VERBAL PROBABILITY EXPRESSIONS IN NATIONAL INTELLIGENCE ESTIMATES: A COMPREHENSIVE ANALYSIS OF TRENDS FROM THE FIFTIES THROUGH POST 9/11

RACHEL F. KESSELMAN

A Thesis

Submitted to the Faculty of Mercyhurst College

In Partial Fulfillment of the Requirements for

The Degree of

MASTER OF SCIENCE
IN
APPLIED INTELLIGENCE

DEPARTMENT OF INTELLIGENCE STUDIES
MERCYHURST COLLEGE
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DEDICATION

This work is dedicated to my best friend and mentor Don Gaddo, who constantly believed in me when I failed to believe in myself.

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First and foremost, I would like to thank my primary reader, Kristan Wheaton, for his guidance and assistance throughout the research process. His patience in dealing with my never-ending stream of questions and spontaneous changes during this project is greatly appreciated. Kris exhibits every trait of a fantastic mentor and his confidence in me over the past two years will not soon be forgotten. I would also like to thank Bill Welch for his willingness to assist as my second reader. His insightful comments in dealing with the National Intelligence Estimates have been most helpful. In taking the time to assist me in my endeavors, Steven Marrin is also owed a debt of gratitude. Our exhaustive conversations helped steer me in a direction that produced an extremely comprehensive literature review.

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And finally, to my good friend and mentor Don Gaddo, I thank him for the years of guidance and belief in me. It is not often that someone comes along who has complete confidence in who you are and what you do. This project would not have been possible without his motivating emails and long chats on the phone.

ABSTRACT OF THE THESIS

Verbal Probability Expressions in National Intelligence Estimates: A Comprehensive Analysis of Trends from the Fifties through Post 9/11

By

Rachel F. Kesselman

Master of Science in Applied Intelligence

Mercyhurst College, 2008

Professor Kristan J. Wheaton, Chair

[This research presents the findings of a study that analyzed words of estimative probability in the key judgments of National Intelligence Estimates from the 1950s through the 2000s. The research found that of the 50 words examined, only 13 were statistically significant. Furthermore, interesting trends have emerged when the words are broken down into English modals, terminology that conveys analytical assessments and words employed by the National Intelligence Council as of 2006. One of the more intriguing findings is that use of the word *will* has by far been the most popular for analysts, registering over 700 occurrences throughout the decades; however, a word of such certainty is problematic in the sense that intelligence should never deal with 100% certitude. The relatively low occurrence and wide variety of word usage across the decades demonstrates a real lack of consistency in the way analysts have been conveying assessments over the past 58 years. Finally, the researcher suggests the *Kesselman List of Estimative Words* for use in the IC. The word list takes into account the literature review findings as well as the results of this study in equating odds with verbal probabilities.]

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INTRODUCTION

The most recent intelligence failures regarding 9/11 and Iraqi Weapons of Mass Destruction (WMD) clearly demonstrate that analytical divisions within the intelligence community (IC) are in need of reform when it comes to producing key estimative judgments for decision makers. Intelligence estimates are intended to convey a degree of certainty which increases a decision maker's ability to take action, but when the words expressed in those estimates are vague enough that they allow multiple decision makers to each glean their own unique perspective, intelligence failure becomes inevitable. Agencies across the IC have yet to craft a standardized list of probability expressions that equate to particular odds for use in estimates, and without words of estimative probability (WEP) it likely becomes more difficult for decision makers to perceive threats.

Sherman Kent has long been regarded as the greatest contributor to the intelligence analysis field, and the Central Intelligence Agency's (CIA) Center for Studies in Intelligence (CSI) first published Kent's work on the need for precision in intelligence judgments in the 1950s. His work, simply titled "Words of Estimative Probability," has become an archetype for intelligence analysts generating estimative products and was the first of its kind dealing with this particular topic. In the article, he attempted to quantify qualitative judgments by assigning percentage values to probability phrases as well as variants for these six originally developed benchmarks. However, the IC has largely ignored this classical piece of work, often producing reports that are primarily clouded by so-called estimative expressions which are really not estimative in nature.

An analyst's job encompasses many aspects, but most importantly, his/her task revolves around reducing uncertainty for a decision maker.[1] When producing intelligence products, analysts should be able to clearly convey a message as well as include a compilation of both facts and logical judgments. Within the sphere of these judgments, it is also necessary to express a level of confidence, ultimately attempting to communicate a particular event's degree of likelihood. After constructing estimative judgments, it is an analyst's duty to question whether they have indeed reduced uncertainty for the policy maker.

There are changes in the ways estimates have been conveyed throughout the years and these trends are significant. For instance, the famous declassified President's Daily Brief (PDB) of August 6, 2001[2] titled "Bin Laden Determined to Strike in US" neglected to provide President George W. Bush with an obvious warning, capabilities assessment or timeframe in dealing with Bin Laden's intentions, but rather with a mere description of the situation and a recount of his previous actions. Most noticeably, WEPs in the memo were nonexistent. Therefore, the CIA's estimative judgment failed to reduce uncertainty that would permit the president and his administration to enact measures aimed at thwarting an attack by Al Qaeda.

An intelligence report that fails to predict what is likely to happen in the near future is of little importance to decision makers. President Bush has even explained to

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[1] Kristan J. Wheaton and Michael T. Beerbower, "Toward a New Definition of Intelligence," Stanford Law and Policy Review 17, no. 1. http://www.mcmanis-monsalve.com/assets/publications/evaluating-intelligence.pdf

[2] Thomas S. Blanton, *The President's Daily Brief (*George Washing University National Security Archives, 2004) http://www.gwu.edu/~nsarchiv/NSAEBB/NSAEBB116/index.htm#docs (Accessed October 19, 2007)

the September 11 commission that the PDB failed to provide sufficient intelligence for his administration to prevent attacks on the World Trade Center and Pentagon.[3]

The Mercyhurst College Institute for Intelligence Studies (MCIIS) has tweaked, through years of experience and practical application, Kent's original WEP list. Most notably, the new list now includes words such as "likely" and "unlikely", because in addition to demonstrating that the analyst is utilizing their own estimative judgments, they also convey that the likelihood of an event is either greater than 50% and less than 100%, or less than 50% but greater than zero.[4]

Significance

Words of estimative probability are central to an analyst's ability to clearly convey a set of judgments. The Commission on the Intelligence Capabilities of the United States Regarding Weapons of Mass Destruction expressed in its report on March 31, 2005 that analysts "must find ways to explain to policymakers degrees of certainty in their work." In addition, the commission urged that assessments of certainty be consistent throughout the IC and that all analysts clearly understand the indicators and how to use them.[5]

It is difficult for the IC to implement change in this area without a clear understanding of the manner in which analysts have previously incorporated probability expressions into their work. If the following research can identify trends in words of

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[3] Joseph Curl, "Bush Tells Panel Memo Lacked Data" (The Washington Times, April 30, 2004) http://goliath.ecnext.com/coms2/gi_0199-313253/Bush-tells-panel-memo-lacked.html (Accessed October 19, 2007)

[4] Diane E. Chido et al, "Structured Analysis of Competing Hypotheses: Theory and Application." Mercyhurst College Institute of Intelligence Studies Press, 2006.

[5] The Commission on the Intelligence Capabilities of the United States Regarding Weapons of Mass Destruction, March 31, 2005 http://www.wmd.gov/report/wmd_report.pdf (Accessed October 19, 2007)

estimative probability since Kent's article first appeared in the 1950s, the IC can then assess whether a lack of these words, vagueness in their meaning or other factors interfered with their ability to accurately predict events. Ultimately, the researcher anticipates that the work will illustrate inconsistencies in using probability expressions and prompt the IC to adopt a uniform method in evaluating indicators and producing intelligence estimates.

Purpose

The purpose of this research is to identify WEP trends in National Intelligence Estimates (NIE) produced by the National Intelligence Council (NIC), long considered the most authoritative written judgments of the IC regarding the likely course of future events. Specifically, the researcher will attempt to determine if analysts' use of WEPs in these documents varied throughout the 1950s, 1960s, 1970s, 1980s and 1990s in comparison with post 9/11 judgments. Additionally, this research will attempt to discern any decade-specific patterns with regards to WEPs as well as the possibility that they are absent in today's NIEs and have instead become largely descriptive.

LITERATURE REVIEW

> When writing analytical judgments, a DI analyst can use any word he or she wishes—''likely,'' ''possibly,'' etc.—to estimate the probability of an event's occurring. This imprecision could easily be overcome by acting on a proposal made by Sherman Kent, the inventor of the intelligence analyst profession, which the DI rejected at the time it was first made. He observed that my ''maybe'' might be your ''probably,'' and someone else's ''certainly'' may be my ''probably.'' To prevent confusion, only certain words describing probability should be permitted in intelligence reporting.
>
> –Garrett Jones, *It's a Cultural Thing: Thoughts on a Troubled CIA*[6]

Experimental data regarding words of estimative probability is severely lacking in the intelligence field; as a result, it was necessary to draw examples from more established disciplines. The following literature review encompasses, therefore, not only verbal probability in the intelligence domain, but also deals with probabilities in weather forecasting, the medical profession, finance and experimentation carried out in the realm of linguistics. In several cases, models from these additional fields are applicable to intelligence. Producing an accurate literature review is dependent on theories and data gleaned from these supplementary fields.

The literature review begins with a discussion of estimative words in the more established disciplines of weather forecasting, medicine, finance and linguistics. The section then progresses to verbal probability expressions in intelligence with a review of Sherman Kent's 1964 ground breaking paper 'Words of Estimative Probability' as well as important studies carried out by David Wark and Edgar Johnson. Following this introduction to the WEP topic, the chapter continues with a thorough analysis of specific intelligence failures that include NIE 29-51 "Probability of an Invasion of Yugoslavia in

[6] Garrett Jones, "It's a Cultural Thing: Thoughts on a Troubled CIA," Orbis 50, issue 1 (2006): 23-40.

1951", the 1996 NIE 95-19 "Emerging Missile Threats to North America During the Next 15 Years" as well as NIE 2002-16HC "Iraq's Continuing Programs for Weapons of Mass Destruction".

Understanding Probability in More Established Disciplines

As National Intelligence Estimates and the subsequent estimative language have only been produced since the early 1940's, it becomes necessary to examine how more established disciplines such as weather forecasting, medicine, finance and linguistics have dealt with the issue of verbal probability and how these present theories apply to intelligence, specifically NIEs.

