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Tolerance of Ambiguity and Inductive vs. Deductive Preference Across Languages and Proficiency Levels at BYU: A Correlational Study

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ABSTRACT

Tolerance of Ambiguity and Inductive vs. Deductive Preference
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This study explored the relationships between roughly 330 participants' tolerance of ambiguity and their preference for either an inductive or deductive presentation of grammar by means of an online survey. Most participants were college students. Other variables examined included years of study, in-country experience, proficiency, age, year in school, and language of choice. A new instrument for measuring inductive vs. deductive preference was also created based on the Learning Style Survey (Cohen, Oxford, & Chi, 2001). Results showed weak correlations between: tolerance of ambiguity and inductive preference (.25), tolerance of ambiguity and proficiency (.25), and inductive preference and proficiency (.20). Additional findings include: a correlation (.62) between proficiency and years of instruction received, a slight correlation (.22) between age and tolerance of ambiguity, no correlation between years of language instruction and tolerance of ambiguity, no correlation between studying abroad and ambiguity tolerance or inductive/deductive preference, and no correlation between age and inductive vs. deductive preference. Lastly, data was analyzed to determine whether language was a contributing factor or not, and only the participants learning Japanese were significantly different ($p = .004$), with a higher preference for inductive learning.

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Chapter 1: Introduction

Introduction

Ambiguity tolerance and inductive vs. deductive learning styles have long been explored by researchers for their potential as indicators of aptitude, for the light they shed on cognitive processes, for the insight they bring to learning strategies, and for their implications for effective teaching methods and individualized instruction. Although ambiguity tolerance and inductive vs. deductive learning styles seem to have received less attention in recent years, both variables remain pertinent to the present-day foreign language classroom. This study explores these two variables in relation to each other along with several moderating variables.

In this introductory chapter is provided a statement of the problem, the purpose of the study, the researcher's hypotheses, operational definitions, limitations to the study, an outline of the research design and data analysis, and a summary of the findings.

Statement of the Problem

My review of the literature revealed no studies that look specifically at tolerance of ambiguity in relation to inductive vs. deductive preference. However, there are a few studies addressing tolerance of ambiguity and proficiency (Chapelle & Roberts, 1986). There are also a handful of inconclusive studies that address inductive vs. deductive instruction and student achievement as measured by performance on tests (Herron & Tomasello, 1992; Robinson, 1996; Shaffer, 1989). These studies, however, explore inductive vs. deductive instructional *methods* and not students' instructional *preference*. Therefore, their findings do not directly further research on aptitude measurement and provide only minimal insight into cognitive styles.

Purpose of the Study

The present study aims to bridge the gap in research on ambiguity tolerance and inductive vs. deductive preference as preliminary research to explore these potential correlations along with several other moderating variables. As preliminary correlational research, the present study may provide grounds for further research.

Hypotheses

1. There will be a positive correlation between tolerance of ambiguity and a preference for inductive instruction.

2. There will be a positive correlation between tolerance of ambiguity and proficiency.

3. There will be a positive correlation between inductive preference and proficiency.

4. Students with a high tolerance of ambiguity *and* an inductive preference will report the highest levels of proficiency.

5. There will be a positive correlation between years of language instruction received and tolerance of ambiguity.

Operational Definitions

Tolerance of ambiguity. After analyzing how researchers had been using the term "ambiguous," Norton (1975) concluded that ambiguity can mean (listed in order of frequency of occurrence among research articles): 1) multiple meanings, 2) vagueness, incompleteness, or fragmentation, 3) a probability, 4) unstructured, 5) lack of information, 6) uncertainty, 7) inconsistencies and contradictions, and 8) unclear. Ambiguity tolerance is defined in this paper as one's ability to ignore, accept, or be comfortable with any of the eight definitions of ambiguity outlined by Norton.

Inductive vs. deductive preference. Although inductive and deductive learning are at first glance a simple dichotomy, Decoo (1996) identifies five different modalities common among researchers: (a) actual deduction, (b) conscious induction as guided discovery, (c) induction leading to an explicit "summary of behavior," (d) subconscious induction on structured material, and (e) subconscious induction on unstructured material. The five modalities can be viewed as points on a deductive to inductive continuum or spectrum. The present study defines deductive learning as being formally presented with grammar rules and explanations first, and examples or exposure second. Inductive learning is defined as the reverse order: examples or exposure first, and grammar rules and explanations second. Therefore, on Decoo's continuum, this study's definition of deductive learning aligns with the first (a) modality, "actual deduction," while the definition for inductive learning aligns with both the second (b) and third (c) modalities.

Limitations and Threats to Validity

There are several limitations and threats to the validity and reliability in the present study. First of all, although the new inductive vs. deductive preference measure was validated through correlational statistics, this is the first study to use the new measure. Thus, there are currently no similar studies with which to further validity the instrument. Second, because no criterion based proficiency exam was administered to the participants, proficiency correlations only include those who had already taken the OPI – a much smaller sample size. Third, BYU has a very unique population that includes many language learners who have spent a year and a half or longer in the target language or culture. This threatens the external validity of the study. Lastly, because this is a correlational study and not an experiment, one cannot determine whether one variable is causing the other, nor can one confirm the reasons for the outcomes and correlations.

Every action was made to minimize the effects of these threats to validity and reliability as was feasible.

Research Design and Data Analysis

Subjects. As many participants as possible from as many foreign languages as possible at BYU have been included in this study. However, being a BYU student was not a requirement to take the survey. Ultimately, 333 participants, representing 38 languages, completed the survey.

Instruments. The survey used in the present study contains two independent measures along with several items that measure moderating variables. The first measure is Ely's (1995) Second Language Tolerance of Ambiguity Scale. Ely's measure has 12 items with a four-point Likert scale. The second measure included in the survey is a new measure of inductive vs. deductive preference created and validated by the researcher. This measure includes six questions on inductive vs. deductive preference borrowed from the Learning Style Survey (Cohen, Oxford, & Chi, 2001) along with nine new questions specific to a language learning environment. Lastly, the survey also includes questions about students' self-perceived proficiency, OPI scores, previous grade earned, expected grades, language background, age, current class being taken, and in-country experience among other things.

Survey procedure and analysis. Flyers with a link to the online survey were administered to all foreign language departments at BYU except the Slavic and Germanic Languages Department. Some departments forwarded an email link to the survey. Specific differences in participation between departments are listed in detail in Chapter 3.

After the administration of the survey, descriptive and correlational statistics were calculated. Correlational statistics were chosen because this study is designed to be preliminary research only. In other words, it is exploratory research to determine whether connections

between ambiguity tolerance and inductive. vs. deductive preference and proficiency exist or not and whether they should be explored further. Lastly, Cronbach's scores and correlational statistics were used to validate the new inductive vs. deductive instrument.

Summary

This study explored the relationships between roughly 330 participants' tolerance of ambiguity and their preference for either an inductive or deductive presentation of grammar. Other variables examined included years of study, in-country experience, proficiency, age, year in school, and language of choice.

A new instrument for measuring inductive vs. deductive preference was also created based on the Learning Style Survey (Cohen et al., 2001), and then validated by first showing a strong (.86) correlation with a borrowed subset of items and then finding a strong (.75) Cronbach's alpha.

Results showed weak correlations between: tolerance of ambiguity and inductive preference (.25), tolerance of ambiguity and proficiency (.25), and inductive preference and proficiency (.20). No correlation was found between years of language instruction and tolerance of ambiguity. Descriptive statistics suggest students may be on average less tolerant of ambiguity and more likely to prefer a deductive learning style. Additional findings include: no correlation between studying abroad and ambiguity tolerance or inductive/deductive preference, no correlation between year in school and ambiguity tolerance or inductive/deductive preference, no correlation between age and inductive/deductive preference, a correlation (.62) between proficiency and years of instruction received, and a slight correlation (.22) between age and tolerance of ambiguity. Lastly, data was analyzed to determine whether language was a

contributing factor or not, and only the participants learning Japanese were significantly different

(p = .004), with a higher preference for inductive learning.

Chapter 2: Literature Review

Introduction

Research on ambiguity tolerance began in the 1940s with the work of Frenkel-Brunswik. She was the first to coin the term "intolerance of ambiguity," or IA, which would later be changed to "Ambiguity Tolerance," or AT, likely in order to eliminate any confusion brought about by double negatives. Today, ambiguity tolerance (AT) seems to receive much less attention than in previous decades and yet it remains an integral part of modern research in language aptitude testing. In fact, ambiguity tolerance may even be included in the new Defense Language Aptitude Battery (DLAB II) being created at the University of Maryland (Bowles, Koeth, Linck, & Bunting, 2009; Bunting, 2009). Research in ambiguity tolerance not only furthers work in aptitude testing, but also sheds light on cognitive processes, learning strategies, personality testing, and implications for effective teaching methods and individualized instruction.

Research on inductive and deductive learning goes back even further than research on ambiguity tolerance. Mankind has explored the nature and uses of inductive and deductive logic as early as Aristotle's times. The idea, however, that some people naturally prefer one style over the other did not receive much attention until the 20th century. Alfred Binet was the first to create an intelligence test in 1904, and this led researchers to have greater interest in individual differences. Research in individual differences then became a springboard for researchers that led them to explore learning styles. Already, by 1907, Dr. Maria Montessori had created materials for her students to enhance their learning styles. Since Montessori, the area of learning styles has exploded and divided into multiple research areas.

Although tolerance of ambiguity and inductive vs. deductive preference have received a great amount of attention and research over the years, the two variables are rarely, if ever, examined together. Moreover, as far as I can tell, there is no study that explores the relationship of these two variables with proficiency as measured by either self evaluation or proficiency exam. Similarly, there appears to be no research on these two variables in relation to time on task (as measured by years of instruction received) or language of choice. This chapter explores the research that has already been done on tolerance of ambiguity, tolerance of ambiguity and language study, and inductive vs. deductive learning styles, and makes an argument for correlational research.

Tolerance of Ambiguity

Ambiguity is something encountered every day in a variety of situations. Whether we are interpreting one's words or actions, dealing with complex emotions, or analyzing conflicting theories or ideologies, we inevitably find ourselves in many situations where things are not crystal clear or easily definable. Given that many things in life are indefinable, unquantifiable, and simply unknown, everyone has been born with or developed a certain level of tolerance to this ambiguity. Such a tolerance or lack thereof and its effects can be viewed in a variety of different aspects of our daily lives and individual personalities. In short, it is an inescapable part of life.

