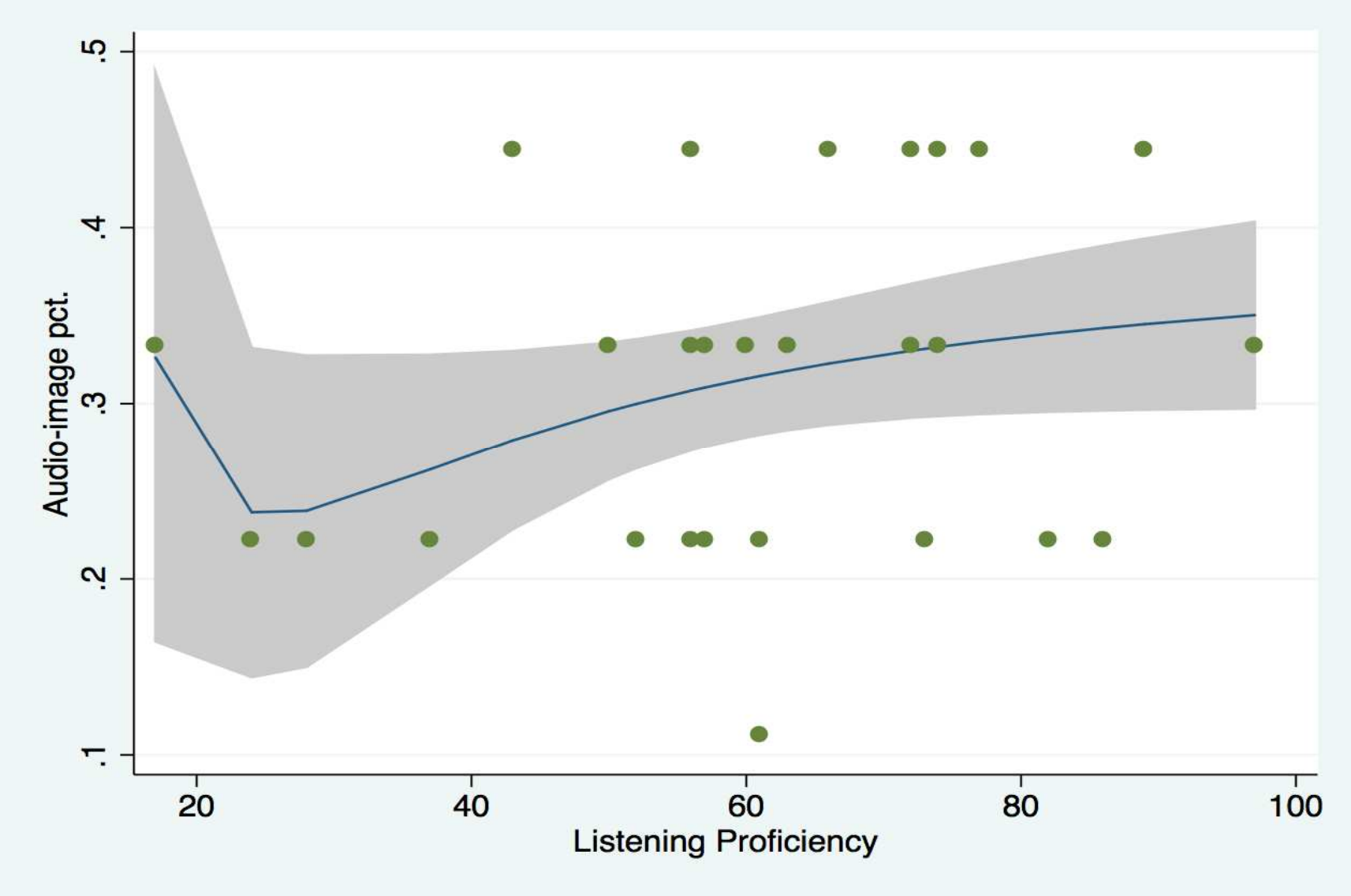
*Listening proficiency is subjects' scores (0 to 120) on the Listening section of the Oxford Online Placement Test (OOPT); idea unit score is out of 29 total audio-only idea units; p-value < 0.01.

Appendix P13. Research Question 4 – Scatter Plot of Listening Proficiency and Image-only Idea Unit Recall Score*



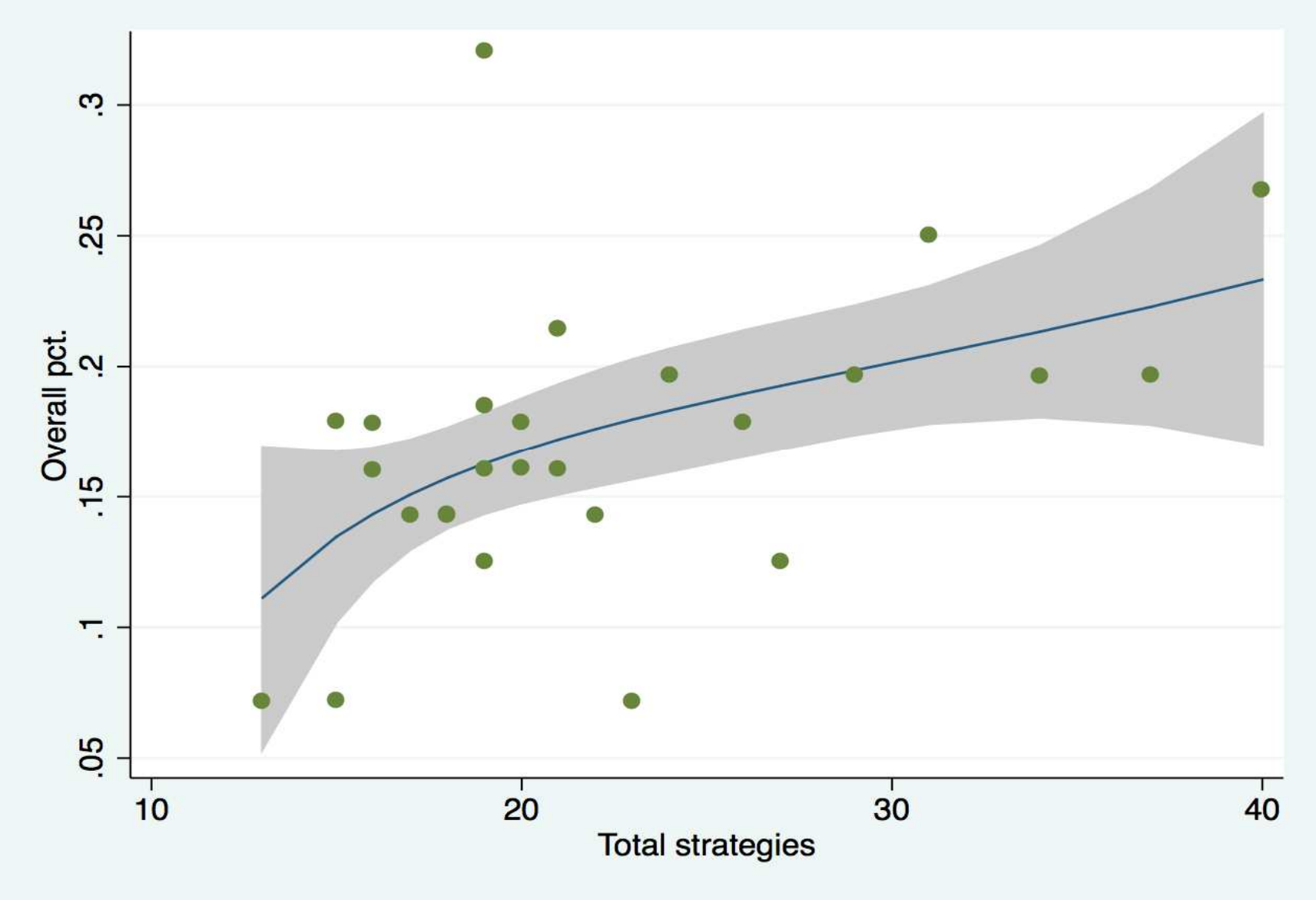
*Listening proficiency is subjects' scores (0 to 120) on the Listening section of the Oxford Online Placement Test (OOPT); idea unit score is out of 18 total image-only idea units.