Weather Forecasting

Similar to intelligence, weather forecasting relies heavily on accurately expressing uncertainty in its forecasts; however, forecasters have also dealt with the problem of conveying their uncertainty to a larger population, with different regions interpreting expressions in unique ways. Forecasters of the National Weather Service (NWS) have been routinely issuing what they call Probability of Precipitation (POP) forecasts to the general public since 1965. These forecasts, expressed numerically, "refer to the occurrence of measurable precipitation in 12 hour periods and represent average point probabilities for a metropolitan area or for one or more counties."[7] There is much debate among forecasters about whether to express odds verbally or numerically, but one thing is sure:

[7] Allan H. Murphy and Robert L. Winkler, "Probability Forecasting in Meteorology," J. American Statistical Association 79, no. 387 (1984): 489-500.

> Where users have *no* confusion about probability is in deciding that 80% is a higher probability than 20%! Studies have shown that giving verbal descriptions of uncertainty (i.e., *chance of rain* or *rain is likely* or *possible rain*) is vastly more confusing to the public. Interpretation of words varies considerably from one person to the next no matter how precisely the NWS might choose to define what *chance of* means. There can be no ambiguity of the *relative* confidence in an event when using probability.[8] Weather forecasters express uncertainty using many word forms.

Ultimately, the public is most interested in events that might disrupt their normal activities and the forecaster might express a risk with phrases such as:

1. only a slight chance of…
2. a high probability due to…
3. some places might get…

John Handmer and Beth Proudley in their paper "Communicating Uncertainty Via Probabilities: The Case of Weather Forecasts" explain that:

> Weather forecasts are inherently uncertain, and this makes the communication task more challenging as forecasters attempt to communicate information about the predicted event, and the uncertainties surrounding the prediction.[9]

During the 1996-97 winter season in Juneau, Alaska, residents were surveyed by the local NWS office to explore the effectiveness of the format and terminology used in writing public weather forecasts. Prior to conducting this research, the NWS had traditionally used a numerical POP statement with conventional verbal qualifiers to describe precipitation occurrences. One section of the questionnaire attempted to ascertain whether or not the public interprets verbal qualifiers in a similar manner to the organization, and respondents were asked to assign percent probabilities to a number of terms commonly used in public forecasts such as *slight chance*, *likely*, *chance*, *possible*,

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[8] Chuck Doswell and Harold Brooks, "Probabilistic Forecasting II: Outlooks, Watches and Warnings," *Cooperative Institute for Mesoscale Meteorological Studies and National Severe Storms Laboratory*, 1998.
[9] John Handmer and Beth Proudley, "Communicating Uncertainty Via Probabilities: The Case of Weather Forecasts," *Environmental Hazards* 7 (2007): 79-87.

developing, *occasional*, *ending* and *periods of*. The results are displayed below in *Table 2.1*.

Table 2.1: Comparison of Respondent and NWS Assigned Probabilities

Term	Survey Mean	Probability
slight chance	19.7%	10%, 20%
Few	28.0%	10%
Ending	31.7%	80%, 90%, 100%
Isolated	34.0%	10%
scattered	34.0%	30%, 40%, 50%
widely scattered	34.3%	20%
Chance	41.8%	30%, 40%, 50%
areas of	43.1%	80%, 90%, 100%
Occasional	50.9%	80%, 90%, 100%
Developing	52.9%	80%, 90%, 100%
Periods of	56.0%	80%, 90%, 100%
Likely	62.5%	80%, 90%, 100%
Frequent	66.5%	80%, 90%, 100%
Numerous	72.3%	80%, 90%, 100%

It is interesting to note that mean respondent scores for many of the words fall well below those prescribed by the NWS. The organization writes:

> A forecaster might use the term *occasional* to forecast an event where it rains on and off during the day, but the public may be expecting it to rain for only half of the day. In other words, public perception of the accuracy of an *occasional rain* forecast may be damaged if it rains during *most* of the day, whereas the forecaster may feel the forecast was justified. The only duration qualifier to receive a fairly high POP was the term *frequent* (66.5%).[10]

[10] Aimee Saviers and Larry VanBussum, "Juneau Public Questionairre: Results, Analyses and Conclusions," National Oceanic and Atmospheric Administration 1996-97, http://pajk.arh.noaa.gov/info/articles/survey/intro.htm

As with other studies in this review, this particular weather experiment denotes a high level of variability in one's capacity to perceive different probability terms. Quantifying the term *likely* appears to be less understood by the public than does the term *chance*. *Likely* was given a mean score of 62.5% when the NWS perceives its level anywhere from 80% to 100%. Other researchers including Krenz and Evans (1993)[11], Sink (1995)[12], Saviers and Van Bussum (1997)[13] and Racy (1998)[14] have corroborated differences in use of the word *likely* in previous surveys. Some have argued that the general public does not understand probability, but Murphy et. al found that the predominant source of misunderstanding stems from confusion about the specific event corresponding to the probability and not by a lack of comprehension of the definition of probability itself.[15] From the surveys mentioned above, only 17.7% of respondents prefer POP forecasts to be expressed verbally compared to 61.1% numerically. Approximately 21.2% of those surveyed would prefer POP forecasts to be expressed using both methods.

The Intergovenmental Panel on Climate Change, a body set up by the World Meteorological Organization and the United Nations Environment Programme, released its Fourth Assessment Report in 2007 in an attempt to update its understanding of global warming. The report conveys its predictions based on working group definitions. The

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[11] S.H. Krenz and J.H. Evans, "Weather Terms Used in National Weather Service Forecasts: Does the Public Understand These Terms? A User's Survey," Central Region Highlights, DOC, NOAA, NWS Central Region Headquarters, 1993.
[12] S.A. Sink, "Determining the Public's Understanding of Precipitation Forecasts: Results of a Survey, National Weather Digest 19, no. 3 (1995): 9-15.
[13] Aimee Saviers and Larry VanBussum, "Juneau Public Questionairre: Results, Analyses and Conclusions," National Oceanic and Atmospheric Administration 1996-97, http://pajk.arh.noaa.gov/info/articles/survey/intro.htm
[14] J.P. Racy, "How Northeast Indiana and Northwest Ohio Residents Interpret Meteorological Terminology and Services Through NOAA Weather Radio," NOAA Technical Service Publications, NWS CR-05, 1998.
[15] Allan H. Murphy et. al., "Misinterpretations of Precipitation Probability Forecasts," Bulletin of the American Meteorological Society 61, no. 7 (1980): 695-701

term *virtually certain* equates to a 99% chance of probability with others following in descending order: *extremely likely* at 95%, *very likely* at 90%, *likely* at 66%, *more likely than not* at 50%, *very unlikely* at 10% and *extremely unlikely* rounding out the list at 5%.[16] The Panel's percentage assigned to the term *likely* seems to correlate well with the public's perception of the same term referenced above, indicating that the NWS may have overestimated its true meaning by assigning a value between 80% and 100%.

Medicine

Employing verbal probability expressions in the practice of medicine is commonplace, with physicians constantly using expressions such as *likely* or *probable* to communicate diagnoses. In a consultation, for example, these expressions may be used to convey to patients the chances of symptoms persisting or the development of a particular side effect. The problem with verbal expressions of probability in the medical field, however, parallels that of weather forecasting: the same expression may convey different degrees of likelihood to different individuals. The question in medicine therefore revolves around how medical professionals can best express this uncertainty to their patients. Bernie O'Brien writes in his paper "Words or Numbers? The Evaluation of Probability Expressions in General Practice:"

> The question is amenable to empirical testing and some studies have been undertaken where doctors numerically rated (for example on a percentage probability scale) particular words or phrases which denote probability. The findings of such studies indicate that although there exists a consistent rank ordering of particular phrases expressing likelihood, the variability in values assigned to phrases is large enough to warrant further study, using

[16] Intergovernmental Panel on Climate Change, "The IPCC Fourth Assessment Report," 2007, http://www.ipccinfo.com/index.php

> different respondent groups and rating contexts, in order to move towards a system of codification for such phrases. [17]

A study carried out in 1986 found agreement among medical professionals in their rankings of verbal probability expressions, but patients' perception of these words seem to vary quite a bit more. More recently, Mazur and Merz in 1994 determined that numerical meanings which patients assign to probability terms appear to fall into identifiable patterns, and while patients vary in the actual values they assign to the terms, the relative meanings of the words show consistent trends. [18]

Other researchers have demonstrated consistency in specific expressions such as *likely*, *unlikely* and *probable*. A study attempting to examine the communication of doubt and certainty in radiological reports ranked these terms most consistent in expressing 'intermediate probability' out of 18 choices, and all three words received statistically significant scores when calculating interobserver difference, with $p=0.015$, $p=0.011$ and $p=0.001$ respectively. [19]

Concordance among studies attempting to assign probability ratings to various expressions has been encouraging. *Table 2.2* below illustrates three separate studies performed by Bryant and Norman in 1980, Kong et al in 1986 and O'Brien in 1989 with similar methodology. The word list is notable because as will be discussed later in this literature review, the terms parallel those proposed by Sherman Kent in 1964 for use in the IC.

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[17] Bernie J. O'Brien, "Words or numbers? The Evaluation of probability expressions in general practice." J. Royal College of General Practitioners, 39, 98-100 (1989).
[18] DJ Mazur and DH Hickam, "Patients' interpretations of probability terms." J General Internal Medicine 6 (1991): 237-240
[19] Hobby, JL et al., "Communication of doubt and certainty in radiological reports." The British Journal of Radiology 73, (2000): 999-1001.

Table 2.2 Probability Ratings of Six Expressions from Three Studies			
	O'Brien	Kong et al	Bryant and
Certain	95%	99%	95%
Probable	75%	70%	77%
Likely	70%	70%	73%
Possible	25%	20%	47%
Unlikely	13%	11%	20%
Never	0%	0%	33%

As is evident, mean probability ratings from the studies demonstrate close correlation between the first three terms. These findings appear to differ from the radiological study mentioned above as the term *unlikely* does not convey 'intermediate probability.'

Medical professionals seem to have had more success in expressing probability to their patients than have weather forecasters to the public. This achievement is likely motivated by legal ramifications, as the law requires that physicians disclose certain information to a patient, regardless of whether that patient has requested the information.[20] If the physician does not disclose this information and a nonnegligent-caused injury results, the medical professional may be held liable. In informed consent, a patient must receive information regarding the expected outcome of the medical intervention, its alternatives and potential adverse outcomes.