Definitions. Ambiguity has been defined in modern research in several ways. Budner (1962) described ambiguity as having three main types: new situations (where there are no cues or where cues are lacking), complex situations (where there are too many cues), and contradictory situations (where cues suggest contrary information). After doing an analysis of how researchers had been using the term "ambiguous," Norton (1975) concluded that ambiguity

can mean (listed in order of frequency of occurrence among research articles): 1) multiple meanings (stimulus entailed two or more meanings), 2) vagueness, incompleteness, or fragmented (parts of a whole were missing), 3) a probability (stimulus could be analyzed as a function of a probability), 4) unstructured (has no apparent organization or only partial organization), 5) lack of information (a situation in which there was no information or very little information), 6) uncertainty ("ambiguous" was equated to the state of mind the stimulus created – namely, uncertainty. In this sense, ambiguity was considered a consequence of a situation, event, interaction, etc.), 7) inconsistencies, contradictions, contraries (stimulus has discrepant information. For example, if a set of information suggested that something could be X and not X at the same time, that set of information would be labeled "ambiguous") and 8) unclear (the word "ambiguous" was viewed and used synonymously with the word "unclear"). McLain (1993) defines ambiguity as not having sufficient information about a context. Although a single definition is rarely complete enough to cover all aspects and provide all angles, the definitions above when combined make for a very thorough and nearly all encompassing definition of the "ambiguity" construct.

After defining "ambiguity" one must then define what a tolerance to such an ambiguity would indicate. Ely (1989) defines the tolerance of ambiguity as the acceptance of uncertainties. In this paper, tolerance of ambiguity is defined as one's ability to ignore, accept, or be comfortable with ambiguity.

Tolerance of ambiguity correlates. Having the construct now defined, the correlates of ambiguity tolerance are explored next. Ambiguity tolerance is in fact strongly correlated with many aspects of our lives, including our personalities and our learning styles. Although some of the correlates of ambiguity tolerance are not yet known to relate directly to inductive or

deductive learning, exploring the correlates of ambiguity tolerance sheds light on the profiles of those who report the construct or the lack thereof. This then establishes another viewpoint of the construct and may create grounds for further theorizing and hypothesizing.

First of all, there have been a number of studies that claim to have found a positive correlation between *in*tolerance of ambiguity and authoritarianism (Adorno, Frenkel-Brunswik, & Levinson, 1950; Millon, 1957; Pawlicki & Almquist, 1973). This seems like a rather logical connection because a more authoritarian approach removes ambiguities associated with leadership roles. Moreover, it would agree with Frenkel-Brunswik's (1949) belief that those without much tolerance for ambiguity would have a "tendency to resort to black and white solutions" to dispel some of the ambiguity they perceive. Davids (1955, 1963), however, found no significant correlation between the ambiguity tolerance and authoritarianism. He addresses the contradiction among his and multiple other studies' findings and concludes that because the same instruments were used, the discrepancies must be due to differences between experimenters. Tolerances of ambiguity and authoritarianism have not received much attention together in recent years but the connection is still an interesting one.

Another interesting correlate with ambiguity tolerance is sex roles. Rotter and O'Connell (1982) explored sex-roles, cognitive complexity, and ambiguity tolerance and found, among other things, a significant relationship between ambiguity tolerance and sex role orientation for women. Women with a low ambiguity tolerance were more likely to maintain a traditional view of sex roles. This is not surprising given that a submission to or acceptance of a traditional sex role bypasses the ambiguities associated with redefining sex roles. This illustrates how those individuals who are less tolerant, or intolerant, of ambiguity may be more likely to just go with an established norm than to step out into unexplored territory and try new things.

Ambiguity tolerance has even been correlated with artistic ability and perception. Tegano (1990) found significant positive correlations between ambiguity tolerance, playfulness, and creativity. She further claims that ambiguity tolerance "might augment both [the] creative process and creative productivity" (p. 1049). Such a connection to creativity may be beneficial to language learners who are constantly required to create new phrases and expressions in order to express themselves. Additionally, one could argue that the inductive process is inherently more creative because it requires the learner to "create" the rules on their own. For this reason, one can hypothesize that those with a high ambiguity tolerance would also report an inductive preference. Interestingly, Norton (1975) found that tolerance of ambiguity also correlated significantly with one's aesthetic judgment. In Norton's study, those with a high degree of tolerance tended to judge poems differently than those with a low degree of tolerance.

As outlined later in this paper, there are also several correlations between ambiguity tolerance and factors related to language learning, such as strategy use.

The disadvantage of *in*tolerance. There appear to be many disadvantages to being *in*tolerant of ambiguity. Brunswik (1949) believed that those who are *in*tolerant of ambiguity have a certain rigidity of thought. This rigidity was believed to lead one to ignore or misrepresent what might be considered the gray area. Brunswik further argued that the *in*tolerant were more likely to jump to conclusions as a result of their rigidity. This also explains Tegano's (1990) findings that showed the *in*tolerant were less likely to be creative. Lastly, Norton (1975) writes that those who are *in*tolerant are likely to view uncertainties and lack of clarity as sources of discomfort or threat. Naturally, one who is constantly feeling threatened or simply uncomfortable could be expected to not perform as well in a variety of tasks. Furthermore, when it comes to inductive and deductive learning, one who is rigid in thought and uncomfortable with gray area

would likely prefer to have that ambiguity removed earlier rather than later – an approach more aligned with a deductive style. Of course, the studies mentioned above do not address inductive and deductive preference directly, so the correlation must be assumed until shown by future studies.

Although I have not encountered any study that has looked at the *advantages* of being *in*tolerant of ambiguity, one can make a few assumptions based on the Myers-Briggs typology. As Tegano (1990) mentions, people with the iNtuitive (N) personality variable tend to be more comfortable with the theoretical and abstract, and people with the Perceiving (P) variable tend to be more comfortable with less-structured situations and schedules. Tegano (1990) and Ehrman and Oxford (1990) show that these two variables strongly associate with ambiguity tolerance. With this in mind, one can assume that their natural opposites, the Sensing (S) and Judging (J) types would be the correlates of ambiguity *in*tolerance. If this is the case, we can assume that those who are intolerant of ambiguity — the S, J, and Sensing + Judging (SJ) types — will share some of the strengths associated with the SJ personality type. These strengths include being more likely to be organized, having a clean workspace, striving to be useful to society, fulfilling duties and responsibilities, being able to anticipate outcomes, being goal-oriented and practical in their approach to problem solving, and respecting authority (Huitt, 1992). Every personality type has its strengths and weaknesses, and although those tolerant of ambiguity may perform better in some ways, the intolerant may perform better in other ways. For example, because SJ personality types tend to be more organized and goal oriented, they may actually perform better in a classroom setting than their natural counterparts, the iNtuitive Perceiving (NP) types, which are more tolerant of ambiguity. The advantage of the intolerant of ambiguity is an area that could use further research, especially in a language learning setting.

Ambiguity tolerance and language learning. Any language learner will agree, whether they have a high or low tolerance for ambiguity, that language learning can involve some extremely ambiguous situations. No learner, or even native, will understand *every* word encountered in the L2. There is ambiguity throughout the entire process. In the beginning stages, learners are unfamiliar with the majority of words being used around them. The ambiguity of new words may lesson with time, but will never disappear. Then, even the learners at the advanced stages are confronted with the ambiguities associated with linguistic subtlety, nuances, and semantic overlapping of which they may have been unaware at the earlier stages of learning. Indeed, although the ambiguity surrounding individual words may lessen with study, an increased understanding may lead to an increased awareness of other ambiguities in the language. Ehrman (1996, as cited in Ehrman, 1999) describes the ambiguities involved in language learning well:

> Language learning for real communicative use, especially in situations which demand structural and lexical precision, is an extremely demanding whole-person engagement. It requires the learner to cope with information gaps, unexpected language and situations, new cultural norms, and substantial uncertainty. It is highly interpersonal, which is in itself fraught with ambiguities and unpredictabilities. Language is composed of symbols, which are abstract and often hard to pin down. Concepts and expressions in any two languages do not relate one-to-one. (p. 72)

Ely (1989) gives a similar description:

> Second language learning is fraught with uncertainty. Seldom do we know the precise meaning of a new lexical item, understand the exact temporal reference of a second language verb form, or feel that we are pronouncing an L2 sound with total accuracy. (p. 437)

In addition to the language itself, students inevitably face cultural ambiguities. Although students may know what to say, they may not know what to do in a certain situation. In the target culture, is it appropriate to bow, shake hands, nod one's head, or just smile? When at the dinner table, should the language learner wait to be served or offer to help serve? Additionally, are there

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certain taboo subjects that are not supposed to be discussed in public within the target culture? L2 learners, especially but not exclusively those living or visiting the target culture, are bombarded with ambiguous cultural situations. Even the most careful and astute language learner will at times be unfamiliar with the cultural nuances that natives have acquired gradually over their lifespan. Lustig and Koester (1993, as cited in Erten & Topkaya, 2009) agree that students can struggle with the ambiguity brought about by new cultural norms in addition to the ambiguities associated with the language itself.

Ambiguity as a source of anxiety for language learners. For many, the ambiguity is a source of anxiety. Norton (1975) believes that those intolerant of ambiguity may have a tendency to experience anxiety because they interpret the ambiguity they encounter as "actual or potential sources of psychological discomfort or threat" (p. 2). Oxford (1999) similarly acknowledges this correlation between ambiguity tolerance and anxiety, as can be seen by her including ambiguity tolerance in a list of ten strong correlates of language anxiety. Oxford states that a lack of ambiguity tolerance "can often raise language anxiety." For this reason, Oxford also argues that "a degree of ambiguity-tolerance is essential for language learners" (Oxford, 1999, p. 62).

Ehrman's (1999) research provides additional insight into the anxiety experienced by people with low ambiguity tolerance. Ehrman argues that language learning can be a source of anxiety because the language learner must learn to fill new, socially appropriate roles. Ehrman notes that language and cultural learning require the learner to establish a new "self." In other words, the learner must create a new identity fitting with the target language and culture. Ehrman believes that such a "challenge to one's pre-established concept of self" can facilitate language learning for those with a higher ambiguity tolerance (or, "thin ego boundaries") or become a source of anxiety for those with a low ambiguity tolerance. When one considers that

language learning can include a certain ambiguity of identity, it's no wonder that some students, especially those with a low ambiguity tolerance, may find the learning process somewhat stressful.

Interestingly, Smock (1955) found that those with an extremely high tolerance of ambiguity were rather polar, meaning that they had either very high or very low anxiety due to ambiguity. This is consistent with Ehrman's (1999) findings that showed that although people with thin ego boundaries (a strong correlate of high ambiguity tolerance) were less likely to feel anxious in ambiguous situations, those with *extremely* thin ego boundaries were more likely to become overwhelmed by the flood of ambiguous stimuli. Perhaps ambiguity tolerance and performance anxiety is actually a curvilinear relationship. It may be that as tolerance of ambiguity goes up, performance anxiety goes down until a certain point at which the relationship is flipped.

Although the present study does not address anxiety, the research of Oxford, Norton, Ehrman, and Smock will prove beneficial for the discussion of the results of this study. It may be that anxiety is the reason for many of the performance differences exhibited between students with either low or high ambiguity tolerance.

Ambiguity tolerance correlates within language learning. There have been a number of studies that have looked at correlations between tolerance of ambiguity and variables related to language learning. Although these studies do not include research into inductive vs. deductive learning styles, they do provide information from which we can make inferences. Some areas that have been explored include: risk-taking, likelihood of success, strategy use, and classroom anxiety.