Appendix P14. Research Question 4 – Scatter Plot of Listening Proficiency and Audio-and-Image Idea Unit Recall Score*



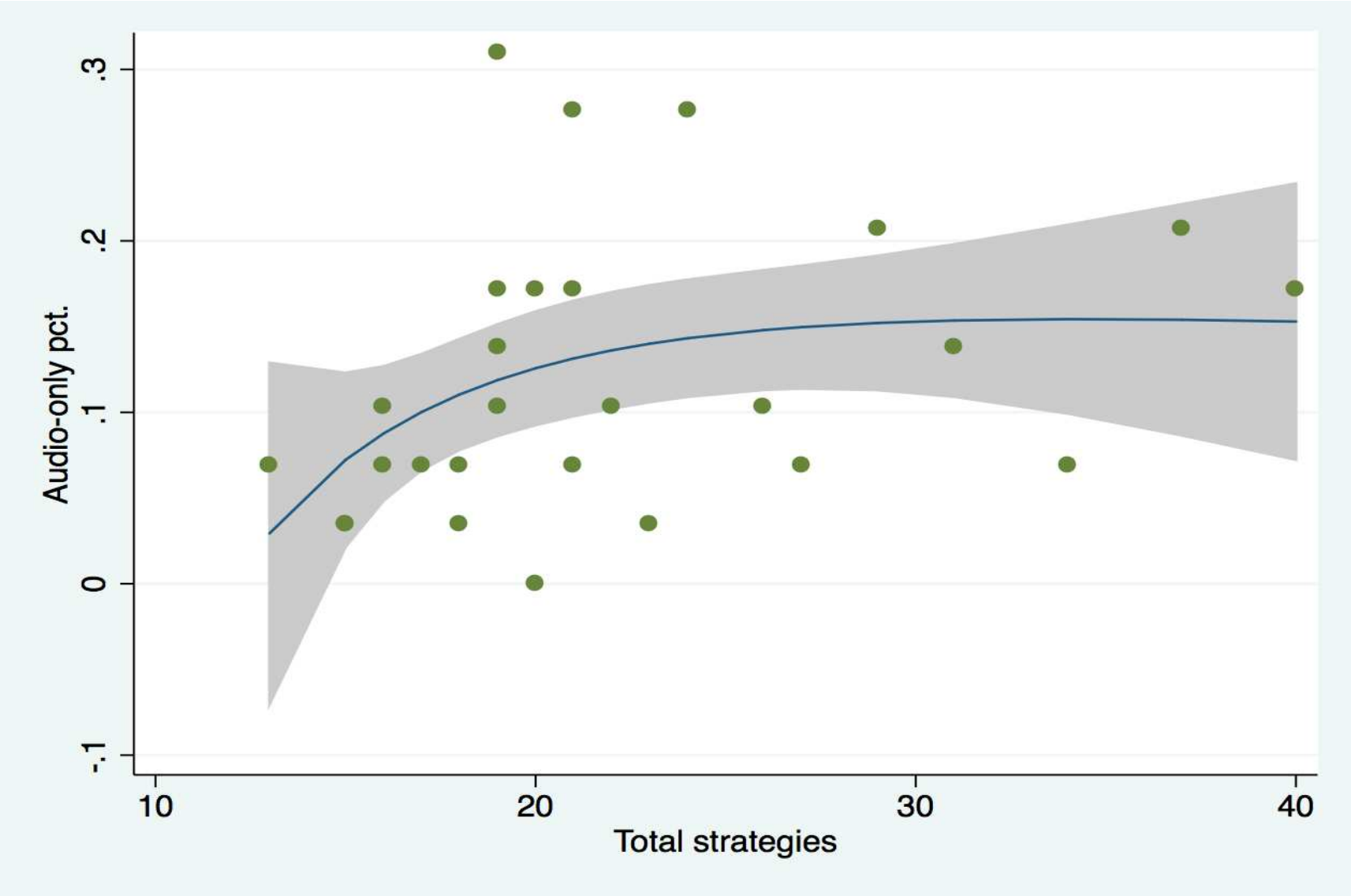
*Listening proficiency is subjects' scores (0 to 120) on the Listening section of the Oxford Online Placement Test (OOPT); idea unit score is out of nine total audio-and-image idea units.

Appendix P15. Research Question 5 – Scatter Plot of Total Strategy Use and Overall Idea Unit Recall Score*



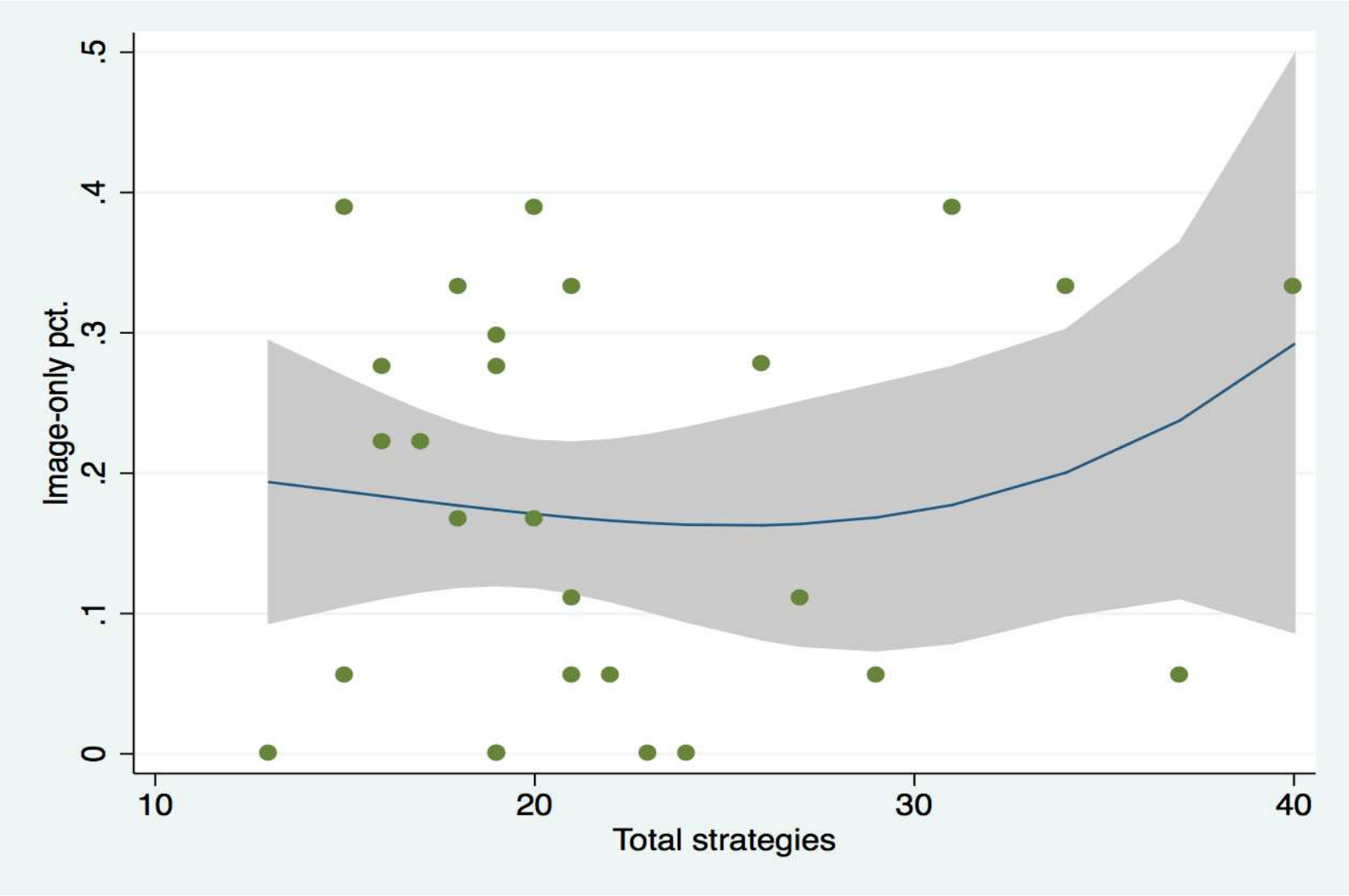
*Idea unit score is out of 56 total idea units; p-value = 0.03.