[20] Dennis J. Mazur and John F. Merz, "Patients' Interpretations of Verbal Expressions of Probability: Implications for Securing Informed Consent to Medical Interventions." J. Behavioral Sciences and the Law 12, 417-426 (1994)

Finance

Although far less substantive research appears in the realm of finance, verbal probability expressions still play an important role in providing clients with financial advice. For example, a financial advisor may utter a statement such as "it is *possible* that company X will experience an increase in profit of at least 5% by the end of next fiscal year."

Two particular pieces of research encompass verbal expressions of probability in the financial setting. The first, an article titled "The Interpretation of Probabilistic Phrases Used to Provide Financial Advice" by Robert Olsen and Michael O'Neill in 1988 strives to "…obtain an estimate of the association between numerical probabilities and a set of probabilistic phrases used by Financial Advisors."[21] In attempting to do so, the researchers distributed a questionnaire with fifteen probabilistic words and phrases to random samples of 25 stockbrokers, 39 bank trust and lending officers, 24 public accountants that provide tax and financial advice and 300 clients. The investigators opted for words that would represent an expansive range of commonly used probabilistic phrases. Ultimately, they decided on six phrases that included the word *probable* and five that used the word *likely*. The results of the study are encouraging:

> In general, the results suggest that in relative terms, clients and advisors are not likely to disagree about the ranking of the examined words and phrases. However, the evidence also indicates that there are likely to be significant absolute differences in the interpretation of phrases and words that could lead to major misunderstandings. For example, assume that an advisor were to say to his clients that "he felt that it was probable that interest rates would rise in the next six months." Given the data…and assuming a normal distribution of probabilistic beliefs, 67% of all clients

[21] Robert A Olsen and Michael F. O'Neil, "The interpretation of probabilistic phrases used to provide financial advice." J Professional Services Marketing, 4, 1 (1989).

would associate numerical probabilities of between 37% and 95% with the advisor's use of the word *probable*. [22]

These findings track well with those in the weather and medical fields. Large inter-subject variability in quantifying and clearly understanding probabilistic phrases is evident in all three disciplines, with rankings of verbal phrases remaining somewhat consistent. For example, the study referenced above mentions that two-thirds of all clients tested would assign probabilities between 0% and 28% to the term *highly improbable*, one of the phrases with the smallest variability in meaning. The authors maintain that probabilistic phrases will, without a doubt, create communication difficulties and that "Financial Advisors should resist the urge to use imprecise probabilistic words or phrases whenever possible." [23]

The second significant piece of work dealing with probability in finance details how auditors use words and numbers to assess risk. In his 2006 dissertation, David Piercey, an Assistant Professor of Accounting at the University of Massachusetts Amherst, attempted to assess the numerical and verbal probability of misstatement in financials. He assigned approximately 600 undergraduate students to three individual groups and provided them with a case to evaluate. One group was informed that their boss wanted them to look favorably on the client; the second was told to be completely objective and the third was asked to be skeptical. All of the students analyzed the case and made judgments regarding the numerical probability of misstatement in the financials.[24]

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[22] Ibid.
[23] Ibid.
[24] David Piercey, "Somewhat possible of substantial doubt?" PhD diss., University of Illinois at Urbana-Champaign, 2006.

In the second phase of the research, half the students were asked to express the probability of misstatement in words. Where the students might have earlier determined that it was 70% likely that a company's assets were overstated, they were now asked to express that statement without using numbers. Subjects were permitted to choose from phrases such as *almost certain*, *very likely*, *somewhat uncertain*, *some possibility*, *slightly likely*, *a chance* or *not quite impossible*. Participants were then asked to complete a numerical scale indicating what that expression means to them from a probability perspective. Piercey concludes that "the effects of initial preferred conclusions on the students' final judgments were more extreme when they responded with words rather than numbers." He also explained that "there is more latitude of judgment with a verbal expression because of the variety of words available and their vagueness.[25]

Linguistics

The field of Linguistics by far contains the majority of literature carried out in the area of verbal probability expressions. As such, research in the field is extensive and only a small number of studies will be discussed in this section. A few principal conclusions can be drawn from the research completed over the past 40 years: (1) people are highly internally consistent in their use of verbal uncertainty expressions and (2) no conclusions about between-subject variability are justified because there is little agreement as to what constitutes consistent and inconsistent use.

Lichtenstein and Newman carried out one of the earliest studies in the field in 1967 titled "Empirical Scaling of Common Verbal Phrases Associated with Numerical Probabilities." They asked 188 subjects to assign numerical values between .01 and .99

[25] Ibid.

to 41 verbal expressions, and the results allowed the authors to observe some interesting characteristics. First, the degree of qualification of adverbial modifiers was symmetrical between *likely* and *unlikely*. The order was *very* > *quite* > no adverb > *rather* > fairly > *somewhat*. Second, subadditivity (or the tendency to judge probability of the whole to be less than that of the parts)[26] was observed between the mean values assigned to eight of the 11 sets of symmetric pairs. For example, subjects assigned a mean value of .79 to *quite likely* while they gave a mean value of .11 to *quite unlikely*, with an overall total of only .90. In relation to the present experiment, the primary limitation of this study was the choice of stimuli, where many of the expressions dealt with frequency rather than uncertainty.

In 1985, Budescu and Wallsten, in their study "Consistency in Interpretation of Probability Phrases," attempted to determine whether "there are large, consistent individual differences between people in the ranking of non-numerical probability phrases."[27] Or, in more technical terms, do observed differences derive from individual differences or are they the effect of taking a cross-section of individual variability over time? Thirty-two subjects rank ordered and made pair comparisons between 19 expressions which the authors classified as anchor expressions, higher than chance or lower than chance. The study consisted of three replications separated by three week intervals. Each replication was composed of a pair comparison task and either a ranking or an estimation task. A 32 x 4 (subjects x time rank orders) analysis of variance was performed on ranks separately for each expression. The results indicated that the

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[26] Renan Levine, "Subadditivity and the Unpacking Effect in Political Opinions." University of Toronto, 2007, http://works.bepress.com/cgi/viewcontent.cgi?article=1012&context=renan

[27] David Budescu and Thomas Wallsten, "Consistency in Interpretation of Probabilistic Phrases." Organizational Behavior and Human Decision Processes 36 (1985): 391-405.

between-subject variance was the dominant factor for all expressions. On the basis of their results, Budescu and Wallsten argued that:

> The practical implications of the present results are quite clear—probability phrases may lead to ordinal confusion in usual communication. Furthermore, it must be true that use of numbers rather than phrases will eliminate this particular problem.[28]

Like other studies, however, a large set of the expressions employed dealt with frequency rather than probability. This may increase between-subject variance in ranking and pair comparison tests because the expressions do not constitute a homogenous set.

In 1989, Reagan, Mosteller and Youtz carried out a study titled "Quantitative Meanings of Verbal Probability Expressions." In addition to studying frequency distributions for single number equivalents of probability expressions, the researchers expanded on a subsequent study carried out by Wallsten in 1986 by asking if "the number or set of numbers a person would refer to with a probability expression" was "the same as the number or set of numbers a person would understand the probability expression to mean?"[29] They cited an example of whether humans intend *unlikely* to refer to percentages from 5% to 25%, stating that they should use it in situations to correspond to just those probabilities. To address the issue, they instructed subjects to specify which probability expressions were appropriate for various numerical probabilities. A total of 115 undergraduate students from Stanford participated in the experiment. The researchers employed 18 probability expressions, asking subjects to assign both percentages and verbal expressions to three different sentence contexts. Of the 18 expressions, six that utilized the word *chance* were symmetric with each other. In

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[28] Ibid.
[29] Regan, Robert T. et al, "Quantitative Meanings of Verbal Probability Expressions." Journal of Applied Psychology 74 (1989): 433-442.

addition, expressions incorporating the stem *probable* demonstrated concordance with the stem *likely*. Overall, 15 of the expressions were very good at representing the extremes of the 0% to 100% range, and two of the expressions were good for the middle. However, no expression appeared to capture probabilities in the range of 30% to 35%.

In 1997 Tavana and Mohebbi conducted an applied study to determine how best to develop a standardized set of useful verbal probability phrases for communication purposes within an expert community. The study, titled "An Applied Study Using the Analytic Hierarchy Process to Translate Common Verbal Phrases to Numerical Probabilities," utilized the expertise of 30 financial strategists at the Financial Strategies Group (FSG) of a major Wall Street Firm whose communication frequently includes the use of non-numerical phrases to express uncertainty throughout the course of a workday. The data for the study was collected from three questionnaires. A total of 76 probabilistic phrases were divided into 11 groups according to the similarity of the numerical values assigned in other studies. Participants were asked to select the phrase in each group that most clearly captured the probability conveyed by the phrases in a particular group. Two subsequent questionnaires were distributed a few weeks following the initial one. The third questionnaire was significant in that it utilized the Analytic Hierarchy Process which assists a decision maker in evaluating complex judgmental problems. To reduce the number of pairwise comparisons (the process of comparing entities in pairs to judge which of each pair is preferred),[30] the questionnaire was divided into two parts. Phrases identified with a higher probability were placed on one questionnaire while phrases identified with a lower probability were placed on a second questionnaire.

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[30] Statistical Consultants List, Definition of 'Pairwise Comparisons,' 1995. http://core.ecu.edu/psyc/wuenschk/StatHelp/Pairwise.htm

A quadratic least-squares technique was used to map the relative weights onto a subjective probability scale, resulting in a consistent scaling of probabilistic phrases that the analysts prefer and actually use. The scale presents the authors' final verbal probabilistic expressions and perceived probability estimates. Overall, the scale contains 11 probability phrases ranging from impossible at 0.00 to certain at 1.00. The terms *toss-up* and *certain* were the anchors representing 50% and 100% probabilities. The relative weight for *toss-up* was 0.047 and for certain was 0.346, with the model estimating probability for each of the other phrases associated with a relative weight between *toss-up* and *certain*.

> The proposed method makes it easier to codify the meaning that individuals assign to verbal probability expressions, to publicize these meanings and to train people to use the terms with these common meanings. The results demonstrate that professional colleagues are able to agree on the interpretation of probabilistic phrases with little overlap when they select a representative set of phrases and make comparisons among them in a systematic manner. Furthermore, assessments before and after the implementation of the verbal probability scale indicate that the verbal phrase scale is working at FSG. Specifically, the financial analysts restricted their verbal expressions of probability to the phrases in the scale.[31]

[31] Tavana, Madjid et al., "An Applied Study Using the Analytic Hierarchy Process to Translate Common Verbal Phrases to Numerical Probabilities." Journal of Behavioral Decision Making 10 (1997): 133-150.