McLain (1993) found that students with a high tolerance of ambiguity are more willing to take risks and more open to change. Ely's (1989) findings support McLain's. In Ely's study, students with a high ambiguity tolerance were more willing to speak without being sure that what they were saying was correct. Such students may do better in a language learning environment because they are less likely to feel anxious about making errors, which is an inevitable part of participating in a second language environment. If students with a higher ambiguity tolerance are less concerned about making speaking errors, perhaps they will have the same attitude toward the rule discovery process — a form of inductive learning – which seems more ambiguous because of the possibility of coming up with incorrect rules on one's own.

It appears that on average students tolerant of ambiguity are more likely to experience overall success in language learning. Chapelle (1983, as cited in Ely, 1989) did a study that examined ESL college students' tolerance of ambiguity and their final TOEFL scores and discovered there to be a positive correlation between the two. Naiman et. al. (1978) had similar findings in their study that examined personality traits and student performance; those students tolerant of ambiguity scored higher on both receptive and productive tests. Even when rating their own language ability, students with a higher ambiguity tolerance report a greater aptitude (Reiss, 1985). The present study seeks, among other goals, to verify these findings by comparing participants' tolerance of ambiguity to their proficiency as measured by 1) self-rated language ability, and 2) OPI scores when available.

It appears that there is a correlation between ambiguity tolerance and language learning strategy use. Ely (1989) found several of such correlations. For example, students less tolerant were more likely to look up a word immediately after encountering it rather than guessing from context. Additionally, students with a *high* ambiguity tolerance were more likely to a) use

alternative strategies rather than rote memorization, and b) create mental images of words to better remember them. On the other end of the spectrum, students *less* tolerant of ambiguity were more likely to employ the verbal strategy of planning what they were going to say ahead of time. This could be viewed as a method of coping with, or a reaction to, the L2 performance anxiety mentioned earlier (Ehrman, 1999; Norton; 1975; Oxford, 1999). This may also explain why those intolerant report thinking very carefully about grammar when writing. Although Ely's study does not address inductive vs. deductive learning style preference as a factor in students' strategy use, one could easily conjecture that such a correlation exists. For example, students who enjoy employing more creative strategies (as students with a higher ambiguity tolerance often do) might also prefer to independently develop grammar rules on their own because of the inherent creativity required.

As mentioned earlier, there seems to be a correlation between some of the key personality variables used in the Myers and Briggs typology and ambiguity tolerance. The same connection seems to exist in the realm of language strategy use as well. Ehrman and Oxford (1990) found that iNtuitive (N) personality types (which correlate with a higher ambiguity tolerance) report guessing from context more often than Sensing (S) personality types. This aligns with several of the arguments made earlier. Guessing from context requires more creativity in filling the gaps. Moreover, some tolerance of the unknown is required to continue reading or speaking without taking a pause for clarification. Additionally, immediately looking up an unknown word aligns perfectly with what has already been mentioned on *in*tolerance of ambiguity because doing so instantly satisfies the need to dispel the ambiguity. Interestingly, Ehrman and Oxford also discovered that less tolerant students were more likely to look at new words and relate them to words in their L1. This aligns well with Huitt's (1992) claims that Sensing Judging (SJ)

personality types tend to cling to personal experience and tradition when approaching a problem. Like Ely (1989), Ehrman and Oxford (1990) also do not address the potential role of inductive vs. deductive preference. Although the present study does not address strategy use directly, the correlations found, albeit weak, may prove beneficial to researchers of foreign language strategy use.

Ambiguity tolerance scales and measures. There are multiple scales and measures available for testing one's ambiguity tolerance. These measures differ in length and style but remain strongly correlated with each other.

Budner's (1962) Tolerance of Ambiguity Scale, although not the first measure of ambiguity tolerance, has been very popular among researchers and is still in use by some today. The scale contains 16 simple, one-sentence statements. To the left of each statement, test takers mark on a scale of one to seven to what extent they agree with the statement. The test is scored by reversing the values of the scores (e.g. the seven becomes a one) and then adding them. Budner's Tolerance of Ambiguity Scale also includes a small chart that lists average scores of students from various fields such as psychology and medicine.

Rydell and Rosen (1966) took a slightly different approach and constructed a 16-item, true-false survey. One sample item states: "I don't like to work on a problem unless there is a possibility of coming out with a clear-cut and unambiguous answer."

Macdonald (1970) revised Rydell and Rosen's instrument slightly by adding four additional items that he borrowed from the California Personality Inventory and Barron's conformity scale. This addition increased the reliability of Rydell and Rosen's scale while still maintaining its high construct validity.

Norton's (1975) Measure of Ambiguity Tolerance (MAT-50) is the largest of the common AT scales with a total of 61 items. The items are divided by category: philosophy, interpersonal communication, public image, job-related, problem-solving, social, habit, and art forms. Norton recommends using a 7-point scale consisting of: <u>YES!</u> YES yes ? no NO <u>NO!</u>.

Ely (1989, 1995) created a tolerance of ambiguity scale that was specific to second language learners. Although, like many other scales, Ely's scale contains simple, one-sentence statements to which test takers indicate the degree to which they agree or disagree, this scale's statements apply directly to the ambiguity experienced in the L2 classroom. For example, one item reads: "It is frustrating that sometimes I don't understand completely some [language] grammar." In another item we find: "It bothers me when the teacher uses a(n) [language] word I don't know." There are 12 items in total and all operate on a four point scale.

In 1993, McLain developed and presented the MSTAT-I scale. This scale was based on new research regarding the constructs involved in ambiguity tolerance. This construct-updated scale includes a 22 item 5-point Likert survey. McLain released the MSTAT-II in 2008. This second version is much shorter and contains only 13 items. In the MSTAT-II, McLain (2009) defines ambiguity tolerance in the abstract as an "orientation, ranging from aversion to attraction, toward stimuli that are complex, unfamiliar, and insoluble." Although the MSTAT-II has a somewhat sterile, generic feel (for example, the word "ambiguous" is used in six of the 13 items), the construct validity and reliability, as well as its correlation to previous scales is rather high.

In the present study, Ely's (1989, 1995) scale is used because while maintaining high validity and reliability the measure is also specific to language learning.

Inductive and Deductive Instruction

Many language instructors have wondered whether they should present a grammar rule first and then give examples (a deductive approach) or whether they should give examples first and rules later (an inductive approach). Some instructors may feel that this is merely a style difference and is largely insignificant. Other instructors, as well as many researchers, however, feel very strongly that one approach is more effective than the other.

Views on these two approaches have swung back and forth, perhaps settling a little as a pendulum does, throughout recent history. The Grammar Translation method was inherently deductive and explicit in its presentation of grammar. For this reason, up until the 1950s it was commonly believed that the deductive approach was superior to an inductive one. Advocates of the Audio-lingual method, however, took language learning in an entirely new direction. This new direction included a predominantly inductive and sometimes even implicit approach to language rules. Some might argue that Audio-lingual method advocates threw the baby out with the bathwater when they abandoned deductive learning while throwing out all that could be associated with the Grammar Translation method. In the last 20 years, we have seen a rise in the popularity of variations on a "communicative approach." This approach seems somewhat more balanced as it allows for both inductive and deductive instruction. However, unlike approaches such as the Audio-lingual method and the Grammar Translation method, it is somewhat unclear and ambiguous to what extent explicit deductive instruction is allowed. In fact, it may vary from instructor to instructor. It will take several years yet before we know whether the pendulum has settled in an appropriate middle or remains in full swing.

Looking at the issue in light of Gardner's (1983) Multiple Intelligences theory, it may be simply that one style is more effective for some students and the other is more effective for other

students. Or, it could be that students prefer one style for one aspect of language learning, such as a deductive style for grammar instruction, and one style for another aspect, such as an inductive approach to vocabulary acquisition. This preference then may differ from student to student. Research in inductive vs. deductive learning and teaching styles sheds only minimal light on these areas but does not provide clear, indisputable answers.

It should be noted that although inductive vs. deductive instruction is at first glance a simple dichotomy, researchers have defined "inductive" and "deductive" so very differently from each other as to create a great deal of confusion. For example, some researchers have used the terms "inductive," "incidental," and "passive" interchangeably or at least with some overlap in meaning. Others, however, have used the terms to address entirely different concepts. Decoo (1996) attempts to remove this ambiguity in the terminology by identifying five different modalities common among researchers. These modalities include: (a) actual deduction – a rules-first approach, (b) conscious induction as guided discovery, (c) induction leading to an explicit "summary of behavior," (d) subconscious induction on structured material, and (e) subconscious induction on unstructured material. The five modalities can be viewed as points on a deductive to inductive continuum. The present study defines deductive learning as being formally presented with grammar rules and explanations first and examples or exposure second. Inductive learning is defined as the reverse order: examples or exposure first, and grammar rules and explanations second. Therefore, on Decoo's continuum, this study's definition of deductive learning aligns with the first modality (a), "actual deduction," while the definition for inductive learning aligns with both the second (b) and third (c) modalities which allow for some form of explicit instruction.

Inductive vs. deductive comparative studies. There are a handful of studies that compare inductive vs. deductive instruction styles. These studies, of which the most significant are reviewed below, have yielded mixed and sometimes contradicting results.

Herron and Tomasello (1992) found that a "guided inductive" approach (Decoo's second (b) modality) was more effective than the traditional deductive approach. Subjects included 26 college students of relatively similar backgrounds taking a beginning French course. Subjects were divided into two groups: a guided inductive group and a traditional deductive group. The guided inductive presentation used for this study would begin with a contextualized oral drill to allow for unaided discovery, followed by a task to complete a model sentence on the board similar to the one practiced orally. In total, there were 10 grammar structures taught to each group of 13. When the data is reviewed as a whole, in 9 out of the 10 structures there was a significant advantage for those with the guided inductive approach. That being said, the study is not without its shortcomings. First of all, different teachers were used to teach the grammar patterns, so it may be that the difference observed is due to teacher differences. Second, with there being only 26 total subjects involved in the study, only 13 subjects are therefore available for each group. Without at least 20 students per group, one cannot make very convincing conclusions.

In contrast to Herron and Tomasello's (1992) study, Robinson (1996) found that the deductive or "instructed" approach was more effective. 104 nonnative speakers of English (94 Japanese, 5 Korean, and 5 Mandarin) participated in the study. All participants had received at least 6 years of formal English instruction. Participants were first screened by means of a grammaticality judgment task and then divided into four treatment groups: *implicit* (asking simple, seemingly unrelated questions to facilitate noticing), *incidental* (teaching X to see if they

will learn Y incidentally), *rule-search* (explicitly guiding their inductive learning), and *instructed* (traditional deduction). After going through a training/instruction phase, participants then performed another grammaticality judgment task. The *instructed* group performed significantly better than all three other groups, suggesting that deductive instruction may be most effective. Like Herron and Tomasello's (1992) study, Robinson's research is not without limitations. In Robinson's study, subjects were selected based on whether they failed to correctly label certain patterns on the grammaticality task as correct English patterns. First of all, the usefulness of grammaticality judgment tests has come into question in recent years. Second, it may be that students who did poorly on these patterns (and perhaps on the test overall) learn better with a deductive approach, and students who did well with those patterns (and perhaps the test overall) would do better with an inductive approach; Robinson's study does not address this issue.