Appendix P16. Research Question 5 – Scatter Plot of Total Strategy Use and Audio-only Idea Unit Recall Score*



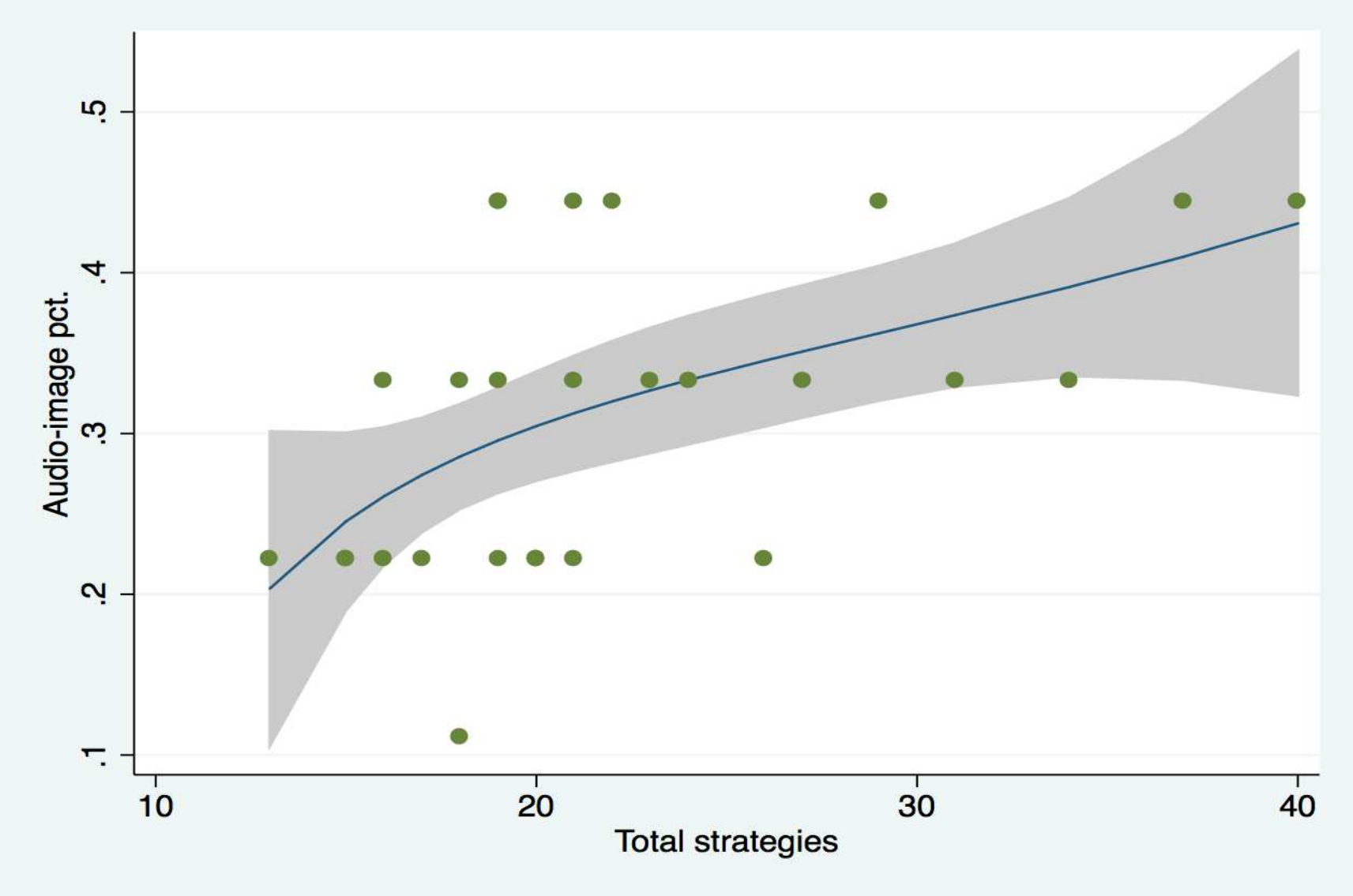
*Idea unit score is out of 19 total audio-only idea units; p-value = 0.02.

Appendix P17. Research Question 5 – Scatter Plot of Total Strategy Use and Image-only Idea Unit Recall Score*