Table 2.3 Perceived Probabilities Using the Analytic Hierarchy Process	
Verbal Expression	Probability
Impossible	0.00
Small Possibility	0.10
Small Chance	0.20
Somewhat Doubtful	0.30
Possible	0.40
Toss-up	0.50
Somewhat Likely	0.60
Likely	0.70
Very Likely	0.80
Quite Certain	0.90
Certain	1.00

Early Attempts at Standardizing Probability Expressions in Intelligence

In a *Washington Post* article dated February 20, 2005 titled "What Percent is 'Slam Dunk'?," Michael Schrage quotes a senior CIA officer who has served for more than 20 years:

> Intelligence officers "would rather use words than numbers to describe how confident we are in our analysis." Moreover, "most consumers of intelligence aren't particularly sophisticated when it comes to probabilistic analysis. They like words and pictures, too. My experience is that [they] prefer briefings that don't center on numerical calculation. That's not to say we can't do it, but there's really not that much demand for it." [32]

A weather forecaster states that he is "fairly certain" we will see snow over the weekend. An intelligence estimate predicts that an enemy attack is "probable" within the next 24 hours. Do these statements have a consistent meaning? Do analysts and decision

[32] Michael Scrage, "What % is Slam Dunk?" *Washington Post,* February 20, 2005, Sunday Section, Sunday Outlook, http://www.washingtonpost.com/wp-dyn/articles/A37115-2005Feb19.html

makers interpret expressions of probability similarly? The answer to both questions is "likely" no. An intelligence officer is responsible for determining the degree of likelihood in any given statement and communicating this effectively to consumers of intelligence, but when there is no standard terminology to describe the probability of events, intelligence failure becomes inevitable. Several analysts and researchers (Kent 1964, Wark 1964, Johnson 1973) have attempted to produce a standard list of probability expressions for the IC, but the community has rejected their efforts.

Sherman Kent's classic work "Words of Estimative Probability" in the 1950s was first classified Confidential and published in the CIA's Studies In Intelligence in 1964. Essentially, the paper attempted to quantify qualitative judgments by presenting the mathematical odds equivalent to verbal expressions of probability. The work was the first of its kind in the intelligence field and unfortunately has largely been ignored since its appearance. Kent argues that the IC needs to differentiate between "…certain knowledge and reasoned judgment, and within this large realm of judgment what varying degrees of certitude lie behind each statement." [33] The initial table of verbal probabilities proposed by Kent and their mathematical equivalents are detailed in *Table 2.4* below.

[33] Sherman Kent, "Words of Estimative Probability," Studies in Intelligence, Volume 8 4-49-65 (Fall 1964), https://www.cia.gov/library/center-for-the-study-of-intelligence/kent-csi/docs/v08i4a06p_0001.htm

Table 2.4: Kent's Words of Estimative Probability		
100% Certainty		
The General Area of Possibility		
93%	give or take about 6%	Almost certain
75%	give or take about 12%	Probable
50%	give or take about 10%	Chances about even
30%	give or take about 10%	Probably not
7%	give or take about 5%	Almost certainly not
0% Impossibility		

Kent first describes three typical kinds of statements present in the majority of intelligence literature. He portrays an indisputable fact, followed by a judgment or estimate based on strong evidence and finally an additional judgment or estimate lacking both direct and indirect evidence.

These three types of statements are illustrated by a briefing officer reporting on a photoreconnaissance mission. Pointing to a map, the officer remarks:

1. "And at this location there is a new airfield. Its longest runway is 10,000 feet."
2. "It is almost certainly a military airfield."
3. "The terrain is such that the Blanks could easily lengthen the runways, otherwise improve the facilities, and incorporate this field into their system of strategic staging bases. It is *possible* that they will." Or more daringly, "It would be logical for them to do this and *sooner or later they probably will*."[34]

If one were to categorize these statements according to levels of certitude, the first is as close as one would come to an indisputable fact. The camera simply replicated an object in a specific area, thus eliminating the need to produce any kind of estimative judgment. The second statement, however, introduces a level of uncertainty, albeit how

[34] Ibid.

much is likely unknown. The man speaking about it uses surrounding factors to substantiate his judgment: he sees that only military aircraft are present on the field, several of them are parked in revetted hardstands, the support area appears to closely resemble a military installation, etc. Perhaps the officer is 80-90% certain of his judgment, but he cannot be entirely sure; therefore, he uses the verbal qualifier *almost* in his statement to demonstrate that he is unable to ascertain the situation.

The final statement is one decisionmakers rarely enjoy deciphering as it is based neither on direct nor indirect evidence. It appears to be lower in certitude than the previous statement, but by how much? The use of *possible* and *sooner or later they probably will* is open to interpretation. The two verbal qualifiers appear to convey a likelihood greater than 50%, but an agreed upon number is difficult to pinpoint.

In this one essay, Kent managed to isolate a serious problem plaguing the IC – an agreed upon list of verbal probability expressions that accurately portray levels of certainty is nonexistent. This begs the question 'How can analysts communicate a level of certainty to a decision maker when producers and consumers each extract different meanings from a single probability phrase?

Kent primarily gears his remarks toward people involved in crafting the most authoritative judgments this nation produces, namely the NIEs. These estimates represent the most formal assessment of an issue that is of high importance to a decision maker, as they often address issues of major national security and require immediate action. In a CRS Report titled "Intelligence Estimates: How Useful to Congress?" Richard Best Jr., a specialist in national defense mentions:

> NIEs represent the highest and most formal level of strategic analysis by the US Intelligence Community. They are by definition forward-looking;

> as one participant in the estimative process has written, "Estimates are not predictions of the future. They are considered judgments as to the likely course of events regarding an issue of importance to the nation. Sometimes, more than one outcome may be estimated."[35]

Kent recognized that these estimates should differentiate between certain knowledge and reasoned judgment. When the IC has agreed upon an analysis, they should be able to choose a word that clearly describes the level of certainty they are attempting to convey. He explains that "ideally, exactly this message should get through to the reader."[36] Initially, several charts were produced that discussed the premise of WEPs in the intelligence community. Kent remarks:

> There were those who thought the concept and the chart a very fine thing. A retired intelligence professional thought well enough of it to put it into a book. CIA officers, addressing War College audiences and the like, would sometimes flash a slide and talk about it. A few copies got pasted on the walls of estimates offices in the community. Some people were sufficiently taken that they advocated putting it on the inside back cover of every NIE as a sort of sure-fire handy glossary.[37]

Others in the community have agreed with Kent's stance on the noticeable and often problematic variability within intelligence semantics. In 1964, David L. Wark published an article titled "The Definition of Some Estimative Expressions" validating that there is much disagreement when it comes to verbal probabilities in estimates. He states:

> Finished intelligence, particularly in making estimative statements, uses a number of modifiers like "highly probable," "unlikely," "possible" that can be thought of as expressing a range of odds or a mathematical probability, and these are supplemented by various other expressions, especially verb forms, conveying the sense of probability less directly "may," "could," "we believe." Certain other words express not

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[35] Richard Best Jr., "Intelligence Estimates: How Useful to Congress?", *CRS Report for Congress*, November 21, 2006, http://www.fas.org/sgp/crs/intel/RL33733.pdf

[36] Sherman Kent, "Words of Estimative Probability," *Studies in Intelligence*, Volume 8 4-49-65 (Fall 1964), https://www.cia.gov/library/center-for-the-study-of-intelligence/kent-csi/docs/v08i4a06p_0001.htm

[37] Ibid.

> probability but quantity, imprecisely but perhaps within definable ranges "few," "several," "considerable." Some people object to any effort to define the odds or quantities meant by such words. They argue that context always modifies the meaning of words and, more broadly, that rigid definitions deprive language of the freedom to adapt to changing needs.[38]

Wark carried out a study to determine the extent to which "…there is a consensus about the quantitative range"[39] of qualitative expressions of probability. A three-part questionnaire on this topic was distributed within the IC, specifically to the Intelligence and Research (INR) Bureau of the State Department, the Defense Intelligence Agency (DIA) Office of Estimates and five CIA offices. A simplified version of the survey was also sent to policy staffs in the White House, State Department and Pentagon.

Respondents were instructed to evaluate 41 different expressions that indicated varying levels of probability and were offered the choice of 0, 10, 20, etc through 100 as signified by each word or phrase. Phases two and three of the questionnaire served primarily as validation tools and asked participants to evaluate the expressions in 17 sentences taken from the intelligence community as well as to assess nine expressions of magnitude not referring to probability in conjunction with several ranges for each. In total, Wark received responses from 240 intelligence analysts and 63 policy officers.

Replies were tabulated for 41 questionnaires in four categories that descended in order of valid definition and are clarified below in *Table 2.5*.

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[38] David L. Wark, "The Definition of Some Estimative Expressions," *Studies in Intelligence*, Volume 8 4-67-80, (Fall 1964), https://www.cia.gov/library/center-for-the-study-of-intelligence/kent-csi/docs/v08i4a07p_0001.htm

[39] Ibid.

Table 2.5: Wark's Reply Categories	
Category A	Consensus including 90% or more of all respondents
Category B	Consensus including 70% to 89% of all respondents
Category C	No consensus, but less than 20% of respondents marked N/A
Category D	No consensus, and 20% or more of respondents marked N/A

Not surprisingly, Wark's study demonstrated high inter-subject variability in evaluating these expressions. In part one, three fell into Category A, thirteen into Category B, seven into category C and eight into Category D. He again revived the theory that an analyst in one office fails to interpret the word *probably* in the same manner as analysts and decision makers do in other offices.