Seliger (1975) also argues for the deductive method. Although some feel that inductive learning is the natural method of learning (Felder & Silverman, 1988), Seliger believes this is not the case with *adult* learners. "The mature learner," Seliger claims, "uses deductive procedures by applying attained concepts or generalized rules to new learning situations" (p. 8). In other words, adults draw from what they've learned from previous experiences (rules) and apply it to new situations. Children, on the other hand, especially babies, have to inductively figure out what is going on around them. With this in mind, a deductive approach appears to be a "natural learning strategy" for adults, and teachers who would like to "exploit this would present language generalizations or rules deductively and not as summaries of behavior" (p. 10).

Seliger's (1975) research supports this argument somewhat but not overwhelmingly so. Although the initial test of Seliger's study showed no significant difference between the inductive and deductive groups, there was a significant difference in favor of the deductive group

on the retention test administered three weeks later. The fact that there was a difference between the two tests raises some interesting questions and begs for further research. Seliger's experiment consisted of two written lessons accompanied by audio tapes. Each lesson was 30 minutes long. There were two experimental groups and a control group, all randomly assigned. There were 58 subjects in total, and all were college-aged students studying English. The test used to measure effectiveness addressed only one element of syntax.

Shaffer (1989) compared inductive and deductive approaches and found no significant difference between the two. There was, however, a "trend…in favor of an inductive approach" (p.399). The study itself included 319 subjects, all high school French and Spanish students, from three different schools — two public schools and one private. The ages of the students ranged from 13 to 18. The participating teachers were asked to divide their students into two groups, attempting to create groups evenly matched in ability. The inductive presentation group was given 10 examples on paper and then asked to write the associating rule for the grammar pattern. The deductive presentation group was given the rule first and then six accompanying examples. Both groups were given practice sheets afterward. Ultimately, the study found no significant difference between either presentation style, regardless of the difficulty of the grammar pattern. In fact, even the more challenging *ser* and *estar* structures showed no difference, which goes directly against Hammerly's (1975) prediction that to teach *ser* and *estar* inductively "would be nonsensical and useless" (p.18). Furthermore, there was no significant correlation between student ability and performance within a particular presentation style, which Shaffer claims provides some evidence against Ausubel (1963) and Carrol's (1964) hypotheses that gifted students are more capable of an inductive approach.

Interestingly, although Shaffer (1989) did not find a significant advantage for the inductive group (or deductive group for that matter), Herron and Tomasello (1992) point out that there were several significant flaws in Shaffer's study that would give an advantage to the inductive group.

> First, the students were not randomly assigned to conditions… Second, students in the inductive condition were given more examples than those in the deductive condition (20 to 6 in the example in the appendix)…Finally, any student in the inductive condition who could not verbalize the rule before taking a test on it was eliminated from analysis; no students from the deductive condition were eliminated. (p. 709)

Exploring the contradictions. As can be seen from an examination of the studies mentioned above, the results from inductive vs. deductive studies are seemingly contradictory and a little confusing at best. Although one cannot determine with certainty the exact reasons for the discrepancies among the results, there are a few key differences between the studies that need addressing. First of all, the researchers of these studies have used different definitions for the word "inductive." For example, in Shaffer's (1989) study, the inductive group was asked to state the rule at the end of the presentation (Decoo's second (b) modality), whereas Herron and Tomasello's (1992) inductive group did not participate in any form of explicit grammar explanation or recitation (Decoo's fourth (d) modality). Second, the treatment methods of each study were very different from each other. Looking at delivery method alone, we see that Shaffer used a paper presentation, Seliger used paper and audiotapes, Robinson used a computer-based presentation, and Herron and Tomasello had their subjects watch a video and then participate in oral drills. Third, the measurement of newly acquired knowledge was approached differently. Shaffer had subjects choose which tense is correct (no conjugation needed), Robinson administered a grammaticality task, and Herron and Tomasello had subjects do a fill in the blank test. Fourth, the subjects in each of these studies were learning different languages. In Shaffer's

study, students studied French and Spanish. Herron and Tomasello's study included only French. Seliger's subjects were ESL students. And Robinson's subjects were learning Japanese, Korean, and Mandarin (99 of 104 studying topic-oriented languages). Given that these major studies defined terms differently, administered different treatments, measured acquired patterns differently, and had subjects studying different languages, it is no surprise that they show mixed results.

The above mentioned studies are significant in and of themselves but leave some questions unanswered. For example, what role do individual differences and preferences of the students play in the studies' outcomes? As an extension of this, is one approach more suitable for one student and not for another? Although the present study leaves some of the broad questions of the inductive vs. deductive debate unanswered, such as which approach is more effective as a whole, it does illustrate some interesting points for further research in this field. For example, correlational data discovered between student preferences and proficiency may serve as evidence for one approach over the other. This may spark additional interest in experimental studies in this area. Furthermore, the present study may provide grounds for studies to be structured in new ways. For example, perhaps a more meaningful experimental study will divide subjects into four groups — by inductive vs. deductive *preference* and by inductive and deductive teaching *approaches*.

The role of explicit instruction. Within research on inductive learning, there is yet another debate of whether inductive teaching should be done implicitly or explicitly. In other words, should the teacher ever state the rules clearly and overtly? Although the present study does not address this issue, the research in this area helps to provide a more complete

understanding of the inductive vs. deductive debate as a whole. For this reason, a brief overview of implicit vs. explicit instruction is provided.

Krashen (1982, 1994) proposes that, especially in beginning levels, students simply need more comprehensible input in the place of explicit grammar explanations. This belief is closely aligned with Reber (1989, as cited in Robinson, 1996), who argues that complex grammatical rules generally cannot be acquired consciously.

Doughty and Williams (1998) argue that a purely implicit instruction style, such as unfocused exposure to input, is not effective for many aspects of language. For this reason, they advocate a Focus on Form (Long, 1991) approach that emphasizes communication but allows for explicit instruction when needed. Although acknowledging that the use of highlighting, color-coding, intonation changes, and font manipulation can be used to improve student performance by generating enhanced input, Doughty and Williams feel this approach alone is still "too implicit to be maximally effective" (p.238). Their findings suggest that when explicit instruction of forms can be provided in a manner that does not hinder a communicative emphasis, in other words a Focus on Form approach, such an approach is far more effective than an enhanced input-laden, implicit approach. Additionally, when a Focus on Form approach is taken, it appears to be more effective than either a solely forms-focused or entirely communication-focused instruction.

Hammerly (1975) argues that teachers need to take a balanced approach that, while emphasizing induction (clearly Decoo's fourth (d) modality), also includes some explicit instruction. Although theorists may cling to one side or the other, Hammerly believes that there is a "middle ground in the deduction/ induction controversy" (p.18). This middle ground, he claims, is to "present inductively those grammatical points that the students can learn without an overt rule and deductively, with rules, those grammatical points that require such an approach."

More specifically, Hammerly believes that roughly 80 percent of the material could be taught inductively with no need for "overt explanations or discussions," (p. 18). Shaffer's (1989) research provides some evidence against this claim, but Hammerly's moderate argument seems to reflect the general sentiment of many others in the field (DeKeyser, 2003; Doughty and Williams, 1998).

Measurement of inductive vs. deductive preference. Measuring one's inductive or deductive preference presents some challenge because there is no test that focuses specifically on this learning style. There have been, however, a few of measures that have included some inductive/deductive items or sections. Additionally, there are measures that include items that strongly correlate with inductive vs. deductive preference.

The Learning Style Survey (Cohen et al., 2001) looks at 11 different learning style relationships, such as extroverted/introverted, random-intuitive/concrete-sequential, and impulsive/ reflective to name three. There are 48 items in total, all of which ask to what extent the test-taker agrees with the statement included in the item on a scale from zero to four. The test is second/foreign language learning specific. Included in this survey are six questions about inductive vs. deductive preference. These six questions are included as part of the measure used in the present study.

Felder and Silverman's (1988) Index of Learning Styles (ILS) measures four learning style pairs: sensory/ intuitive, visual/ auditory, active/ reflective, and sequential/ global. Interestingly, Felder and Silverman believe that there are actually *five* such dichotomies, instead of just four, the fifth being inductive vs. deductive. This fifth contrastive pair and its four items have, however, been removed from their Index of Learning Styles measure for ideological reasons. Although Seliger (1975) would disagree with their argument, Felder and Silverman

believe that even though students as a whole appear to prefer a deductive approach, an inductive approach is more effective because it is the "natural human learning style" (p.677). Felder (2004) gave a further explanation online:

> Barbara Soloman [a contributor to the later version] and I don't want instructors to be able to give our instrument to students, find that the students prefer deductive presentation, and use that result to justify continuing to use the traditional deductive instructional paradigm in their courses and curricula. We have therefore omitted this dimension from the instrument.

Lastly, Kolb's (1985) Learning Style Inventory (LSI) contains a few correlates of inductive and deductive preference that may serve useful for measurement. The LSI assigns learners to one of four primary learning styles, namely: (a) *converger*, (b) *diverger*, (c) *assimilator*, and (d) *accommodator*. These four styles can be characterized by a variety of traits and capture more than just one area of learning style. For example, *divergers* tend to rely on concrete experience and reflective observation, they can be very imaginative and open-minded, and they often come up with new ideas (Smith, 2001). The Learning Style Inventory could be useful for inductive vs. deductive preference measurement because two of its four learning styles appear to correlate with inductive vs. deductive preference (Smith, 2001). *Convergers* tend to prefer deductive learning and *assimilators* opt for inductive learning. Thus, items delineating these two styles could be used in the process of either creating or validating a new inductive vs. deductive preference measure.

As it appears, there is no perfect or even specific measure of inductive vs. deductive learning style preference. For this reason, as mentioned in the introductory chapter, a new measure of inductive vs. deductive preference has been constructed for the purpose of this research. This measure includes the six items found in the Learning Style Survey (Cohen et al., 2001) along with nine new items, several of which are specific to a language learning

environment. As outlined in Chapter 3, the new instrument has been validated by means of calculating the Cronbach's alpha (.75) and by showing a strong (.86) correlation with the borrowed subset of items.

Tolerance of Ambiguity and Inductive vs. Deductive Preference

To my understanding there are no studies that look specifically at tolerance of ambiguity in relation to inductive vs. deductive preference. There have been, however, several studies addressing tolerance of ambiguity and proficiency, which this study's findings may support (Chapelle & Roberts, 1986). Also, as discussed previously, there are a handful of inconclusive studies that look at inductive vs. deductive instruction and student achievement as measured by performance on tests (Herron & Tomasello, 1992; Robinson, 1996; Shaffer, 1989). These studies, however, in addition to being rather inconclusive, only explore inductive vs. deductive instructional methods and not students' instructional preference. Therefore, their findings do not directly further research on aptitude measurement or individualized instruction, and provide limited insight into cognitive styles. The present study sheds some light on what I believe to be the previously unexplored correlations between tolerance of ambiguity and inductive vs. deductive preference and proficiency.

Chapter 3: Methodology

Introduction

      This chapter provides an outline of the survey procedure and differences in participation between foreign language departments, an overview of subject characteristics, a description of the instruments used, and a summary of how the data was analyzed.