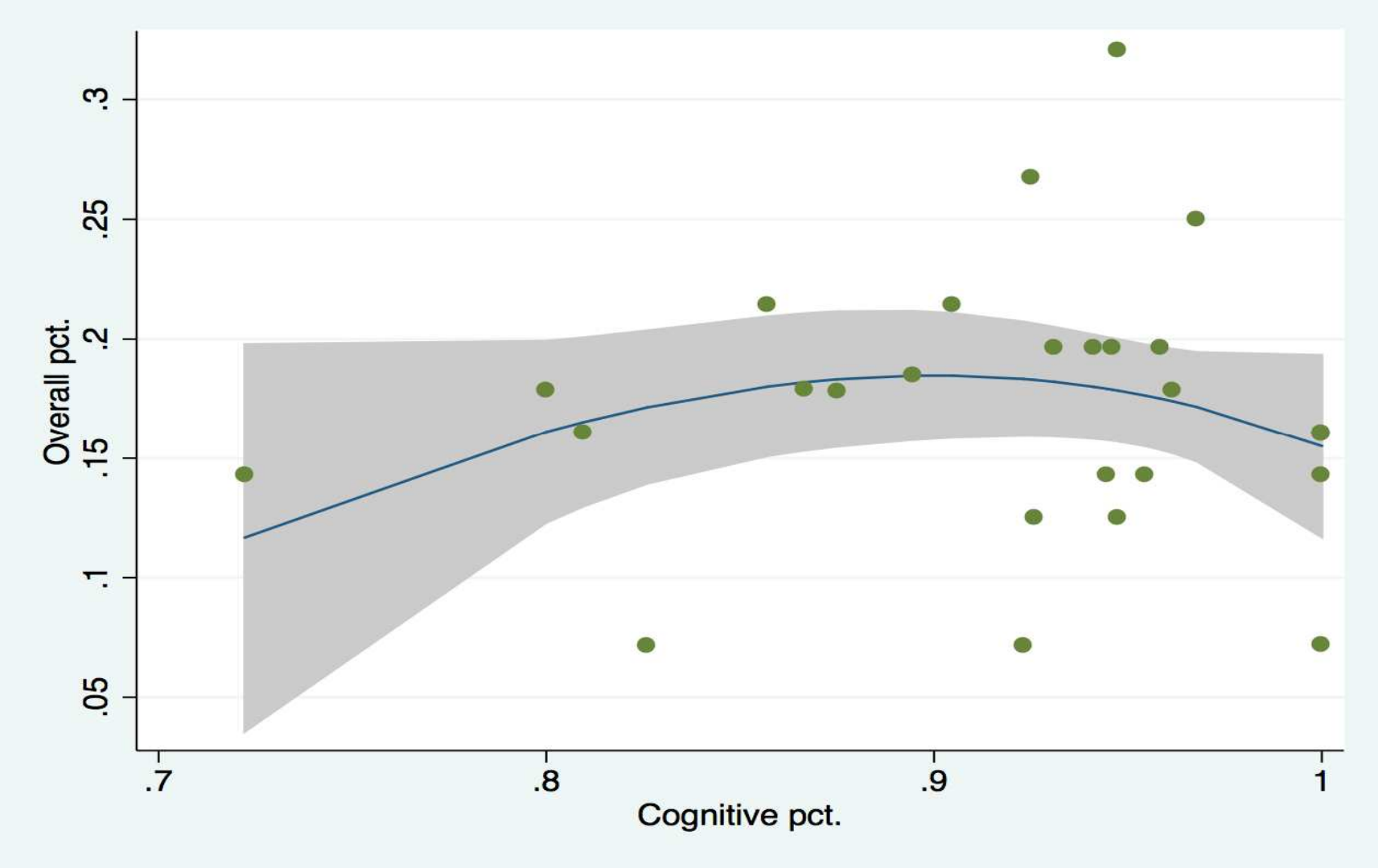
*Idea unit score is out of 18 total image-only idea units.

Appendix P18. Research Question 5 – Scatter Plot of Total Strategy Use and Audio-and-Image Idea Unit Recall Score*



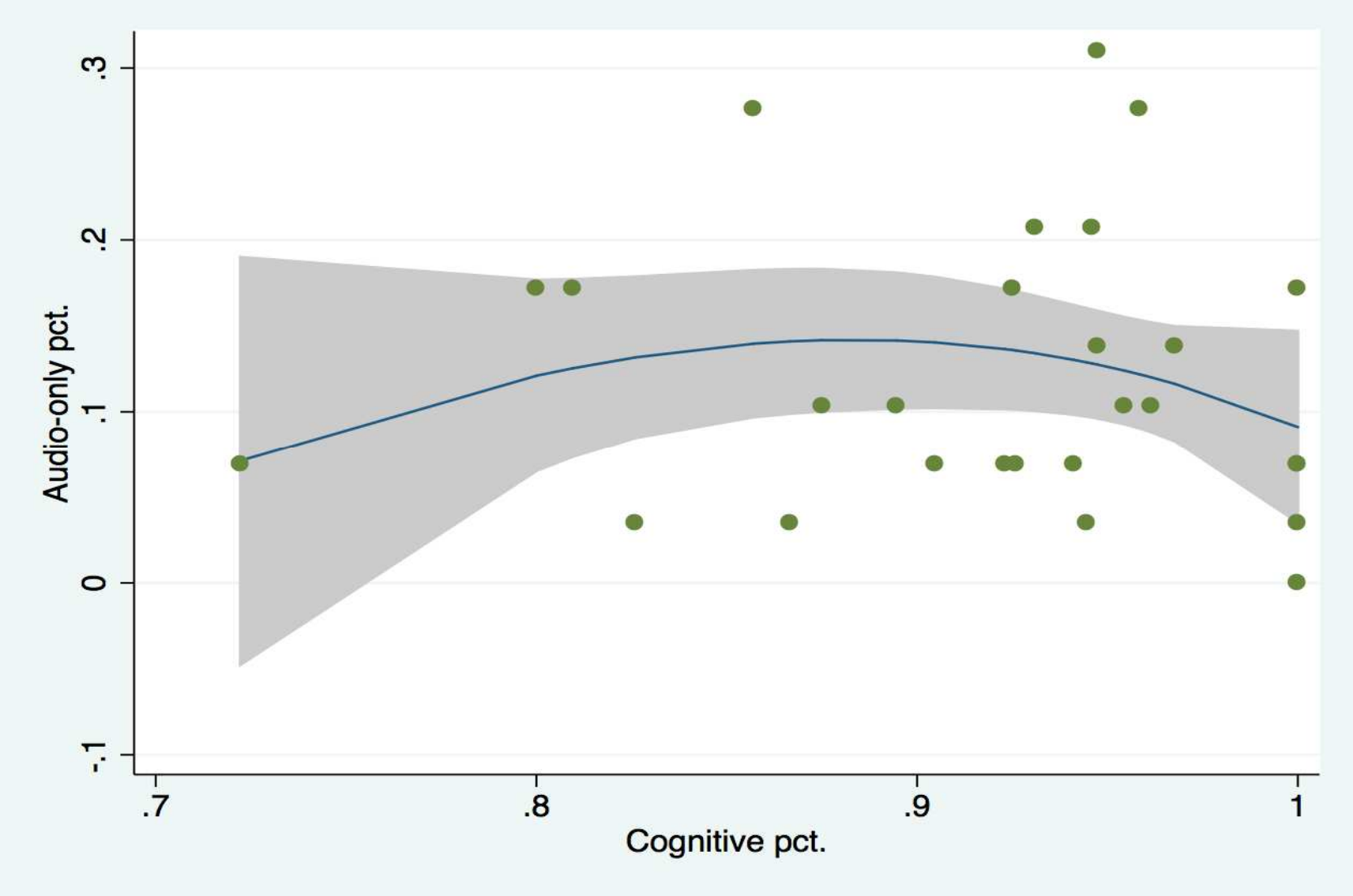
*Idea unit score is out of nine total audio-and-image idea units; p-value < 0.01.

Appendix P19. Research Question 5 – Scatter Plot of Cognitive Strategy Use and Overall Idea Unit Recall Score*