The last published study conducted in intelligence dealing with what Kent deemed 'words of estimative probability' was carried out by Edgar M. Johnson for the Army Research Institute for the Behavioral and Social Sciences in 1973. The research was titled "Numerical Encoding of Qualitative Expressions of Uncertainty," and in it Johnson describes the large individual differences found in a previous study conducted by NATO.[40]

> Twenty-three officers of ten different nationalities, all fluent in English and with a background in intelligence, described in terms of "chances out of 100" what a series of statements meant to them. The size of the range of numerical values assigned to specific phrases varied from 25 to 80. Another informal study found differences as large as 50 between the numerical values assigned to an intelligence evaluation by its two authors.[41]

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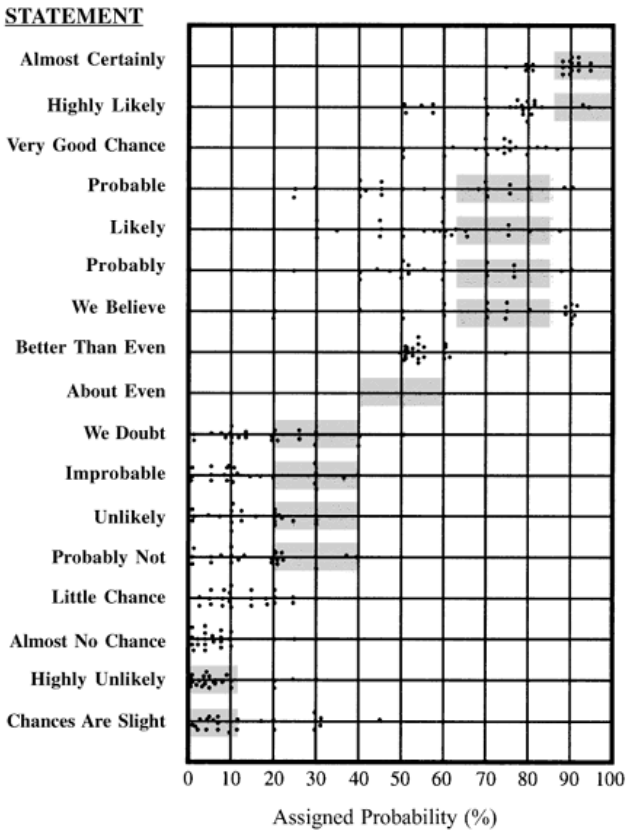
[40] Edgar M. Johnson, "Numerical Encoding of Qualitative Expressions of Uncertainty," Army Research Institute for the Behavioral and Social Sciences, National Technical Information Service, (December 1973), http://stinet.dtic.mil/cgi-bin/GetTRDoc?AD=AD780814&Location=U2&doc=GetTRDoc.pdf

[41] Letter, MAS (Army) (69) 559, from NATO Assistant Chief of Staff for Intelligence to Military Agency for Standardization, OTAN/NATO, Autoronte Brussels/Zaventem B-1110, Brussels 39, Belgium, (February 20, 1970), Subject: Proposed Agenda Item for Next Meeting of the Intelligence Procedures Inter-service Working Party (NU).

The figure below depicts the results of the experiment. One individual dot in the table represents a single officer's probability assignment. As is evident, there is a large discrepancy in the interpretation of nearly all expressions, excluding the broad consensus about the meaning of "better than even." The shaded regions in the *Figure 2.1* represent the ranges originally proposed by Kent.

Figure 2.1: NATO Experiment Results



In his own study, Johnson attempted to 1) assess the effect of context on the numerical encoding of qualitative statements of probability, 2) compare numerical assignments to probability phrases made by military personnel and by evening college students and to 3) determine the consistency and the form of the probability scale used in assigning numerical estimates to probability phrases.

He instructed a group of male US Army enlistees who had recently completed training as image interpreters, as well as a group of 14 college students enrolled in an introductory psychology course at the Graduate School of the US Department of Agriculture, to fill out a questionnaire with 45 sentences (the combination of 15 probability words and three different sentence contexts). Eight of these phrases varied adverbs with the root *likely* and four were adverbs with the root *probable*. The three sentences selected were:

1. The official weather forecast says that rain is ___ for tomorrow.
2. You tell someone that it is ___ you will win a contest.
3. The CIA reports that from satellite photographs it is ___ that anti-missile sites are being constructed around Moscow.[42]

The results of Johnson's study reveal interesting conclusions regarding probability expressions. First, he determined that sentence context does not influence a subject's ability to encode probability phrases into numerical equivalents. This contrasts starkly with Wark's research, as he concluded that sentence context may in fact influence a person's judgment if they are familiar with specific people and places.[43] It is likely that Johnson's sentence referring to Moscow and anti-missile sites held little significance for new recruits or graduate students at the US Department of Agriculture. More recent studies (Windschitl and Weber 1999) have determined that interpretations of vague

[42] Edgar M. Johnson, "Numerical Encoding of Qualitative Expressions of Uncertainty," Army Research Institute for the Behavioral and Social Sciences, National Technical Information Service, (December 1973), http://stinet.dtic.mil/cgi-bin/GetTRDoc?AD=AD780814&Location=U2&doc=GetTRDoc.pdf

[43] David L. Wark, "The Definition of Some Estimative Expressions," *Studies in Intelligence*, Volume 8 4-67-80, (Fall 1964), https://www.cia.gov/library/center-for-the-study-of-intelligence/kent-csi/docs/v08i4a07p_0001.htm

verbal forecasts differ as a function of the context to which they refer, thus refuting Johnson's claim.[44]

Johnson also concludes that encoding probability phrases into numerical equivalents across military personnel and college students was not correlated with age, sex or education beyond high school. While no other known studies have investigated this claim, if it holds true, trained intelligence analysts are in the same group as the general population in terms of one's ability to translate a verbal expression of probability into its numerical equivalent.

Johnson also asserts that individuals were relatively consistent in their encoding of a given probability phrase, but are likely to differ from other individuals. This finding substantiates Johnson and other's claims that large individual differences do exist in interpreting probability expressions (Cohen et. al 1958, Stone & Johnson 1959, Simpson 1963, Lichtenstein & Newman 1967, Levine & Eldridge 1970, Samet 1973).

The issue of how to communicate probability in intelligence has recently gained renewed attention. One recommendation of the WMD report included:

> A structured Community program must be developed to teach rigorous tradecraft and to inculcate common standards for analysis so that, for instance, it means the same thing when two agencies say they assess something 'with a high degree of certainty'.[45]

In addition, the 2004 Intelligence Reform and Terrorism Prevention Act dictated that the Director of National Intelligence shall assess intelligence products to ensure that they "properly caveat and express uncertainties or confidence in analytic judgments…and

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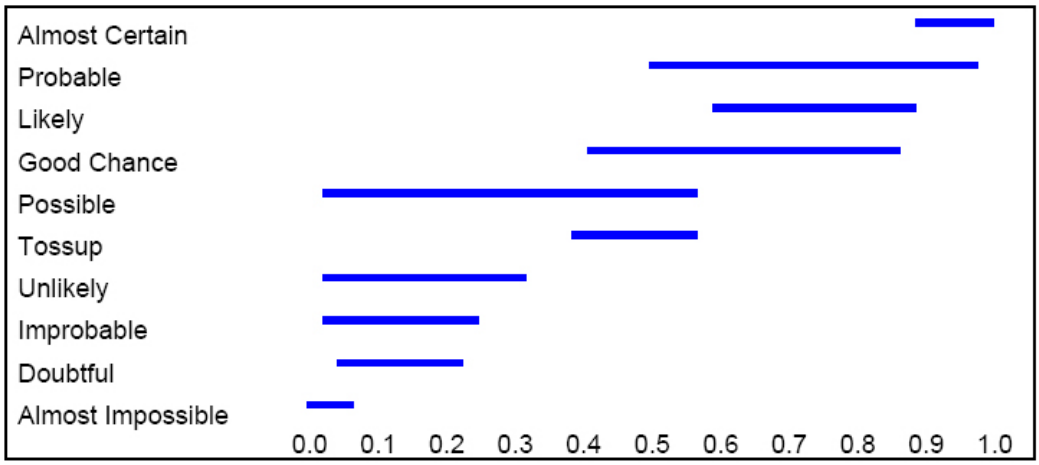
[44] Paul Windschitl & Elke Weber, "The Interpretation of 'Likely' Depends on the Context, but '70%' Is '70%'—Right? The Influence of Associative Processes on Perceived Certainty," J. Experimental Psychology: Learning, Memory and Cognition 25, no. 6 (1999).

[45] Commission on the Intelligence Capabilities of the United States Regarding Weapons of Mass Destruction, "WMD Commission Report," p. 409 (March 31, 2005), http://www.wmd.gov/report/

properly distinguish between underlying intelligence and the assumptions and judgments of analysts…"[46]

The task of how to best express varying degrees of certitude is a complex one. *Figure 2.2* below is taken from Steven Rieber's paper "Communicating Uncertainty in Intelligence Analysis" and demonstrates the difficulty involved in attempting to implement a goal such as the one described above. Subjects tend to assign a broad numerical range to each of the probability terms below, rather than interpreting phrases as one specific numerical value. The expressions *probable*, *good chance* and *possible* seem to cover the largest range in the spectrum.

Figure 2.2: Subject Interpretation of Probability Terms



Richard Heuer, author of "The Psychology of Intelligence Analysis," describes the problem at hand in Chapter 12 of his book.

> When intelligence conclusions are couched in ambiguous terms, a reader's interpretation of the conclusions will be biased in favor of consistency with what the reader already believes.[47]

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[46] Intelligence Reform and Terrorism Prevention Act of 2004, p. 36

[47] Richards J. Heuer, Jr., *Psychology of Intelligence Analysis*, (CIA Center for the Study of Intelligence, 1999), 153, https://www.cia.gov/library/center-for-the-study-of-intelligence/csi-publications/books-and-monographs/psychology-of-intelligence-analysis/PsychofIntelNew.pdf

Do Analysts Use WEPs in National Intelligence Estimates?

Nowhere else are verbal probability expressions of more importance than in this country's National Intelligence Estimates. Since production using the current method first began in late 1950, over 1500 NIEs have been published.[48] Each of these papers intends to convey an 'estimate,' or a statement setting forth explicit and clearly implied judgments. Several IC members that include Harold Ford and Richard Davis have proposed that estimates must find a way to distinguish between what is fact and what is judgment.[49] To arrive at these judgments, it is necessary for analysts to utilize verbal probability terms such as those defined in earlier sections of this review and clearly articulated by Sherman Kent and others in the IC. However, do analysts really use them, and if so, are they the terms plainly defined by Kent in 1964?

In March 1951, NIE 29-51, "Probability of an Invasion of Yugoslavia in 1951," emerged from the IC. It concluded that:

> Although it is impossible to determine which course the Kremlin is likely to adopt, we believe that the extent of Satellite military and propaganda preparations indicates that an attack on Yugoslavia in 1951 should be considered a serious possibility.[50]

A few days after the estimate was published, Sherman Kent engaged in a casual conversation with the Policy Planning Staff's chairman. While speaking about the particular estimate, he proceeded to ask "By the way, what did your people mean by the

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[48] Harold P. Ford, "The Primary Purpose of National Estimating" in *Estimative Intelligence: The Purposes and Problems of National Intelligence Estimating.* Harold P. Ford (University Press of America, 1993), 69-79.