Survey Procedure

      Students were invited to participate in a ten minute online survey. This survey included two independent measures along with several items to measure moderating variables. Further explanation of the instrument is provided later in this chapter. Students' participation was on a voluntary basis. Some students received email reminders with links to the survey in addition to receiving paper flyers. Teachers were given the option to give extra credit as an incentive, but they were not required nor strongly encouraged to do so. Differences between departments in survey procedure are listed below.

      Department participation. This study aimed to include as many students from as many languages as possible. Although the survey was only advertised and encouraged at Brigham Young University, it was not limited to BYU students. All foreign language departments were invited to participate. All departments gave their approval for the study, except the Germanic Department which did not respond to the invitation.

      The Asian and Near-Eastern Languages Department. Participation was slightly higher for this department. This is likely because the principle researcher used to belong to this department and knows many of the professors personally. For this reason, more professors may

have offered students extra credit for participation than did professors of other departments in order to show their support for the researcher.

The Spanish and Portuguese Department. There was no deviation in administration except that there was a shortage of flyers that limited the number of Portuguese speakers who participated.

The French and Italian Department. In addition to flyers, the French and Italian Department sent a confirmation email requesting each teacher to pick up the necessary flyers from their department mailboxes. Additionally, a copy of the flyer that included a link to the survey was emailed to each student in the department. This naturally led to a greater response from students because of the ease of simply following the link.

The Department of Germanic Studies and Slavic Languages. The Department of Germanic Studies and Slavic Languages did not participate in the study.

The Center for Language Studies. The Center for Language Studies, which manages the less commonly taught languages, emailed each student in their department a copy of the link to the survey much like the French and Italian Department in addition to administering the paper flyers.

Subjects

Demographics. In total, 347 people participated in the survey with 333 completing every item. As seen in Figure 1, ages ranged from 17 to 65 with 21 being the median age. The lower number of 20-year-olds is likely because 20 is typically the age at which men in the LDS church are on missions. 190 women participated (57%) and 143 men (43%). As seen in Table 1, the median year in school was Sophomore. 121 participants (36%) had lived abroad for a year and a half or longer with 151 (52%) having been abroad for a minimum of a year and a half.
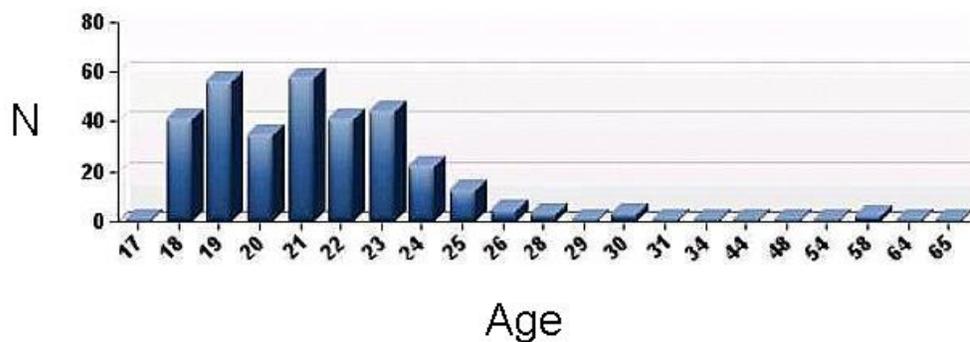
Figure 1. Number of participants by age. This figure lists the students by age, shows the mean age of 21, and illustrates the drop in participants with an age of 20.

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Table 1

Number of Students by Year in School

Year in school	N
Not in School	9
Graduate Student	6
Senior	86
Junior	77
Sophomore	97
Freshman	58
Total	333

Participating languages. As listed in Table 2, ten languages (English, Spanish, Japanese, French, Chinese, German, Italian, Korean, Portuguese, and ASL) had ten or more participants, with a grand total of 38 languages being represented.

Table 2

Number of Students per Language Ability

Language	N	Language	N	Language	N
English	304	Arabic	4	Romanian	1
Spanish	188	Cantonese	3	Swedish	1
Japanese	94	Polish	3	Bulgarian	1
French	92	Tongan	3	Icelandic	1
Chinese	34	Danish	3	Khmer	1
German	34	Dutch	3	Croatian	1
Italian	15	Maori	2	Greek	1
Korean	15	Samoan	2	Indonesian	1
Portuguese	12	Hebrew	2	Jordanian	1
ASL	11	Navajo	2	Egyptian	1
Russian	8	Ukrainian	2	Thai	1
Latin	8	Hungarian	1		
Mandarin	8	Mongolian	1		
Welsh	6	Slovenian	1		

Note. At first glance, there appears to be overlap. This is because many students speak two or more languages and were therefore included in multiple languages. Also, some participants have listed their language by dialect while others have used a broader classification. For example, 35 participants indicate being able to speak "Chinese" while others indicate more precisely that they speak "Mandarin" (eight subjects) or "Cantonese" (3 subjects). Similarly, the one "Egyptian" speaker may be included with Arabic speakers. Chinese speakers (Mandarin and Cantonese), however, were the only participants grouped together in this manner for the purposes of data analysis.

Instruments

   This study gathered data by means of an online survey created at Qualtrics.com that contained multiple scales and measures. The items included in the survey consisted of Ely's (1995) Second Language Tolerance of Ambiguity Scale, a new measure of inductive vs. deductive preference that included items from the Learning Style Survey (Cohen et al., 2001), and some additional items for demographics, proficiency, and aptitude to be able to successfully measure potential moderating variables.

   Tolerance of ambiguity. Ely's (1995) Second Language Tolerance of Ambiguity scale was chosen because it is the only well known and validated measure of tolerance of ambiguity that is specific to the language learning environment. Ely's instrument, however, was originally designed for Spanish language learners. Consequently, for this survey, the word "Spanish" has been replaced with variations of "a foreign language." The Cronbach's alpha of the revised version of Ely's instrument was .82.

   Inductive vs. deductive preference. The new measure of inductive vs. deductive preference specific to language learning was created because, as outlined in Chapter 2, no such specific instrument exists. This measure borrows six items from the Learning Style Survey (Cohen et al., 2001) and includes nine original items. The new items are written based on observation as well as on common definitions for "inductive" and "deductive" learning. All items, along with their item-total correlations, are included in Table 3. Items marked with an asterisk are borrowed from the Learning Style Survey. A positive response to items 1, 3 5, 7, 8, 9, 11, and 13 indicates a deductive preference and a positive response to items 2, 4, 6, 10, 12, and 14 indicates an inductive preference. Negative responses to either set of items were assessed as positive responses for the opposite preference.

Table 3

Inductive vs. Deductive Instrument Item-Total Correlation

Item #	Item	Item-Total Correlation
14	When learning a new grammar pattern, I would rather pick it up "as we go" instead of going over the rules first.	.640
8	I feel that example sentences are only helpful when we've already gone over the rules.	.630
*5	I like to start with rules and theories rather than specific examples.	.604
*4	I like to learn rules of language indirectly through being exposed to lots of examples of grammatical structures and other language features.	.543
13	When we do a new activity or game in class, I prefer to know all of the rules before we start.	.502
7	I find myself wishing my teachers would just give me the rule, because I don't like it when they try to help me figure it out on my own.	.487
*15	I figure out rules based on the way I see language forms behaving over time.	.486
2	I prefer figuring out a grammar pattern on my own before looking at the explanation in the book.	.476
10.	I prefer to have some example sentences before the teacher tries to explain a new grammar pattern to me.	.447
*11	I like to go from general patterns to the specific examples in learning a target language.	.418
*9	I like to begin with generalizations and then find experiences that relate to them.	.412
*6	I don't really care if I hear a rule stated since I don't remember rules very well anyway.	.371
3	It's easier for me when my teacher gives an overview of something before getting into the particulars.	.233
12	I think seeing the big picture first can sometimes be helpful, but I really don't need it.	.232
1	As a general rule, I do better when I get the big picture first and the details later.	.225

Validation. The new inductive vs. deductive measure proved very reliable with a Cronbach's alpha of .75 which suggests a very strong internal consistency. Furthermore, the new instrument correlated with the subset borrowed from the already validated Learning Style Survey (Cohen et al., 2001) at .86. Interestingly, the new inductive vs. deductive measure had a much higher alpha than the original LSS items which had an alpha of only .56 in this study.

Analysis

After receiving the results from the survey, the data was analyzed in order to validate the new and altered instruments, find potentially useful descriptive statistics and discover possible correlations between key variables. Analysis of Covariance was also used to analyze multiple variables combined, such as whether proficiency was related to ambiguity tolerance depending on language. The results of this analysis are included in the next chapter.

Chapter 4: Results

Introduction

This chapter provides the results from the survey procedure and analysis. First, an analysis of descriptive statistics is provided. From there, results are presented in light of this study's original hypotheses. Additional findings unrelated to the original hypotheses are also included.

Descriptive Statistics

Inductive vs. deductive preference. Given that a score of zero on the new measure for inductive vs. deductive preference would indicate no preference, the fact that there was an average score of 6.02 suggests that there may be a slight preference among language learners for deductive learning. Despite this apparent preference, the histogram provided in Figure 2 shows a fairly typical bell-curve spread with a range of -11 to 22 (theoretical range being -30 to 30).
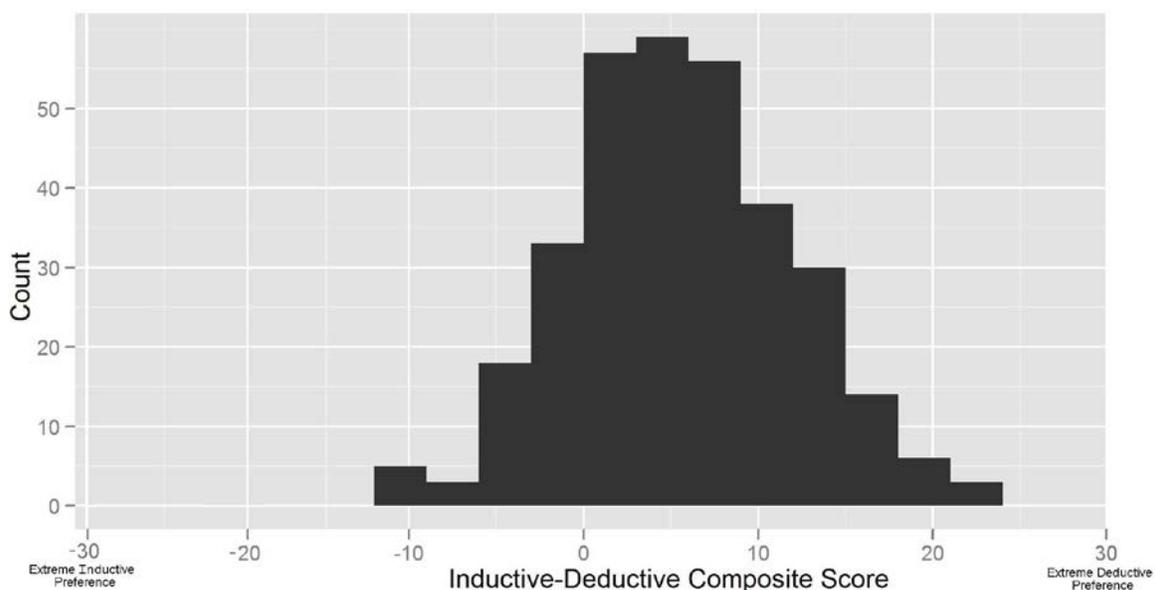
Figure 2. Students' inductive-deductive composite scores. This figure shows a bell-curve with average scores being on the deductive side of the spectrum.