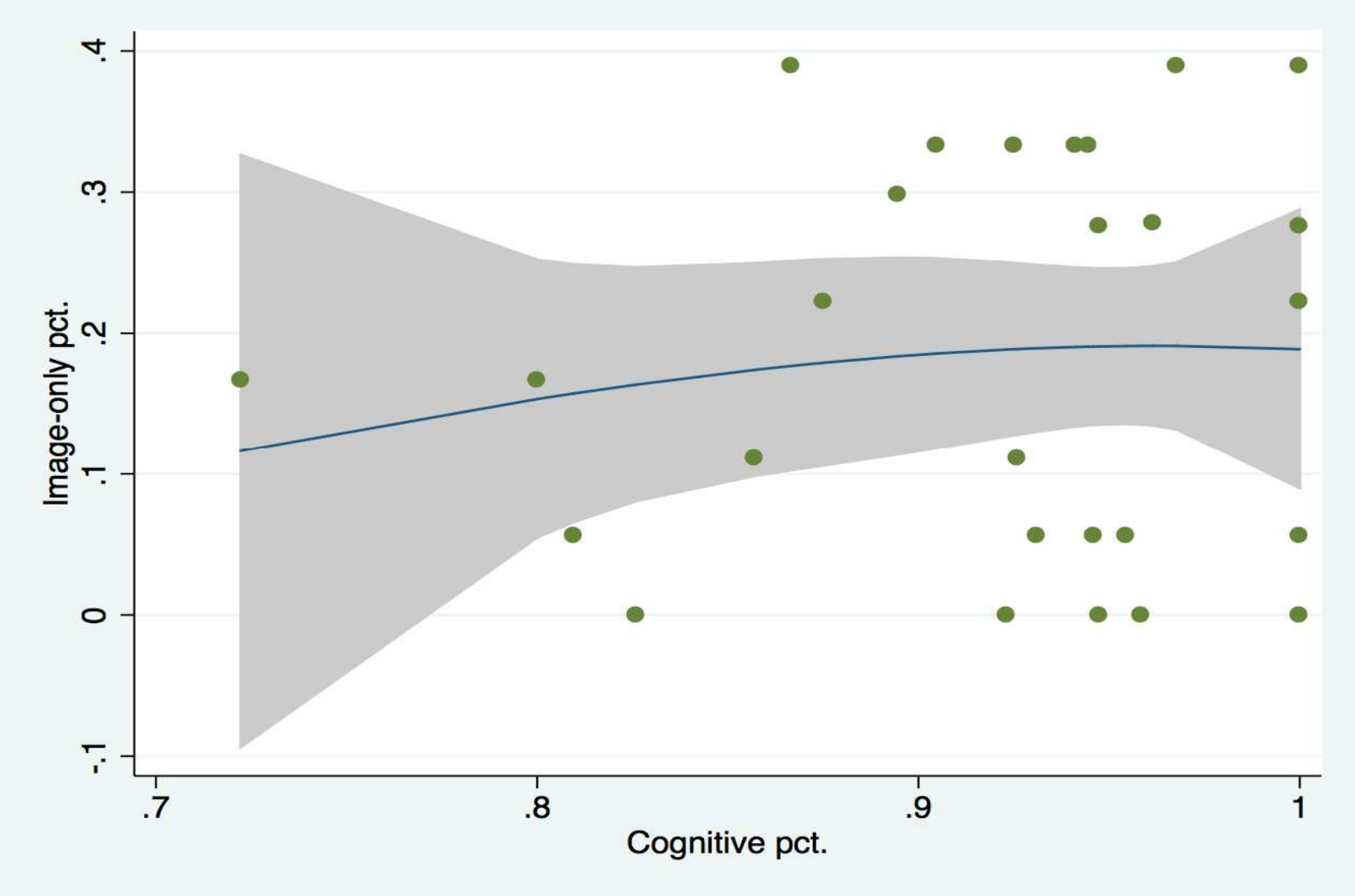
*metacognitive strategy percent = 1 – cognitive strategy percent (i.e. the line of best fit would be inverted for the metacognitive and total idea unit scatter plot along the horizontal axis); idea unit score is out of 56 total idea units.

Appendix P20. Research Question 5 – Scatter Plot of Cognitive Strategy Use and Audio-only Idea Unit Recall Score*



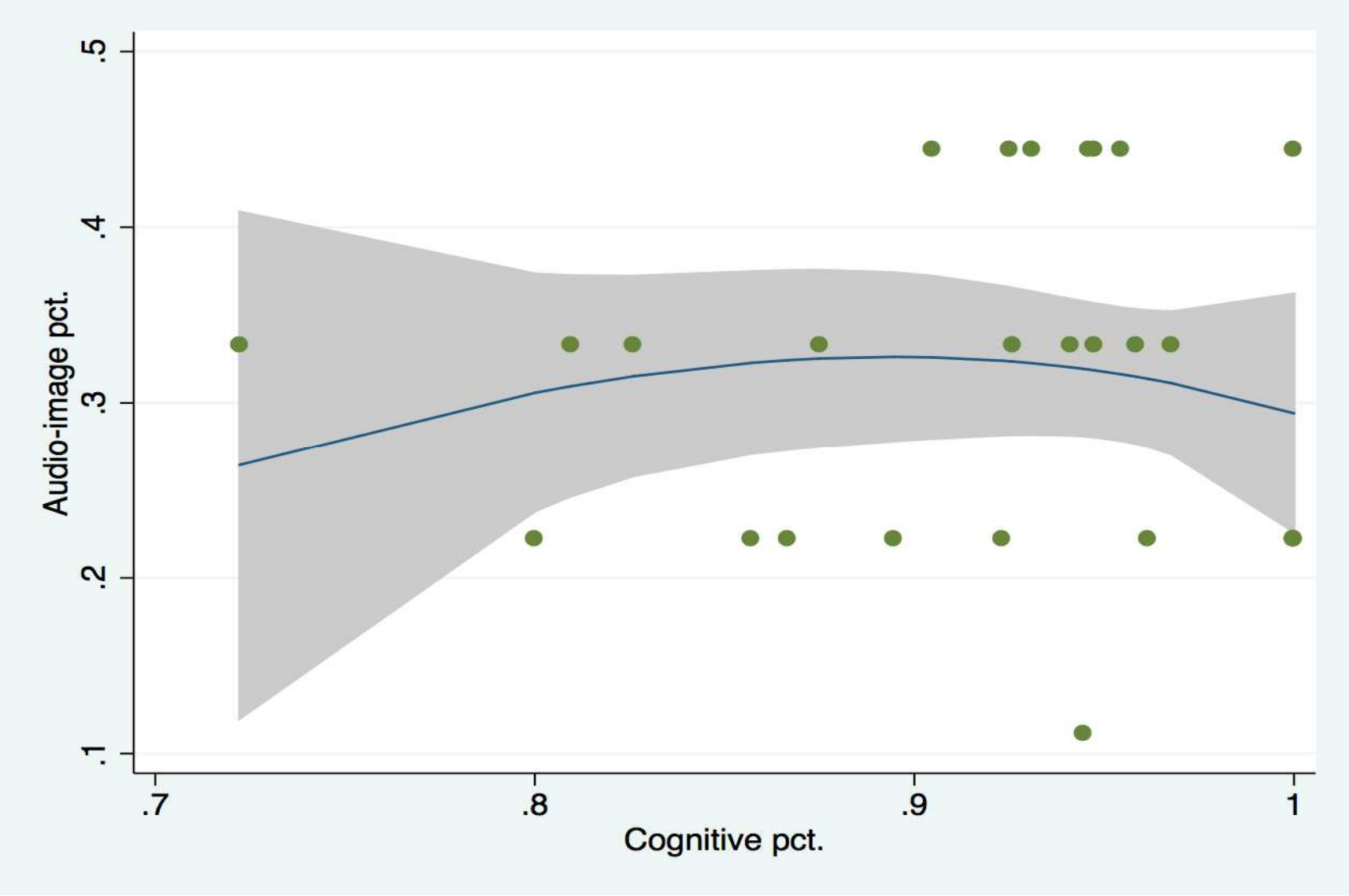
*metacognitive strategy percent = 1 – cognitive strategy percent (i.e. the line of best fit would be inverted for the metacognitive and audio-only idea unit scatter plot along the horizontal axis); idea unit score is out of 29 total audio-only idea units.