[49] Ibid.
Richard Davis, testimony before US Senate Select Committee on Intelligence, "Foreign Missile Threats: Analytic Soundness of National Intelligence Estimate 95-19, December 4, 1996, http://www.gao.gov/archive/1997/ns97053t.pdf

[50] United States, Directorate of National Intelligence. "Declassified Probability of an Invasion of Yugoslavia in 1951." http://www.dni.gov/nic/PDF_GIF_declass_support/yugoslavia/Pub08_NIE-29_1.pdf

expression 'serious possibility'? What kind of odds did you have in mind?"[51] Kent responded that he would place his odds around 65 to 35 in favor of an attack, while the chairman and his colleagues had interpreted the odds considerably lower. More troubling was the fact that colleagues on the Board of National Estimates conveyed odds to Kent ranging anywhere from 20 to 80. This discussion is what first prompted Kent to devise a standardized list of terminology for use in estimates; however, the IC has refused to adopt any such method and misinterpretations as the one illustrated above continue to plague current NIEs.

The National Intelligence Council, a body tasked with preparing these estimates of substantial magnitude, claim on their website that NIEs remain controversial. They paraphrase Sherman Kent:

> …estimating is what you do when you do not know something with exactitude or confidence. In discussing large or complex topics, National Intelligence Estimates necessarily have to delve into a realm of speculation, a dense process of trying to separate out the probable from the possible from the impossible, and of providing answers to difficult but important questions with an appropriate degree of uncertainty about incomplete information.[52]

'An appropriate degree of uncertainty' is a term that varying members of the IC have yet to agree upon. As is evident from previous discussions in this review, decision makers interpret probability differently than their analysts, and with a lack of standardized terminology, this misunderstanding sets the stage for strategic surprise.

As NIEs are one of the most formal and authoritative intelligence products produced by the IC, it is difficult to fathom why after approximately 70 years of

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[51] Sherman Kent, "Words of Estimative Probability," *Studies in Intelligence*, Volume 8 4-49-65 (Fall 1964), https://www.cia.gov/library/center-for-the-study-of-intelligence/kent-csi/docs/v08i4a06p_0001.htm

[52] Robert L. Suettinger, National Intelligence Council, "Overview: History of Intelligence Estimates," http://www.dni.gov/nic/NIC_tradecraft_overview.html

experience in the intelligence field this country has yet to formulate an effective method for conveying probability. However, before the IC can devise a system for expressing uncertainty, it is necessary to first understand how varying degrees of certitude were conveyed in the past. One fact, however, is known about NIEs: There have been several large scale intelligence failures and misinterpretations because decision makers were not able to properly glean the degree of likelihood put forth by their analysts.

Two such NIEs will be closely examined in this section and include the 1995 NIE 95-19 "Emerging Missile Threats to North America During the Next 15 Years" as well as NIE 2002-16HC "Iraq's Continuing Programs for Weapons of Mass Destruction."

The 1995 NIE 95-19, "Emerging Missile Threats to North America During the Next 15 Years," stated:

> First, we believe North Korea is developing a missile, which we call the Taepo Dong 2, that could have a maximum range capability sufficient to reach Alaska. The missile may also be capable of reaching some US territories in the Pacific and the far western portion of the 2000 km-long Hawaiian Island chain.[53]

In the first key judgment, the question becomes "What do the words *we believe* and *probable* mean?" The phrases seem to convey odds much greater than 50%, but by how much? Again, with a lack of standardized terminology, it is possible that both decision maker and analyst interpret these two probability expressions in very different manners. The second key judgment states:

> …the Intelligence Community judges that in the next 15 years no country other than the major declared nuclear powers will develop or otherwise acquire an intercontinental ballistic missile that could threaten the contiguous 48 states or Canada.[54]

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[53] John E. McLaughlin, testimony for the US Senate Select Committee on Intelligence, "Emerging Missile Threats to North America During the Next 15 Years," December 4, 1996, http://www.fas.org/irp/congress/1996_hr/s961204m.htm

[54] Ibid.

The second key judgment affirms with 100% certainty that no other country, aside from the major declared nuclear powers, will acquire the ballistic missile technology necessary to threaten the contiguous 48 states or Canada. In 1996, Richard Davis, Director of National Security Analysis in the National Security and International Affairs Division of the General Accounting Office, testified before the US Senate Select Committee on Intelligence about the analytic soundness of National Intelligence Estimate 95-19. He concluded:

> The caveats and intelligence gaps noted in NIE 95-19 do not support the 100% certainty level of its main judgment. For example, at the beginning of NIE 95-19, the estimate states "as with all projections of long-term developments, there are substantial uncertainties." Also, NIE 95-19's Intelligence Gaps section noted several shortcomings in the Intelligence Community's collection of information on foreign plans and capabilities.[55]

A second, more notorious case of interpreting uncertainty is found in NIE 2002-16HC, "Iraq's Continuing Programs for Weapons of Mass Destruction." The NIE states:

> We judge that Iraq has continued its weapons of mass destruction (WMD) programs in defiance of UN resolutions and restrictions. Baghdad has chemical and biological weapons as well as missiles with ranges in excess of UN restrictions; if left unchecked, it probably will have a nuclear weapon during this decade.[56]
>
> Additionally, the NIE concludes:
>
> Although we assess that Saddam does not yet have nuclear weapons or sufficient material to make any, he remains intent on acquiring them. Most agencies assess that Baghdad started reconstituting its nuclear program about the time that UNSCOM inspectors departed -- December 1998.[57]

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[55] Richard Davis, testimony before US Senate Select Committee on Intelligence, "Foreign Missile Threats: Analytic Soundness of National Intelligence Estimate 95-19, December 4, 1996, http://www.gao.gov/archive/1997/ns97053t.pdf

[56] National Intelligence Council, NIE 2002-16HC "Iraq's Continuing Programs for Weapons of Mass Destruction, October 2002 NIE Key Judgments, http://www.dni.gov/nic/special_keyjudgements.html

[57] Ibid.

While NIEs are, by definition, intended to be estimative in nature, the first key judgment nearly begins with something that sounds like a fact. The problem with this particular NIE, however, is evident in its use of vague terminology. The expression *we judge* conveys a near 100% level of certitude. The key judgment also puts forth the idea that "Baghdad has chemical and biological weapons as well as missiles with ranges in excess of UN restrictions."[58] Moreover, what does the word *probably* mean? Does the expression equate to odds of 50% or greater? Kent defined probable with odds at 75%, give or take 12%.[59] If the analysts meant to express their odds on a scale similar to that of Kent's, this places the likelihood anywhere from 63% to 87%. A decision maker is likely to take different action on odds calculated at 80% versus 50%. Fifty percent may signal that a policy maker needs more information while 80% may indicate more decisive action. Furthermore, if odds were estimated at only 63%, it would then be important to take into account the view of the State Department's Bureau of Intelligence and Research (INR) who claimed in the NIE that:

> Some of the specialized but dual-use items being sought are, by all indications, bound for Iraq's missile program. Other cases are ambiguous, such as that of a planned magnet-production line whose suitability for centrifuge operations remains unknown. Some efforts involve non-controlled industrial material and equipment-including a variety of machine tools-and are troubling because they would help establish the infrastructure for a renewed nuclear program. But such efforts (which began well before the inspectors departed) are not clearly linked to a nuclear end-use. Finally, the claims of Iraqi pursuit of natural uranium in Africa are, in INR's assessment, highly dubious.[60]

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[58] Ibid.

[59] Sherman Kent, "Words of Estimative Probability," Studies in Intelligence, Volume 8 4-49-65 (Fall 1964), https://www.cia.gov/library/center-for-the-study-of-intelligence/kent-csi/docs/v08i4a06p_0001.htm

[60] National Intelligence Council, NIE 2002-16HC "Iraq's Continuing Programs for Weapons of Mass Destruction, October 2002 NIE Key Judgments, http://www.dni.gov/nic/special_keyjudgements.html

On August 11, 2003 then Director of Central Intelligence George Tenet released a statement in defense of the 2002 Iraqi NIE. In it, he mentions that "the history of our judgments on Iraq's weapons programs is clear and consistent."[61] In fact, the NIE is anything but clear and consistent, using expressions such as *we assess*, *we believe*, *probably* and several modals that include *might*, *may* and *could*. Statements that contain these terms are only conjectures based so loosely in fact that an analyst chooses to use an estimative expression which lacks a clear meaning. The work of the Commission on the Intelligence Capabilities of the United States Regarding Weapons of Mass Destruction (known better as the WMD Commission) further reinforced the failure surrounding intelligence analysis, and in particular, NIEs:

> We conclude that the Intelligence Community was dead wrong in almost all of its pre-war judgments about Iraq's weapons of mass destruction. This was a major intelligence failure. Its principal causes were the Intelligence Community's inability to collect good information about Iraq's WMD programs, serious errors in analyzing what information it could gather, and a failure to make clear just how much of its analysis was based on assumptions, rather than good evidence. On a matter of this importance, we simply cannot afford failures of this magnitude.[62]

For the first time in August 2006, the National Intelligence Council (NIC) began including an explanation of its estimative language in the NIE titled "Prospects for Iraq's Stability: Some Security Progress but Political Reconciliation Elusive." This original word list included, from least degree of likelihood to the greatest, *remote*, *unlikely*, *even chance*, *probably/likely* and *almost certainly*. The list is astonishingly close to with that of Kent's original proposal nearly five decades ago. In the November 2007 NIE "Iran: Nuclear Intentions and Capabilities," the NIC tweaked the list to include seven, rather

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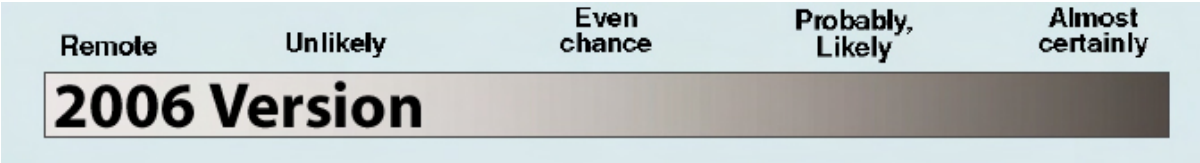
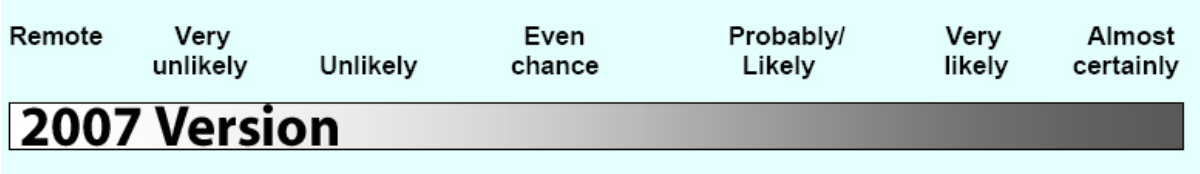
[61] George J. Tenet, DCI statement on the 2002 NIE "Iraq's Continuing Programs for Weapons of Mass Destruction," August 11, 2003, http://www.fas.org/irp/cia/product/dci081103.html

[62] The Commission on the Intelligence Capabilities of the United States Regarding Weapons of Mass Destruction, "Report to the President," March 31, 2005, http://www.wmd.gov/report/wmd_report.pdf

than five, estimative expressions: *remote*, *very unlikely*, *unlikely*, *even chance*, *probably/likely*, *very likely* and *almost certainly*.