Tolerance of ambiguity. Given that Ely's (1995) Second Language Tolerance of Ambiguity Scale allows for a theoretical range of 12 (extremely intolerant) to 72 (extremely tolerant), with 42 being neutral, the fact that the average score was 37.45 suggests that language learners may be slightly *less* tolerant of ambiguity. The histogram provided in Figure 3 shows a median score in the low 30's, an actual range of 18 to 65, and a slightly positive skew.
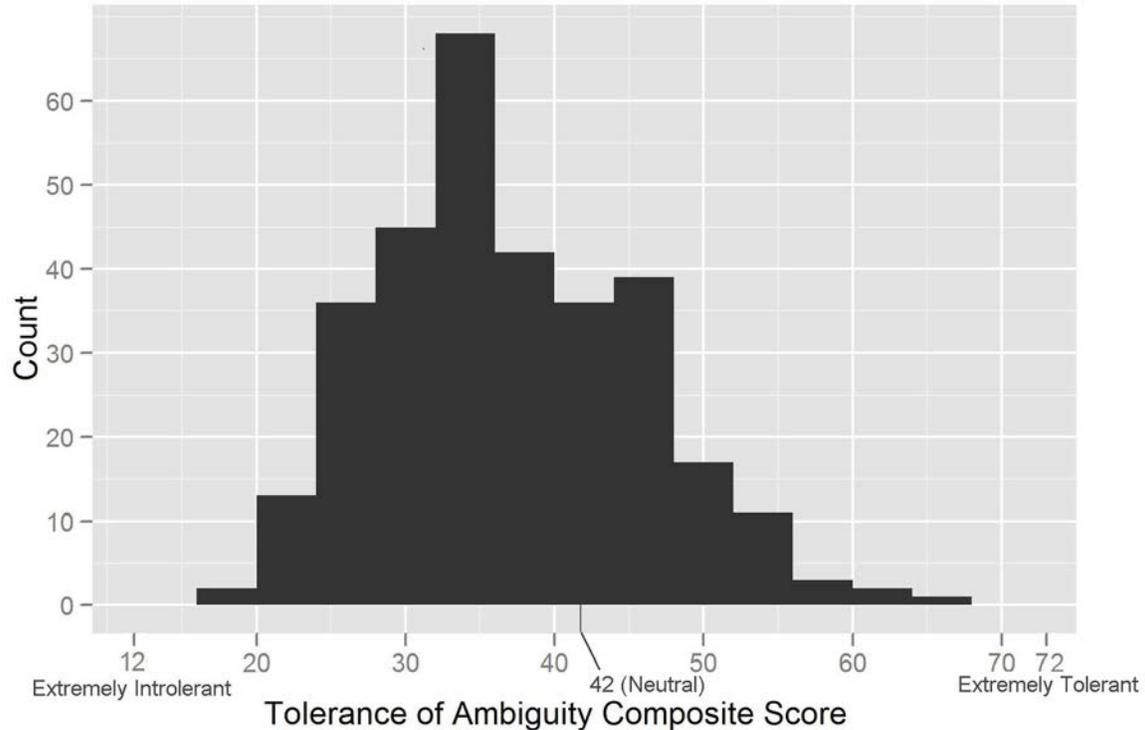
Figure 3. Tolerance of ambiguity composite scores. This figure shows a slightly positive skew with average and mean scores being on the intolerant side of the ambiguity spectrum.

Correlational Results of Original Hypotheses

Tolerance of ambiguity and inductive vs. deductive preference. Assuming the new inductive vs. deductive instrument is valid and accurately measures students' preferences, results suggest that tolerance of ambiguity may have a positive correlation with inductive preference. However, the extent of this correlation is not as great as anticipated. The two correlate at only .24.

Tolerance of ambiguity and proficiency. Results, as predicted, suggest that tolerance of ambiguity and proficiency may be positively correlated. However, the correlation was rather weak at only .25 when measuring proficiency by OPI scores. It should be noted, however that of the 333 participants who completely finished the survey, only 52 (16%) had taken the OPI. The

correlation is just as weak (.27) when using participants' self-rating of proficiency. Interestingly, tolerance of ambiguity was slightly (.32) more correlated with participants' self-rating of language aptitude.

Inductive vs. deductive preference and proficiency. Results, as predicted, suggest that an inductive learning style and proficiency may be positively correlated. Correlational statistics show a .21 relationship between inductive preference and OPI scores. However, there was no correlation with self-rating of proficiency.

Tolerance of ambiguity plus inductive preference and proficiency. Although it was hypothesized that participants with a high tolerance of ambiguity and high preference for inductive learning would correlate with proficiency through means of ANCOVA, no such correlation was found.

Time on task and tolerance of ambiguity. Although it was hypothesized that participants who had studied a language for a longer period of time would correlate with tolerance of ambiguity, no such correlation was found. Similarly, there was no correlation between year in school and tolerance of ambiguity. However, there was a slight (.22) positive correlation between age and tolerance of ambiguity. This slight correlation between age and tolerance of ambiguity led the researcher to ask whether perhaps experience abroad would correlate with ambiguity tolerance. However, no such correlation was found between ambiguity tolerance and A) whether participants had studied abroad, or B) whether participants had served a Latter-day Saint mission abroad.

Additional Findings

Time on task and proficiency. Educators and OPI administrators alike will be happy to learn that time on task as measured by years of study correlated with proficiency as measured by

OPI scores at .62. Years of study also correlated slightly (.24) with participants' self rating of language aptitude but not nearly as strongly as it does with OPI scores.

Differences across languages. Language of choice was determined not to be a significant factor in neither participants' tolerance of ambiguity nor their preference for inductive or deductive instruction styles. However, students of Japanese appear to be an exception. Students of Japanese scored, on average, 2.7 points lower – and thus more inductive — on the inductive vs. deductive measure, with a *p*-value of .0004. As shown in Figure 4, non-Japanese participants scored an average of 6.75 while students of Japanese scored an average of 4.06. This suggests that the students of Japanese may be slightly more inductively oriented than students of other languages.

Languages were further categorized and analyzed by difficulty using the Foreign Service Institute's (FSI)'s difficulty categories. There was no significant difference between language difficulty and inductive vs. deductive preference, tolerance of ambiguity, or proficiency.
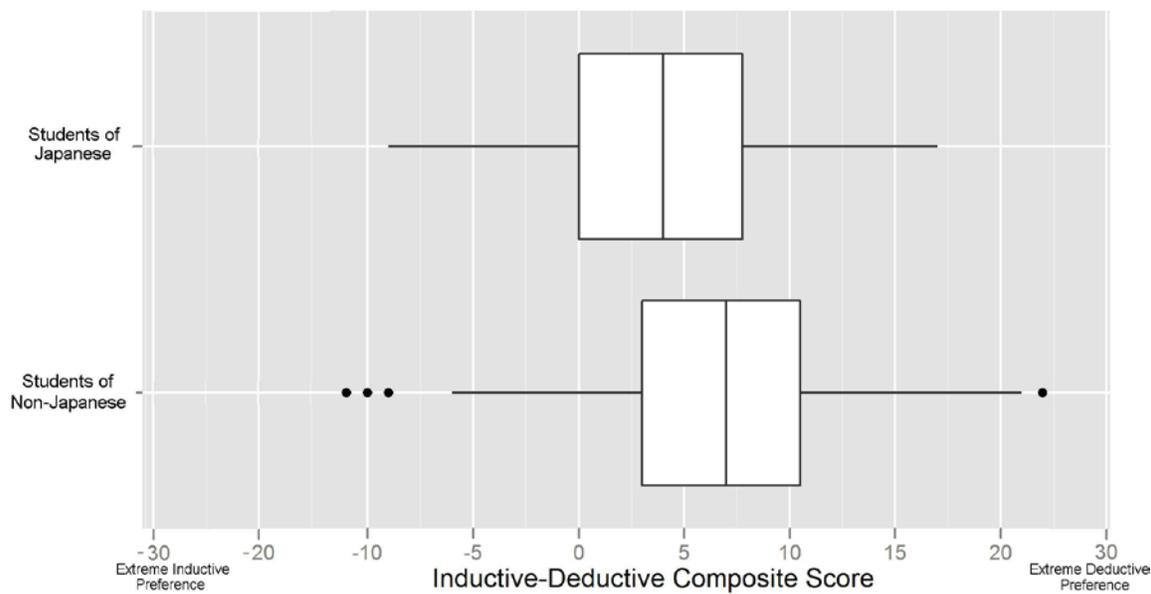
Figure 4. Inductive-deductive composite scores of students of Japanese. This figure illustrates how the students of Japanese scored on average 2.7 points more inductive than students of non-Japanese languages.

LDS missionary service. There was no correlation between missionary service and inductive vs. deductive preference or tolerance of ambiguity. Because men and women serve missions of different lengths (1½ year or 2 years respectively), this data was further analyzed by gender. Of the 157 returned missionaries in the sample, 119 were men and 38 were women. There was no statistical difference in ambiguity tolerance, inductive preference, or proficiency (as measured by OPI) between the men and women. Interestingly, although there was no statistical difference between previous grades earned, female returned missionaries, expected a lower grade than male returned missionaries at a statistically significant level (p-value < .001). Female returned missionaries similarly self-rated their language aptitude lower than male returned missionaries (p-value .005) despite there being no difference between OPI results.

Chapter 5: Discussion

Introduction

        This chapter provides an interpretation of the results of the study, further explanation of the reasons behind the original hypotheses, possible implications of the results, limitations of the study, and suggestions for further research. When appropriate, speculation and opinion have been included and marked as such.

Interpretation of Results

        As seen in Chapter 4, only three of the original five hypotheses bore true: correlations between tolerance of ambiguity and inductive preference (.24), tolerance of ambiguity and proficiency (.25), and inductive preference and proficiency (.21). However, because these correlations are very weak, they cannot be considered very significant. That being said, as minimal as the correlations may be, it is still interesting that slight correlations appear to exist where intuition would suggest that they do. Below are provided possible reasons for why the variables in this study could be correlated.

        Tolerance of ambiguity and inductive preference. There are a number of reasons why one might expect an inductive preference and a tolerance of ambiguity to be correlated. To begin with, learners in an inductive environment are required to go without knowing the exact rules for a longer period of time. This places the student in a linguistically ambiguous situation because there are so many unknowns, be they lexical, pragmatic, etc. Moreover, the rules learners generate on their own in the meantime may be incorrect, which further creates ambiguity as a lack of clarity. Assuming that inductive learning is indeed more ambiguous as outlined above, perhaps language learners with a high ambiguity tolerance are better able to handle the more

ambiguous inductive approach. Additionally, it could be that those who are more tolerant of ambiguity prefer inductive learning because they enjoy the ambiguity.