Appendix P21. Research Question 5 – Scatter Plot of Cognitive Strategy Use and Image-only Idea Unit Recall Score*



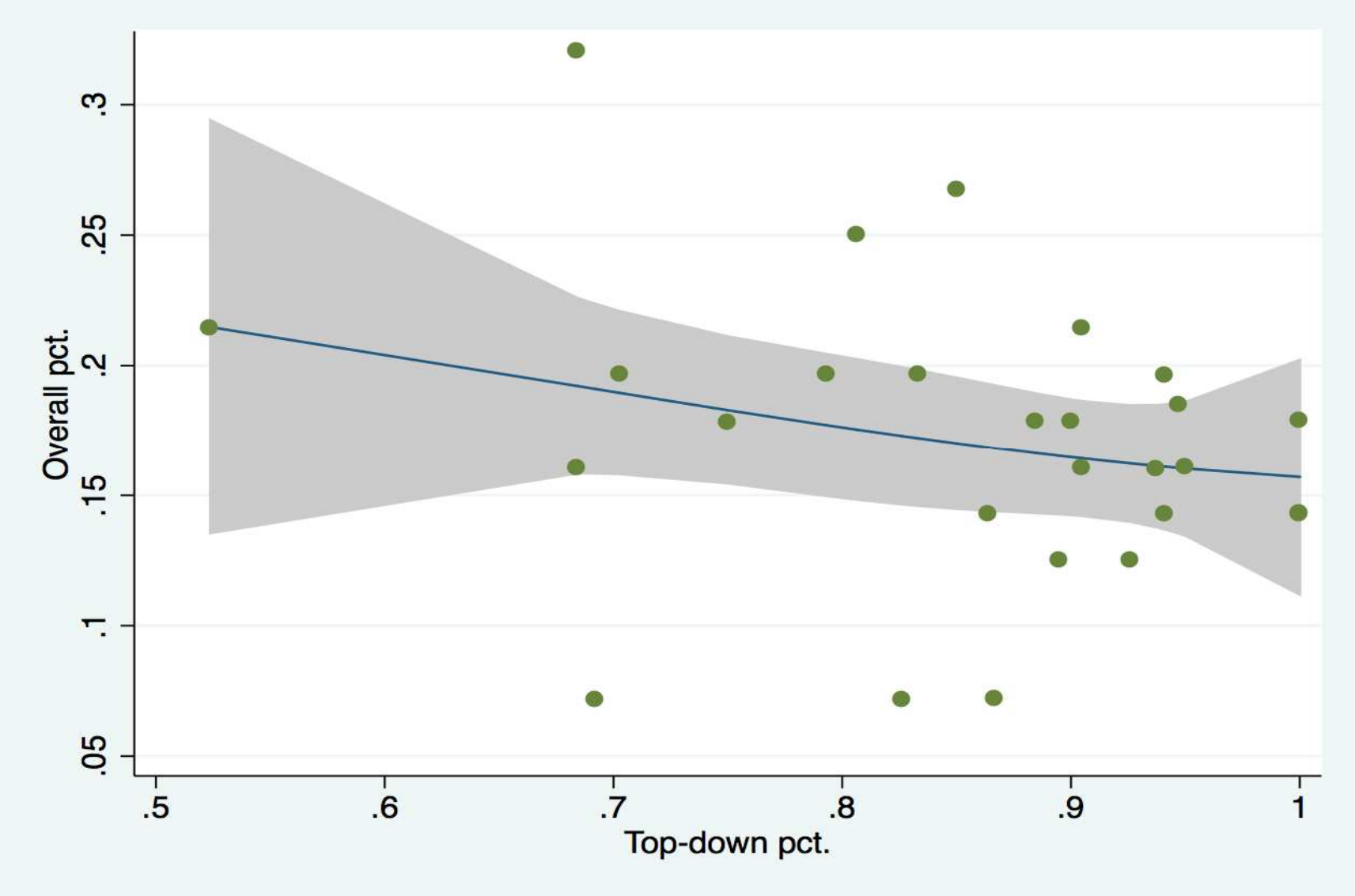
*metacognitive strategy percent = 1 – cognitive strategy percent (i.e. the line of best fit would be inverted for the metacognitive and image-only idea unit scatter plot along the horizontal axis); idea unit score is out of 18 total image-only idea units.

Appendix P22. Research Question 5 – Scatter Plot of Cognitive Strategy Use and Audio-and-Image Idea Unit Recall Score*



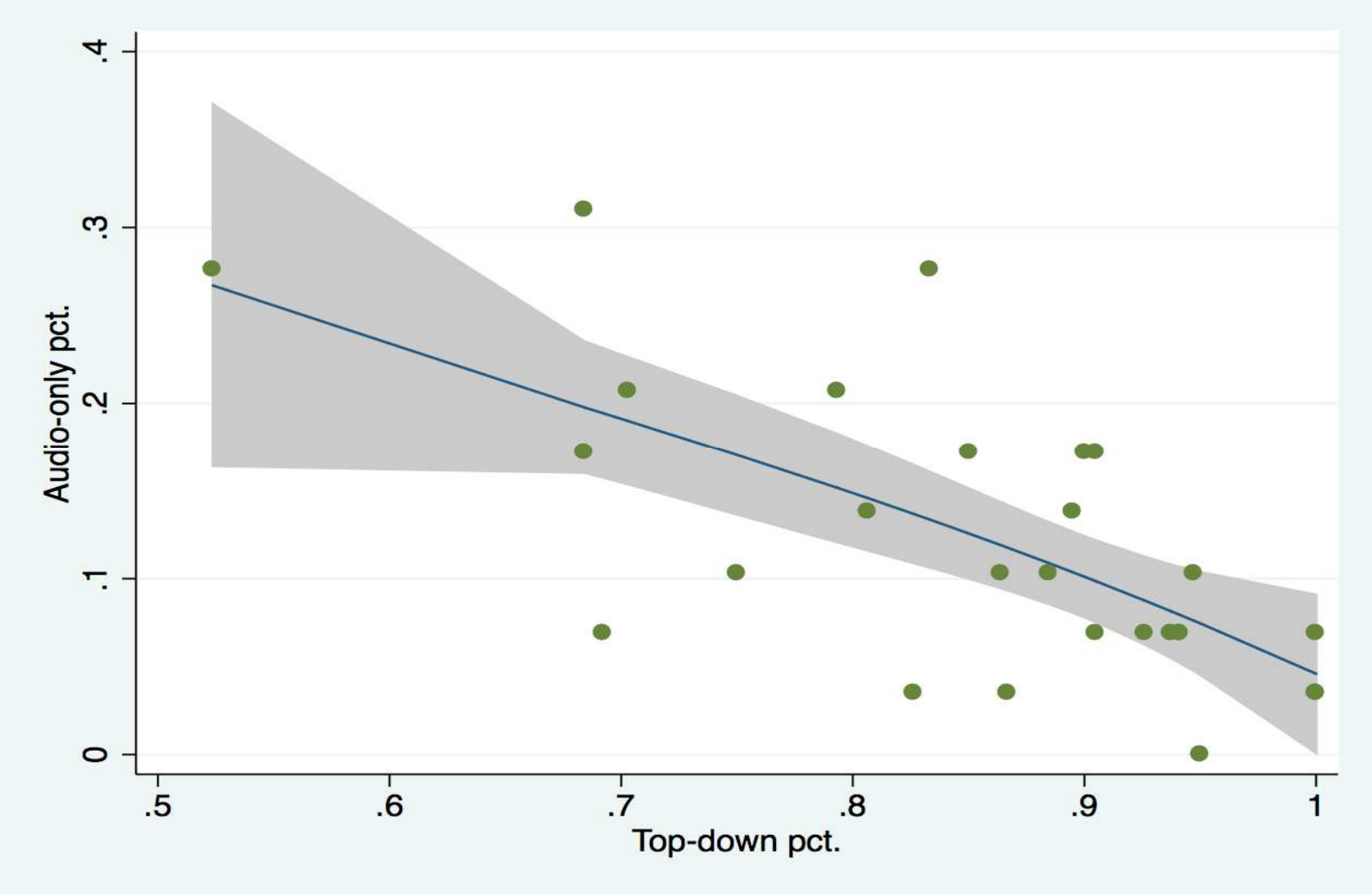
*metacognitive strategy percent = 1 – cognitive strategy percent (i.e. the line of best fit would be inverted for the metacognitive and audio-and-image idea unit scatter plot along the horizontal axis); idea unit score is out of nine total audio-and-image idea units.