Following the literature review findings, this researcher would hypothesize that NIEs, since their inception, have been primarily clouded by so-called estimative expressions which are largely void of Kent's 1964 proposed list of WEPs that were intended to aid in standardizing an inventory of qualitative judgment terms for use in the IC. The terms present in NIEs over the past 58 or so years likely follow the pattern of those found in the 1995 and 2002 NIEs which include several expressions that lack a quantitative meaning such as *we judge* and *we assess* as well as modals like *may*, *could*, *might* and *will*. Post 9/11 NIEs, if anything, have become more descriptive than their predecessors from the 1950s, 1960s, 1970s, 1980s and 1990s.

METHODOLOGY

The experiment tested a number of occurrences of verbal expressions of probability throughout six decades, with each word carefully selected by the researcher. Ultimately, the design of the project was aimed at examining usage of these verbal expressions to judge whether or not overall and individual trends existed in the National Intelligence Estimates, and if so, to further discern their meanings. All attempts were made to keep the data objective; however, due to the subjective nature of the estimates, a lack of more recent declassified judgments and technology complications, it is likely that some amount of bias is present in the research design.

Design

A total of 50 words and 13 phrases were selected for inclusion in the experiment, and they are listed below in *Table 3.1*. The words were drawn from several sources in order to produce a comprehensive list. Firstly, Sherman Kent's words of estimative probability were included as well as the various synonyms he had produced in his second iteration of the list. Words were also drawn from Mercyhurst College's words of estimative probability list that included many of the same words as Kent's, albeit with a few variations. Since modals such as *will*, *would*, *could*, *might* and *may* are also estimative in nature, the decision was made to include these in the experimental data as well. Finally, the researcher quickly perused NIE's prior to the experiment to extract additional words for inclusion into the experiment. Furthermore, words that were not necessarily estimative in nature but that had appeared in several NIEs were also included. These were words such as *we*, *assess*, *believe*, *judge*, *estimate*, *if*, etc. Towards the end of

the experiment, the decision was made to include 13 phrases when the software was updated with a phrase counting capability. Each of the 50 words and 13 phrases were counted throughout the six decades and recorded whether they registered occurrences or not.

In addition, 120 National Intelligence Estimates, a total of 20 for each decade, were carefully chosen from the Central Intelligence Agency's (CIA) Library of Declassified NIE's, the National Intelligence Council's web library and the Federation of American Scientist's website of NIC documents. Every attempt was made to garner a representative sample from each decade, using two NIEs from each year; however, there are exceptions to this and they are present namely due to the quality of particular documents. Only key judgments were analyzed, and each document was required to meet certain specifications prior to selection: (1) key judgments must be between one and four pages in length, (2) the font size and resolution of the document need to be of adequate quality for processing in optical character recognition software, and (3) that no more than two text blocks could be excluded through black markings on the document. The NIEs from the 1950s through 1990s strictly adhered to these requirements; however, as there are far fewer NIEs present from 2000 onward, the researcher was forced to include longer key judgments in the sample size as well as documents that were not necessarily NIEs but that followed the format. The sample size was primarily constrained by the lack of declassified judgments from 2000-2008 and the need to perform an analysis of variance (ANOVA) with equal sample sizes from each decade.

Table 3.1: Current Experiment's Words of Estimative Probability		
Almost	Highly	Possibility
Assess	If	Possibly
Believe	Impossible	Presume
Certain	Improbable	Presumed
Chances	Judge	Probability
Conceivable	Likelihood	Probable
Confidence	Likely	Probably
Confident	Low	Remote
Could	May	Should
Dismiss	Medium	Slight
Doubt	Might	Slightly
Doubtful	Moderate	Unless
Estimate	Not	Unlikely
Estimated	Odds	Virtually
Even	Overwhelming	Will
Fifty-fifty	Perhaps	Would
High	Possible	Almost Impossible
All But Certain	Almost Certainly	Chances are About
Chances a Little	Chances a Little	Some Slight Chance
Even Chance	Highly Probable	Virtually Certain
Very Likely	Very Unlikely	Virtually Impossible

Process

After words and estimates were selected, a spreadsheet was created that would identify each NIE by a number, decade and subject (please see *Appendix C*). For example, the code of the first NIE was 1-50-SVT, indicating that it was the first NIE analyzed in the project from the year 1950 and dealt with the topic of the Soviet Union. This coding serves to not only organize the data but also to allow any future researchers to re-analyze data in the word frequency software if they so desire, whether it be to repeat the experiment or to examine a new list of words.

The documents proceeded through several stages before data was input into in the spreadsheet. First, estimates on CIA's website were present only as images files (in JPEGs); therefore, every key judgment image were saved and coded. Following this step, the image files were run through what is known as optical character recognition (OCR) software, a tool that allowed the researcher to convert an image file to editable text. Approximately eight different types of OCR software programs were surveyed before finally settling on ABBYY FineReader 9.0, the only program on the market that could handle the poor resolution of the CIA documents.

After each page was converted, the researcher read through each estimate to correct mistakes and ensure that words present on the overall list were used in a way the experimenter intended. This included ensuring that uses of *not*, *even*, *if*, *will* and other words, which may have a contextual discrepancy in meaning, were used in a way that was appropriate for testing their word frequency from a probability standpoint. For example, in a sentence reading "The Soviets have not acquired nuclear weapons

technology" versus "The Soviets are not likely to acquire nuclear weapons technology," the word *not* would only be recorded from the second sentence.

Finally, a notepad file was created as it was the only format Hermetic Word Frequency Software would accept. Within this software, the master word list was uploaded which forced the program to only search each document for those particular words. When the word frequency list was generated, the researcher populated the Excel spreadsheet. This process was repeated for each of the 120 key judgments.

Data Analysis

Raw numbers were calculated for each word within the various decades, but running a statistical analysis with these raw numbers would fail to yield valid results due to the large variation of total word frequency in each document and across each decade. Therefore, raw numbers were converted to proportions, with the researcher calculating total word counts for each document and dividing individual word frequency numbers by these overall sums. This method serves to level the playing field and ensure that statistically significant results are in fact demonstrating a comparable trend across the decades. The data was then converted back into whole numbers which produced a so-called natural frequency, or in this case, the number of estimative words per every 10,000 in a particular document.

One-way ANOVAs were run for each of the 50 words that registered occurrences. Tukey Honestly Significant Different (HSD) post-hoc tests were completed for those results indicating statistical significance below the p=.05 level. The .05 level is generally accepted as the lowest level of significance by researchers, indicating a result is 95% true

and not due to chance. Statistical significance implies that the means differ more than would be expected by chance alone. In the case of non-significance, the differences between the means are not great enough to allow the researcher to say with any level of confidence that they are indeed different. The Tukey HSD test is designed to perform a pairwise comparison of the means to determine the location of significant difference. Overall significance is found in the 'Between Groups' row and indicates that there is statistical significance between decades in regards to one particular word. The post-hoc tests further examined individual decade interaction and the significance associated with each of those decades.

RESULTS

The results of the experiment on words of estimative probability in key judgments of NIEs yielded a number of interesting, but not many surprising results. This chapter will detail the findings of the experiment, including both statistical analysis and charts that break down words by specific categories, in the following nine sub-sections. The meaning of the results and their implications for the IC will be discussed in the following chapter. All of the data is present in its normalized form, meaning that the number of occurrences is measured out of 10,000 words. The first few sections will discuss both statistically significant and insignificant words across the decades with a focus on why some of these expressions demonstrated change while others remained consistent or were neglected by the IC. The statistically significant words are, in a sense, special because they reveal that there is a 95% certainty level the patterns seen across decades are not due to chance. The following section will detail phrases and their lack of usage throughout the decades. The next few sections concentrate on specific types of words that were tested during the experiment, namely modals and words that the NIC has stated 'convey analytical assessments.' Next, words and patterns of the new NIC estimative language list will be examined, and a detailed breakdown of *probably* versus *likely*, words that are now synonyms for one another, will also be presented. Finally, the chapter will conclude with some discussion regarding the ten estimative words that have been prominent thus far in the 2000s in comparison to those of the 1950s as well as some consistent patterns in word usage throughout the years.

Statistically Significant Words

Of the 50 words, 12 were found to be statistically significant (See *Appendix A* for green word frequency graphs of all the statistically significant words). Those words include *almost*, *assess*, *believe*, *confident*, *estimate*, *even*, *impossible*, *judge*, *likely*, *low*, *probably* and *would*. The results are displayed below in *Table 4.1*. The 'between groups' is the statistical significance that accounts for interaction among the various decades, but in order to determine exactly where the significance was coming from, it was necessary to conduct Tukey post-hoc tests. In the data below, the significant result (p value) is less than or equal to the α value (.05), which allows the researcher to reject the null hypothesis that all the means within a particular word across the decades are equal. The degrees of freedom (Df) in the numerator below is one less than the number of groups. The Df is five because six decades were tested. The value of .000 in the sum of squares indicates that there is little variation due to the interaction between samples, also revealing that the sample means are close to one another. The mean square denotes the variance due to the interaction between the samples, or the between group variation divided by its degrees of freedom. The statistically significant results, namely those from the Tukey post-hoc test, will be further explained below in a discussion of each individual word.