It could be that the process of learning inductively promotes the development of ambiguity tolerance. For this to be true, tolerance of ambiguity would have to be a flexible trait subject to change over time due to experience. However, finding no correlation between study/mission abroad and tolerance of ambiguity provides evidence against this theory and suggests that perhaps ambiguity tolerance is a relatively fixed trait. That being said, one may ask whether tolerance of ambiguity is a trait one is born with or acquires over time. It is the researcher's belief that ambiguity tolerance is generally a fixed trait that may appear to shift with age (as evidenced by a correlation of .22) through acquiring and developing new strategies to deal with ambiguity. In other words, the preference and propensity remain static while the coping strategies develop over time.

Lastly, it is possible that those who are very tolerant of ambiguity feel that they cannot learn well deductively because they don't handle the rigidity of grammar rules well. This theory originates in the inductive vs. deductive item that reads "I don't really care if I hear a rule stated since I don't remember rules very well anyway," which was borrowed from the Learning Style Survey (Cohen et al., 2001).

Tolerance of ambiguity and proficiency. It was hypothesized that tolerance of ambiguity would correlate with proficiency primarily because previous studies had found such a correlation (Chapelle & Roberts, 1986). However, there are other reasons that would suggest a correlation.

To begin with, as discussed in Chapter 2, language learning can be an extremely ambiguous process and environment; this then might give an advantage to those who are more

tolerant of the ambiguity. One can assume that students who are not comfortable with their learning environment would not perform as well.

Another explanation for why tolerance of ambiguity and proficiency might be correlated is that perhaps those who are tolerant of ambiguity simply learn more inductively (as suggested above), and that the correlation between ambiguity tolerance and proficiency is actually an extension of the correlation between inductive preference and proficiency. In other words, one variable could be embedded in the other.

Prior to the implementation of the survey, it was also hypothesized that perhaps tolerance of ambiguity and proficiency would correlate because the less tolerant students would be more likely to drop out, or that students were actually developing a tolerance to ambiguity with time. However, no correlations were found between years of study and ambiguity tolerance. For this reason, there is no evidence to support this theory.

Inductive preference and proficiency. One assumption that could be drawn from a correlation between inductive preference and proficiency is that an inductive approach is in fact better than a deductive one. Of course, one would need an experimental study to support such a claim. This finding does, though, agree with Herron and Tomasello's (1992) claims that a more inductive approach may be best. However, there are other potential reasons for correlations to exist here.

Perhaps as students' proficiency increases, they become more comfortable with an inductive approach. Students' experience with the inductive approach may lead them to experience less anxiety with the process. This naturally leads one to ask, do students view the inductive approach as anxiety inducing? Further research in this area may be useful.

It was also hypothesized that students' inductive preference would correlate with proficiency because perhaps inductive students would continue studying the language longer. This was based on the hunch that inductive learners might enjoy the learning process more than deductive learners. However, this theory has been abandoned because of the lack of a correlation between years of study and inductive vs. deductive preference.

It is interesting that inductive preference correlated with proficiency as measured by OPI scores but did not correlate with self-rated proficiency. Perhaps inductive learners perform better on tests even though they self-rate themselves as having a similar proficiency as others. Or, the difference could be attributed to unique subject characteristics of those who take OPI tests as opposed to the entire sample. The only thing that can really be said with confidence is that there is a gap between how students view their proficiency and how well they perform on proficiency tests.

Tolerance of ambiguity plus inductive preference and proficiency. The combination of tolerance of ambiguity and inductive preference did not yield any stronger correlations with proficiency than either variable did on its own. This correlation was predicted because it was assumed that the students tolerant of ambiguity could handle the anxiety of language learning better while their preference for the inductive learning style would further separate them from the less proficient by their A) use of a superior learning style, or B) enjoyment of the learning (figuring out) process. Because both tolerance of ambiguity and inductive preference separately correlate with proficiency somewhat, a lack of additional correlation when the two are combined suggests that perhaps the two variables are overlapping.

Years of study and ambiguity tolerance. Although ultimately no correlation was found, it was hypothesized that years of study would correlate with ambiguity tolerance for one of two reasons: drop out or tolerance development.

Given that language learning is a very ambiguous process, it could be assumed that students who could not handle the ambiguity would be more likely to cease studying foreign languages. This then would create a correlation with ambiguity tolerance and years of study because only the more tolerance would still be around.

The opposing theory was that a correlation would exist because students were learning to develop a tolerance to ambiguity through constant exposure. However, this theory has no supporting evidence. Not only was there no correlation found between years of study and tolerance of ambiguity, but there also was no correlation between studying abroad (whether as a Later-day Saint mission or not) and tolerance of ambiguity.

Interestingly, although years of study does not seem to correlate with ambiguity tolerance, age does correlate slightly (.22). This suggests that it is the passing of time and not necessarily the quality of time that may influence one's ambiguity tolerance. Or, it is possible that quality of time may still be playing a role but that the process is so slow that it only becomes apparent over several years.

Because a correlation was found between ambiguity tolerance and age, it was hypothesized that perhaps one's inductive vs. deductive preference might similarly correlate with age, but no such correlation was found.

Thoughts on correlations. Although several weak correlations were indeed found between the variables mentioned above, the results are too weak to be at all convincing.

Furthermore, given the weak correlations between the primary variables of this study, there may be little to no advantage in looking at them in light of each other in future studies.

General descriptive statistics. As can be seen in the histograms provided in Chapter 3, it appears that students are generally slightly less tolerant of ambiguity and slightly more deductive when compared to theoretical neutral scores. This claim regarding students is made based on the fact that the vast majority of participants were students. More interesting, perhaps, than where the peak of the bell curve lies is simply the fact that students can be found on either side of these two spectrums.

Interpretation of Additional Findings

Japanese language learners. As indicated in Chapter 4, there was a significant difference in Japanese students' inductive preference. Such a correlation might exist for a number of cultural and linguistic reasons.

Assuming that an inductive learning process is more ambiguous than a deductive one, it is possible that the difference may be attributed to Japanese being more ambiguous. The Japanese language and culture is known for being somewhat ambiguous because of its abundant use of ellipses and often more indirect ways of requesting and correcting. However, the Japanese learners did not exhibit a higher tolerance of ambiguity than other language learners. For this reason, this hypothesis has no evidence. Although, ambiguity and indirectness may be separate altogether. In that case, perhaps it is the indirectness of Japanese.

Another possible explanation for this difference is based on researcher observation only. The primary researcher is both a student and teacher of Japanese and has noticed that many learners of Japanese enjoy learning Japanese *through* watching *anime*, Japanese animated shows and films, and have done so for many years. This process of picking up language through

observation without explicit instruction is inherently inductive in nature. Therefore, if there are many students taking Japanese who enjoy learning through observation, it would seem logical that they would prove more inductive than learners of other languages. It would be interesting to perform the same ambiguity tolerance test with Japanese natives to see if they similarly prefer an inductive approach or if it is just the students of Japanese who prefer the inductive approach. This theory could easily have been substantiated or abandoned with the inclusion of an item asking about either anime watching or learning through television. However, the theory arose as a byproduct of the findings and was not among the initial hypotheses. That being said, future studies may easily explore this area with the inclusion of such an item.

Instrument validation. The creation and validation of the new measure for inductive vs. deductive preference may prove to be this study's most significant contribution to the field of foreign language acquisition. As stated previously, prior to this study, no such measure existed. The parts and pieces available within other instruments were very minimal at best. The researcher believes that the new instrument is more complete than anything previously available and may aide future research in inductive vs. deductive preference.

Male and female missionaries. In Chapter 3 it was shown that female returned missionaries expect lower grades and rate themselves of a lower language aptitude than male missionaries despite not receiving lowering grades in the past nor having lower proficiency (as measured by OPI). It could be that female returned missionaries believe that they are not as proficient in the target language because they served six months less than the male missionaries. This insecurity perhaps may also be leading them to expect lower grades. Or, it is possible that women, or at least female returned missionaries, have a more moderate or modest view of their own proficiency than men.

Implications

Although students on average appear slightly less tolerant of ambiguity and slightly more likely to prefer a deductive approach over an inductive one, both sides of the spectrum are represented in the students' responses. In other words, there are inductive learners, deductive learners, learners tolerant of ambiguity, and learners less tolerant of ambiguity. For this reason, instructors must consider all sides of these variables.

Inductive and deductive preference. It would be wise for an instructor to consider a mixed methods approach to meet the needs of all kinds of students. With this in mind, a guided inductive approach, which combines elements of both inductive and deductive learning, may be a superior classroom teaching style. The same effect could be reached by alternating styles. For example, a teacher could use an inductive approach three times a week and a deductive approach twice a week.

Tolerance of ambiguity. With regards to having both students who are tolerant of and intolerant of ambiguity, the researcher believes that a clear, less ambiguous approach to teaching is superior to a more ambiguous one. The researcher assumes that students who are tolerant of ambiguity would perform equally well in either an ambiguous or unambiguous situation, while a student who is less tolerant may struggle or become anxious in ambiguous situations. It is similarly assumed that such anxiety has a negative effect on language learning. For these reasons, perhaps teachers should consider cultivating a clear, structured, consistent and simple style of teaching as possible. Lastly, it should be noted that the researcher may be biased because he has a very low tolerance of ambiguity.

Limitations

  New instrument validation. Although the Cronbach's alpha of the new inductive vs.
deductive preference measure is fairly high (.75) and correlates strongly (.86) with a subset of
questions borrowed from the Learning Style Survey (Cohen et al., 2001), there is currently no
other known, validated instrument specific to inductive vs. deductive preference. Thus, without a
valid instrument with which to correlate the new instrument, coupled with the lack of
experimental research, the situation is not ideal for validating the new measure. For this reason, it
is not entirely clear whether inductive and deductive preference is being measured accurately.

  Self-rating. Both the measure for inductive vs. deductive preference and the measure for
tolerance of ambiguity are self rated. Self rating presents several potential flaws because it is not
objective and observable. Thus, any correlations found can only be said to be correlations
between how participants view themselves and may not be representative of actual behavior.

  Sampling. The participants of this study were self-selected for varying degrees of
compensation depending on instructor and department. For this reason, more grade-conscious
students and grade suffering students may have participated. Furthermore, the recruiting flyer
included the researcher's name which may have led more of his friends and acquaintances to
participate.

  Subjects. BYU students, the vast majority of participants, are a very unique population
that includes many language learners who have spent a year and a half or longer in the target
language or culture as missionaries. As mentioned in Chapter 3, 121 of the 333 participants had
lived in another language culture for a year and a half or longer. This missionary experience
generally begins with three to 12 weeks of intense deductive-style instruction followed by 15 to
23 months of inductive, in-country learning. Although no significant difference was found

between returned missionaries and non-missionaries, the fact that a large portion of the sample has such a unique experience may threaten the external validity of the study.