Appendix P23. Research Question 5 – Scatter Plot of Top-down Strategy Use and Overall Idea Unit Recall Score*



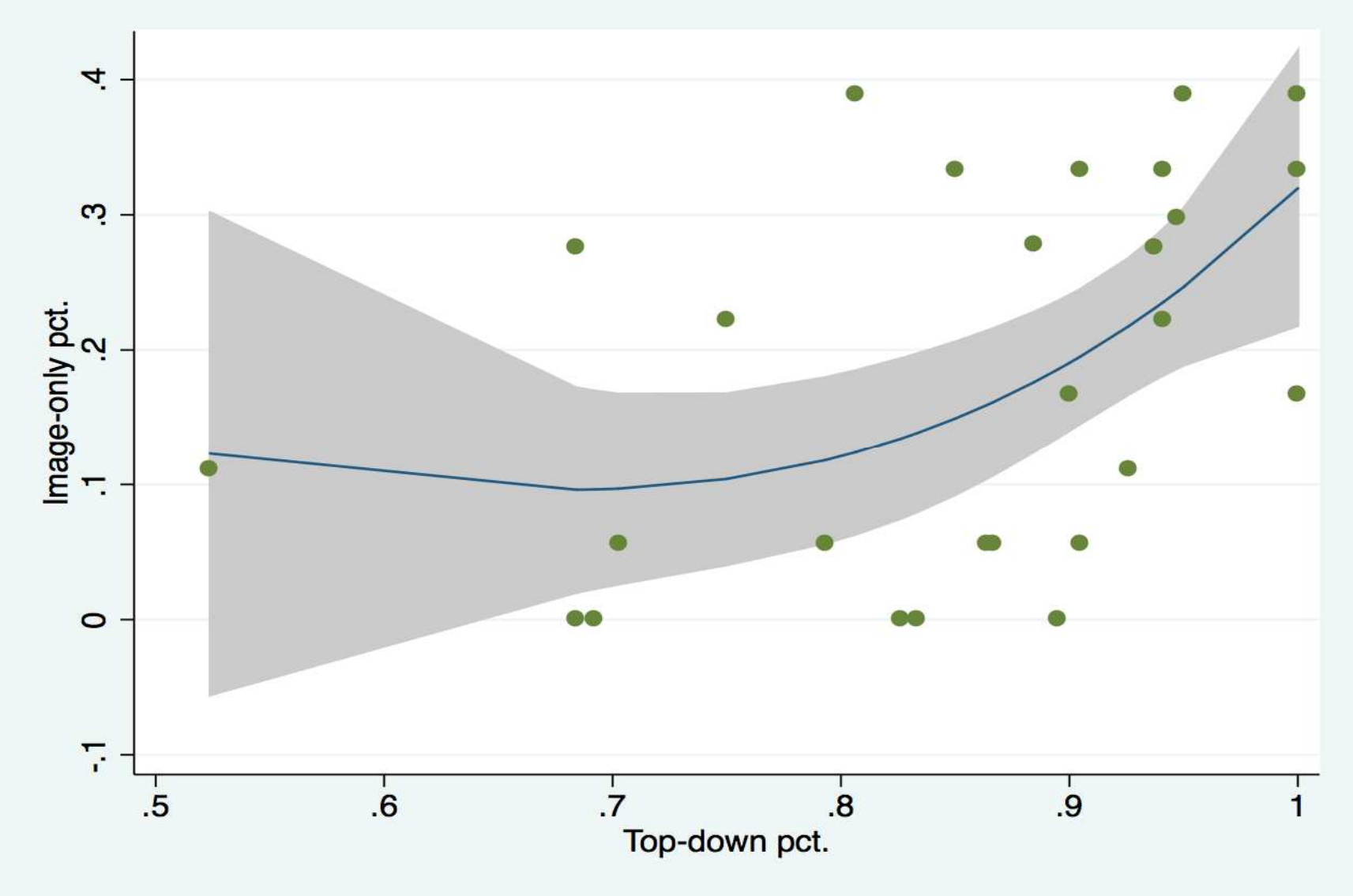
*bottom-up strategy percent = 1 – top-down strategy percent (i.e. the line of best fit would be inverted for the bottom-up strategy and total idea unit scatter plot along the horizontal axis); idea unit score is out of 56 total idea units.

Appendix P24. Research Question 5 – Scatter Plot of Top-down Strategy Use and Audio-only Idea Unit Recall Score*



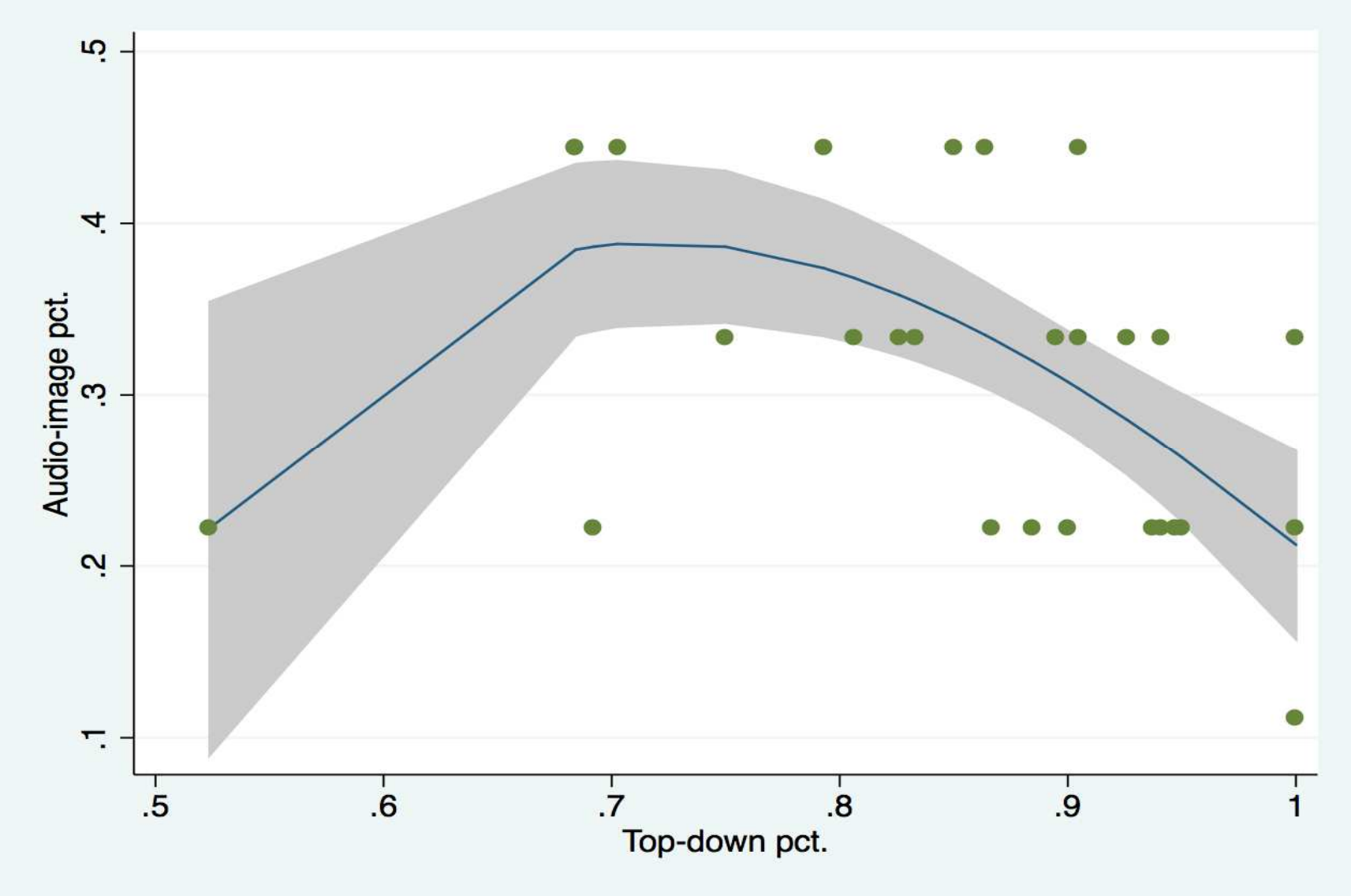
*bottom-up strategy percent = 1 – top-down strategy percent (i.e. the line of best fit would be inverted for the bottom-up strategy and audio-only idea unit scatter plot along the horizontal axis); idea unit score is out of 29 total audio-only idea units; p-value < 0.01.