Proficiency. In this study, proficiency was examined with two items: 1) expected grade, and 2) OPI results. The former was ultimately abandoned because it was not only a poor indicator of proficiency, but also created several interesting but deceptive correlations. For example, proficiency as measured by expected grade was negatively correlated slightly with years of study. This seems natural because one would expect that language courses would get harder as students progress through their respective programs. However, it would be false to say that "proficiency" is negatively correlated with years of study. Similarly, expected grade was lower in the less commonly taught languages. This could be explained by less commonly taught languages generally being less familiar and therefore more challenging. However, to say that the student of an easier course is more "proficient" because their grade is higher would be deceptive. For these reasons, OPI scores were deemed a more preferable measure of proficiency. However, as mentioned in Chapter 3, only 52 participants (%16) had taken the OPI. For this reasons, correlational data that refer to proficiency represent a much smaller population than the whole. Additionally, who has taken an OPI is not something distributed randomly.

The OPI was chosen because of its high validity and reliability, but it still may not be the best measure for proficiency. The OPI can only safely be said to measure one's *oral* proficiency. In other words, it does not take into account one's reading and writing abilities and only loosely judges listening ability. For this reason, any correlations found in this study related to proficiency may only indicate correlations with the participants' oral skills and not their overall language abilities. This potential problem was only realized after the full-scale implementation was underway and could not, therefore, be remedied with more proficiency related items.

Further Research

Because the present study is only a correlational study, one cannot draw causal conclusions. As such, there remain several questions that can only be answered with measurable, experimental research. Additionally, there arose many research questions as a result of viewing and contemplating the research data.

Further research questions include: would the same results be found with non-BYU participants? Would an increased awareness of one's ambiguity tolerance or inductive vs. deductive preference have an effect on performance? Is one approach, inductive or deductive, more effective than the other? Do students learn better when they receive instruction in the style of their preference? Do students feel inductive approach is more ambiguous? Does the inductive approach take longer as many claim? Do students actually learn/study the way they say that they prefer? Do the intolerant of ambiguity really experience greater levels of anxiety? Do students' inductive or deductive preference and their tolerance of ambiguity play any role in whether they enjoy language learning? Would one find the same correlations related to proficiency with other methods of measuring proficiency, such as with a writing proficiency exam? Why exactly do Japanese learners tend to prefer the inductive approach more than other language learners? Would native Japanese speakers show the same preference for inductive instruction? These questions await future research.

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Appendix

This appendix includes the entire survey that each subject participated in online along with a few notes regarding the individual items.

The new measure for inductive vs. deductive preference is listed as question 17 (Q17). Items borrowed from the Learning Style Survey (Cohen et al., 2001) are marked with an asterisk and italicized for convenience.

Ely's (1995) measure of ambiguity tolerance is included as question 18 (Q18).

Question 19 (Q19) constitutes ten items borrowed from Bush's (1983) doctoral dissertation. These items were intended to be used to validate Ely's (1995) measure which had been altered slightly for this study because the word "Spanish" needed to be replaced with "a foreign language" multiple times. However, upon finding a high Cronbach's alpha with the slightly altered version, the items were abandoned and not included in any further research.

Tolerance of Ambiguity and Inductive vs. Deductive Preference Online Survey

Q1   **Implied Consent to Participate in Research**
        You are invited to participate in this research study of Jordan Bledsoe. I am a graduate student at Brigham Young University, and I am conducting this survey as part of my Thesis work. I am interested in finding out about the connections that may exist between students' learning styles, particularly their preference for grammar instruction, how comfortably they are with ambiguity, and their overall language proficiency.
        Your participation in this study will require completion of the following survey. This should take approximately ten minutes of your time. Your participation will be anonymous and you will not be contacted again in the future. You will not be paid for being in this study. This survey involves minimal risk to you. However, the benefits of your participation may impact society by helping increase knowledge about learning styles and students' individual differences. This may improve individualized, online language instruction and possibly language aptitude testing.
        You do not have to participate in this survey if you do not want to be. You do not have to answer any question that you do not want to answer for any reason. You may stop taking the survey at any time. We will be happy to answer any questions you have about this study. If you have further questions about this project or if you have a research-related problem, you may

contact me, Jordan Bledsoe, by email at jordanbledsoe1@gmail.com or by phone: 503-577-9222. You may also contact my advisor, Masakazu Watabe, at: masakazu_watabe@byu.edu .

If you have any questions about your rights as a research participant you may contact the IRB Administrator; Brigham Young University, A-285 ASB; Provo, UT 84602; irb@byu.edu or 801-422-1461. The IRB is a group of people who review research studies to protect the rights and welfare of research participants.

The completion of the following survey implies your consent to participate.

Q2 If you have taken this test before, you do not need to take it a second time.

Q3 Gender
○ Male
○ Female

Q4 Please indicate your age.

Q5 Please indicate what year in school you are.

	Not currently in school	Freshman	Sophomore	Junior	Senior	Graduate Student
Year in School						

Q6 Please indicate any languages you have experience with and how well you speak them.

	Limited / Minimal	Novice	Intermediate	Advanced	Native-like	Native
1st Language	○	○	○	○	○	○
2nd Language	○	○	○	○	○	○
3rd Language	○	○	○	○	○	○
4th Language	○	○	○	○	○	○
5th Language	○	○	○	○	○	○
6th Language	○	○	○	○	○	○

Q7 Did you grow up in a home that spoke two or more languages?
○ Yes
○ No

Q8 How many years have you studied the foreign language that you are most confident in?

	1	2	3	4	5	6	7	8	9	10	11	12 or more
Years of study												

Q9 If you are currently taking a foreign language class or classes, please indicate which one(s). example: Spanish 205, Japanese 300

Q10 Have you ever done a study abroad or lived in the culture of the language you are studying for more than two months?
○ Yes
○ No

Q11 If you served a foreign language speaking LDS mission, was it in the target country or culture?
○ Yes
○ No
○ Did not serve a mission OR Did not serve a foreign language mission

Q12 What grade did you receive in the last foreign language class you took?

	I am currently enrolled in my first language class.	A	A-	B+	B	B-	C+	C-	D+	D-	F
Grade from previous class											

Q13 If you are taking a foreign language class right now, what grade do you expect to receive at the end of the semester?

	I am not currently enrolled in a language class	A	A-	B+	B	B-	C+	C-	D+	D-	F
Estimated grade											

Q14 Have you taken an official OPI (Oral Proficiency Interview) before?
- ❍ Yes
- ❍ No

Q15 If you have taken an official OPI before, please indicate the language(s) you tested in and the score(s) you received.

	Novice Low	Novice Mid	Novice High	Int.Low	Int. Mid	Int. High	Adv. Low	Adv. Mid	Adv. High	Superior
Language 1	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍
Language 2	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍
Language 3	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍
Language 4	❍	❍	❍	❍	❍	❍	❍	❍	❍	❍

Q16 Generally speaking, how good do you think you are at learning foreign languages? Please slide the bar to indicate on a scale of 0 to 10.

Q17 For each item indicate your immediate response.

	Never	Rarely	Sometimes	Often	Always
As a general rule, I do better when I get the big picture first and the details later.	❍	❍	❍	❍	❍
I prefer figuring out a grammar pattern on my own before looking at the explanation in the book.	❍	❍	❍	❍	❍
It's easier for me when my teacher gives an overview of something before getting into the particulars.	❍	❍	❍	❍	❍
*I like to learn rules of language indirectly through being exposed to lots of examples of grammatical structures and other language features.	❍	❍	❍	❍	❍
*I like to start with rules and theories rather than specific examples.	❍	❍	❍	❍	❍
*I don't really care if I hear a rule stated since I don't remember rules very well anyway.	❍	❍	❍	❍	❍
I find myself wishing my teachers would just give me the rule, because I	❍	❍	❍	❍	❍

don't like it when they try to help me figure it out on my own.					
I feel that example sentences are only helpful when we've already gone over the rules.	○	○	○	○	○
I like to begin with generalizations and then find experiences that relate to them.	○	○	○	○	○
I prefer to have some example sentences before the teacher tries to explain a new grammar pattern to me.	○	○	○	○	○
I like to go from general patterns to the specific examples in learning a target language.	○	○	○	○	○
I think seeing the big picture first can sometimes be helpful, but I really don't need it.	○	○	○	○	○
When we do a new activity or game in class, I prefer to know all of the rules before we start.	○	○	○	○	○
When learning a new grammar pattern, I would rather pick it up "as we go" instead of going over the rules first.	○	○	○	○	○
I figure out rules based on the way I see language forms behaving over time.	○	○	○	○	○

Q18 Please indicate how strongly you agree or disagree with the statements below. Choose your immediate response.

	Strongly Disagree	Moderately Disagree	Slightly Disagree	Slightly Agree	Moderately Agree	Strongly Agree
When I'm reading in a foreign language, I get somewhat impatient when I don't totally understand the meaning.	○	○	○	○	○	○
It bothers me that sometimes I don't know exactly what the teacher is saying in a foreign language, even though I understand the general idea.	○	○	○	○	○	○
When I write compositions	○	○	○	○	○	○

in a foreign language, I don't like the fact that I can't always express my idea exactly.						
I find it kind of frustrating that it's sometimes hard to pin down the meaning of a foreign language grammar point.	❍	❍	❍	❍	❍	❍
I don't like the feeling that my language pronunciation may not be quite right.	❍	❍	❍	❍	❍	❍
I enjoy reading something in a foreign language that takes a while to figure out completely.	❍	❍	❍	❍	❍	❍
It bothers me that even when I study a foreign language's grammar, some of it is hard to really understand.	❍	❍	❍	❍	❍	❍
When I'm writing in a foreign language, I don't like the fact that I can't say just what I want.	❍	❍	❍	❍	❍	❍
When I'm speaking in a foreign language, I don't really worry about not being able to say what I mean.	❍	❍	❍	❍	❍	❍
It bothers me when the teacher uses a word I don't know.	❍	❍	❍	❍	❍	❍
I don't like the fact that it's often impossible to find words in a foreign language that mean exactly the same as some English words.	❍	❍	❍	❍	❍	❍
I wish I could pronounce words in a foreign language the way they should be pronounced.	❍	❍	❍	❍	❍	❍

Q19 Please indicate how strongly you agree or disagree with the following statements.

	Strongly Disagree	Disagree	Somewhat Disagree	Somewhat Agree	Agree	Strongly Agree
No matter who I'm talking to, I'm always a good listener.	○	○	○	○	○	○
People who fit their lives into a schedule probably miss most of the joy of living.	○	○	○	○	○	○
I never hesitate to go out of my way to help someone in trouble	○	○	○	○	○	○
When I don't know something, I don't at all mind admitting it.	○	○	○	○	○	○
I never resent being asked to return a favor.	○	○	○	○	○	○
I'm always willing to admit it when I make a mistake.	○	○	○	○	○	○
I have never been irked when people expressed ideas very different from my own.	○	○	○	○	○	○
I don't get upset when events come up that cause my daily routine to be changed.	○	○	○	○	○	○
I am usually calm and not easily upset.	○	○	○	○	○	○
I don't mind having other students laugh at me when I make a mistake while speaking in class.	○	○	○	○	○	○