Appendix P25. Research Question 5 – Scatter Plot of Top-down Strategy Use and Image-only Idea Unit Recall Score*



*bottom-up strategy percent = 1 – top-down strategy percent (i.e. the line of best fit would be inverted for the bottom-up strategy and image-only idea unit scatter plot along the horizontal axis); idea unit score is out of 18 total image-only idea units; p-value < 0.01.

Appendix P26. Research Question 5 – Scatter Plot of Top-down Strategy Use and Audio-and-image Idea Unit Recall Score*



*bottom-up strategy percent = 1 – top-down strategy percent (i.e. the line of best fit would be inverted for the bottom-up strategy and audio-and-image scatter plot); idea unit score is out of nine total audio-and-image idea units; p-value = 0.02.

Appendix Q: Numbers of Individual Strategies Used by Each Subject (and Total Number of Each Strategy Used)

Name	CMON	PROID	HMON	HCONF	SEVAL	SELFQ	SUM	SUM-A	SUM-I	NDED	REPR	WELAB	WELAB-A	WELAB-I
Rita	1	0	0	0	0	0	0	6	1	1	0	4	2	0
James	0	0	1	1	0	2	0	2	6	2	0	7	0	0
David	4	0	0	0	0	3	0	1	2	0	0	2	0	0
Lisa	2	0	0	0	0	2	1	2	2	0	0	1	0	1
Ruth	1	0	1	0	0	3	0	6	2	0	0	2	1	2
Mary	1	0	0	0	1	0	0	3	5	2	0	2	0	0
Anna	1	0	0	0	0	1	1	5	2	0	0	3	0	1
Joan	1	0	0	0	0	2	0	4	3	1	0	2	0	2
Rose	0	0	0	0	0	1	0	0	4	1	0	1	0	4
Brian	0	0	0	0	0	2	0	1	2	0	0	4	0	0
Judy	2	1	0	0	0	3	2	4	1	0	0	4	0	0
Jane	1	0	0	0	0	0	0	8	3	0	0	0	0	0
Lori	1	0	0	0	0	1	1	6	0	0	0	0	0	0
Steve	3	0	0	0	1	1	1	3	1	0	0	1	0	0
Sara	3	0	0	0	1	5	0	4	0	0	0	0	0	1
Kevin	2	0	0	0	0	1	0	4	3	0	0	0	0	0
Larry	0	0	0	0	0	3	1	2	4	1	0	1	5	1
Frank	3	0	0	0	0	1	1	4	2	0	0	0	0	0
Ruby	2	0	0	1	0	6	0	5	3	0	0	3	0	0
Scott	2	0	0	0	0	0	0	6	1	0	0	0	1	0
Lois	1	0	0	0	0	0	0	8	1	3	0	5	1	0
Jerry	0	1	0	1	0	0	0	7	3	0	0	1	0	0
Peter	0	0	0	0	0	4	0	4	3	0	0	1	0	1
Henry	0	0	0	0	0	1	0	0	3	1	0	1	0	0
Tina	2	0	0	0	0	0	0	3	5	0	0	3	0	1
Roger	1	0	0	0	0	0	1	3	2	0	1	1	0	0
Keith	0	0	0	0	0	0	1	8	0	0	0	1	0	0
TOTALS	34	2	2	3	3	42	10	109	64	12	1	50	10	14

NAME	PELAB	PELAB-A	PELAB-I	EXINF	BPINF	HFORM	INT	INT-I	FEED	IDW	IDC	VOC	TRAN	GU
Rita	1	0	2	1	0	1	0	0	0	1	3	0	0	0
James	4	0	0	1	0	3	3	0	0	0	0	0	2	0
David	3	0	0	0	0	2	1	0	0	2	0	0	0	0
Lisa	1	0	1	2	0	0	2	1	0	0	1	0	0	0
Ruth	1	0	2	3	1	1	0	0	0	5	6	0	0	0
Mary	1	0	0	4	0	0	0	0	0	1	1	0	0	0
Anna	0	1	1	0	0	1	2	0	0	0	2	0	1	0
Joan	2	0	2	2	0	1	0	2	0	1	4	2	0	0
Rose	3	0	4	0	0	0	0	0	0	0	0	0	0	0
Brian	0	0	0	1	0	0	4	1	0	0	0	0	1	0
Judy	1	0	0	1	0	1	1	0	0	0	0	0	0	0
Jane	1	0	0	2	0	0	1	0	1	0	2	0	0	0
Lori	2	0	0	0	0	0	2	0	0	3	3	0	0	0
Steve	3	1	1	0	0	2	1	0	0	3	0	0	0	1
Sara	1	0	0	1	1	0	0	0	1	0	0	0	0	0
Kevin	2	0	0	1	0	0	1	0	1	0	0	0	0	0
Larry	0	0	0	1	0	0	0	0	0	1	0	0	0	0
Frank	0	0	0	0	0	0	0	0	0	2	8	0	0	0
Ruby	7	0	2	1	0	2	0	1	1	3	3	0	0	0
Scott	0	0	0	0	1	0	0	0	1	1	3	0	0	0
Lois	0	0	0	0	0	0	0	1	2	0	4	0	0	0
Jerry	1	0	0	1	1	5	0	0	2	5	1	0	0	0
Peter	1	0	0	2	0	0	0	0	0	0	1	0	0	0
Henry	0	0	0	2	0	4	1	0	0	1	1	0	0	0
Tina	0	0	6	1	2	1	1	0	0	2	0	0	0	0
Roger	0	0	0	0	0	0	1	0	0	2	0	0	1	0
Keith	1	0	0	1	0	0	1	0	0	4	2	0	0	0
TOTALS	36	2	21	28	6	24	22	6	9	37	45	2	5	1

Note: N = 27; meanings of the codes used to denote each strategy are found in Appendix A; all subjects' names are pseudonyms.