Table 4.1: One-Way ANOVA Statistically Significant Results

		Sum of Squares	Df	Mean Square	F	Sig.
Almost	Between Groups	.000	5	.000	2.847	.018
Assess	Between Groups	.000	5	.000	3.182	.010
Believe	Between Groups	.000	5	.000	5.152	.000
Confident	Between Groups	.000	5	.000	3.425	.006
Estimate	Between Groups	.000	5	.000	14.283	.000
Even	Between Groups	.000	5	.000	4.102	.002
Impossible	Between Groups	.000	5	.000	2.379	.043
Judge	Between Groups	.000	5	.000	2.872	.018
Likely	Between Groups	.000	5	.000	2.971	.015
Low	Between Groups	.000	5	.000	4.330	.001
Probably	Between Groups	.000	5	.000	6.999	.000
Would	Between Groups	.000	5	.000	2.665	.026

The word *almost* was extremely statistically significant at p=.018, indicating at 98.2% that the variation was not due to chance. Upon closer examination, the proportions of word frequency, or the word frequency of *almost* divided by the total number of words in all documents over each decade, decreased from 11 in the 1950s to four in the 2000s. Post-hoc tests demonstrate that the most significant change takes place from the 1960s to the 1990s, with statistical significance at p=.014. The word frequency during this time decreased from 16 to one.

Assess is statistically significant at p=.010. Word frequency proportions increased from three in the 1950s to 13 in the 2000s. Post-hoc tests reveal that significance lies in the change from the 1970s, 1980s and 1990s compared to that of the 2000s, with significance levels at p=.034, p=.020 and p=.048 respectively. Word frequency changed from two words in the 1970s to one in the 1980s to three in the 1990s, which is in comparison to 13 words in the 2000s.

The word *believe* demonstrates exceptional statistical significance at p=.000.[63] There is a noticeable word frequency decrease from 32 in the 1950s to three in the 2000s. Post-hoc tests reveal that changes from the 1950s, 1960s and 1980s compared to the 2000s are significant at p=.017, p=.001 and p=.004 respectively. Comparing the 1960s to the 1990s is also barely significant at p=.044. Data for the statistically significant comparisons include 32 words in the 1950s, 37 in the 1960s and 28 in the 1980s compared to three in the 2000s.

Confident is highly significant at p=.006. Word frequency proportions increased from 0 in the 1950s to one in the 1990s, but returned to 0 in the 2000s. Post-hoc tests reveal that the statistical significance lies in comparing every decade except the 1990s to the 1980s, with significance holding steady at p=.017 for each. Word frequency ranged from zero in the 1950s, 1960s and 1970s to two in the 1980s and back to zero in the 2000s.

Estimate also demonstrates exceptional statistical significance at p=.000. There is a large decrease in word usage from the 1950s to the 2000s, with word frequency in the fifties set at 38 and dropping to five in the 2000s. Post-hoc tests exhibit significance in every decade, with p=.000 significance present when comparing the 1950s to the 1970s, 1980s, 1990s and 2000s. Word frequency decreased from 38 words in the 1950s to 27 in the 1960s, seven in the 1970s, six in the 1980s, seven in the 1990s and finally five in the 2000s.

Even was statistically significant at p=.002. Large fluctuations in word frequency proportions are not present, but there is a significant jump in the 1990s compared to the other decades, and this is evident through post-hoc tests. Statistical significance is apparent when comparing the 1960s, 1970s and 1980s to the 1990s, with levels at p=.002, p=.014 and

[63] A statistical significance level of .000 is exceptional as it indicates with 100% certitude that the results are not due to chance.

p=.024 respectively. Word frequency proportions decreased from 18 in the 1950s to 10 in the 1960s and 1970s to 11 in the 1980s. This number then increased to 26 during the 1990s.

The word *impossible* was just barely significant at p=.043. Only the 1950s and 1990s registered occurrences of the word, and interestingly enough, post-hoc tests revealed no statistical significance between any of the decades. Word frequency in the 1950s amounted to two and decreased to one in the 1990s.

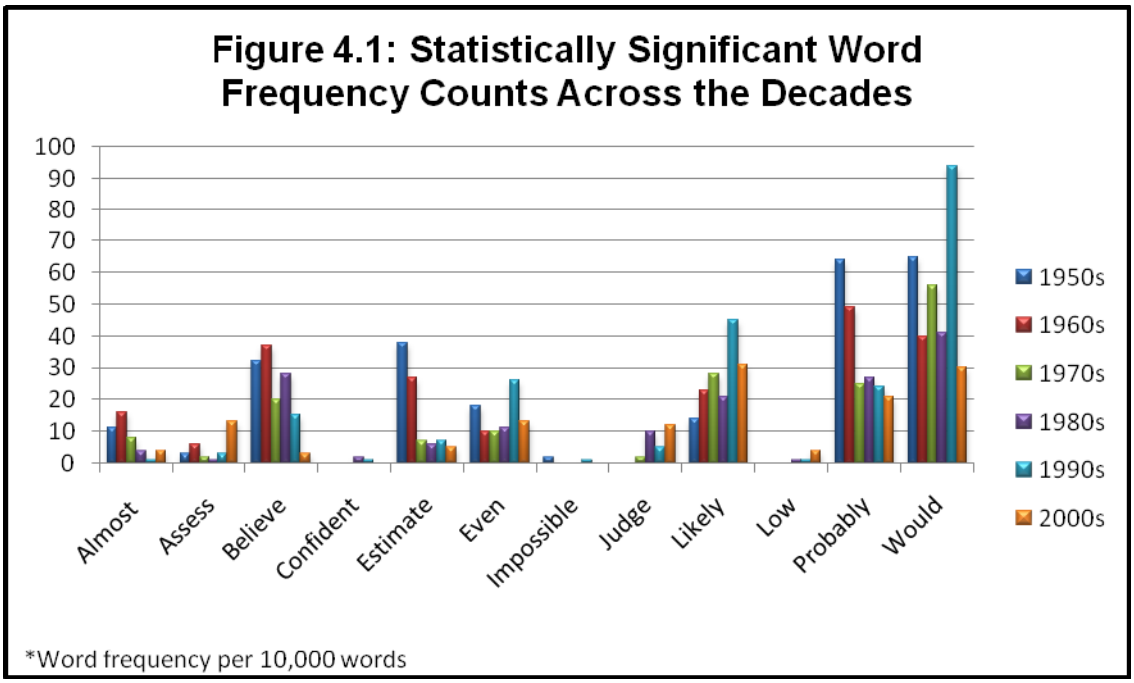
Judge was significant at p=.018 and just like the word *impossible*, post-hoc tests reveal no statistical significance between the decades. Word frequency proportions increased immensely from zero in the 1950s and 1960s to two in the 1970s to 12 in the 2000s.

Likely's statistical significance measured p=.015, indicating a high degree of statistical significance. Post-hoc tests revealed extreme significance between the 1950s and 1990s at p=.005. Word frequency proportions during these two decades are equal to 14 in the 1950s and 45 in the 1990s. Word frequency proportion in the 2000s decreased to 31.

The word *low* demonstrated high statistical significance at p=.001. Usage increased from zero in the 1950s, 1960s and 1970s to one in the 1980s and 1990s increasing to four in the 2000s. Post-hoc tests reveal statistical significance at the .003 level when comparing the 1950s, 1960s and 1970s to the 2000s.

The word *probably's* statistical significance measured p=.000, indicating a near 100% confidence level that these trends are not attributable to chance. Upon closer examination, word frequency dropped from 64 in the 1950s to 21 in the 2000s, with a fairly steady drop over the remaining decades. The word registered 49 occurrences in the 1960s, 25 in the 1970s, 27 in the 1980s and 24 in the 1990s.

Finally, *would* exhibited statistical significance at the p=.026 level. Word frequency decreased from 65 in the 1950s to 30 in the 2000s; however, these numbers appear to fluctuate greatly over the decades. Post-hoc tests reveal significance between the 1990s and 2000s at the p=.028 level. During the 1990s there were 94 occurrences and this number dropped significantly to 30 in the 2000s.



The chart above compares the statistically significant words from each decade (for individual charts please see *Appendix A*). As is evident, *probably* and *would* register the most occurrences. It is important to point out words such as *confident*, *impossible*, *judge* and *low* which are statistically significant but appear to register under 10 occurrences. These words are significant generally due to an increase from zero to only one or two occurrences per decade.

Of the 50 words, only two additional words fell on the cusp of statistical significance, placing them at a confidence level of 90% or greater. These words are *doubt* and *unless.*

The word *doubt* exhibited a statistical significance of p=.079, or 92.1% that the results are not due to chance. Post-hoc tests reveal that the significance likely stems from comparing the 1970s to the 2000s with p=.085. During this time, word frequency decreased from four to zero. A better case for statistical significance is seen in *unless* with p=.055. Post-hoc tests demonstrate that the significance lies in the change from the 1950s to the 1960s with significance at p=.060. Word frequency diminished from five to zero during these two decades.

Statistically Insignificant Words

Out of the remaining 37 words, 33 of them registered at least one occurrence during any one of the decades (see individual turquoise-colored word frequency charts in *Appendix A*). Of these 33 words, five clearly emerged as those used most often: *could*, *if*, *may*, *not* and *will*, each registering over 100 total occurrences (see *Figure 4.2* below). *Could* registered 145 hits, *if* numbered 133, *may* 108, *not* 254 and finally *will* numbered 717 hits, by far the most utilized word across the decades. The reason that they likely failed to appear as statistically significant is due to their almost consistent usage from the 1950s through the 2000s.

There was a slight increase in the word *could* across the decades, registering 15 occurrences in the 1950s, 24 in the 1960s, 15 in the 1970s, 25 in the 1980s, 36 in the 1990s and 30 in the 2000s. The word's statistical significance measured p=.354 which means that there is only a 64.6% chance that the results are true. There hasn't been much change in use of the word *if* over the decades with it numbering 32 in the 1950s, 16 in the 1960s and 1970s, 21 in the 1980s, 29 in the 1990s and 19 in the 2000s. Its statistical significance measured

p=.147. The last three words have also remained fairly static across the decades. *May* registered 26 hits in the 1950s, 16 in the 1960s, 14 in the 1970s, 22 in the 1980s, 11 in the 1990s and 19 in the 2000s. *Not* numbered 40 in the 1950s, 51 in the 1960s, 47 in the 1970s, 50 in the 1980s, 36 in the 1990s and 30 in the 2000s. Finally, *will* by far not only has the highest number of occurrences in this category, but it outnumbers all of the other 50 words by over 400. Use of the word decreased from 129 in the 1950s to only 83 in the 1980s, but has since rebounded to 135 in the 1990s and 2000s.

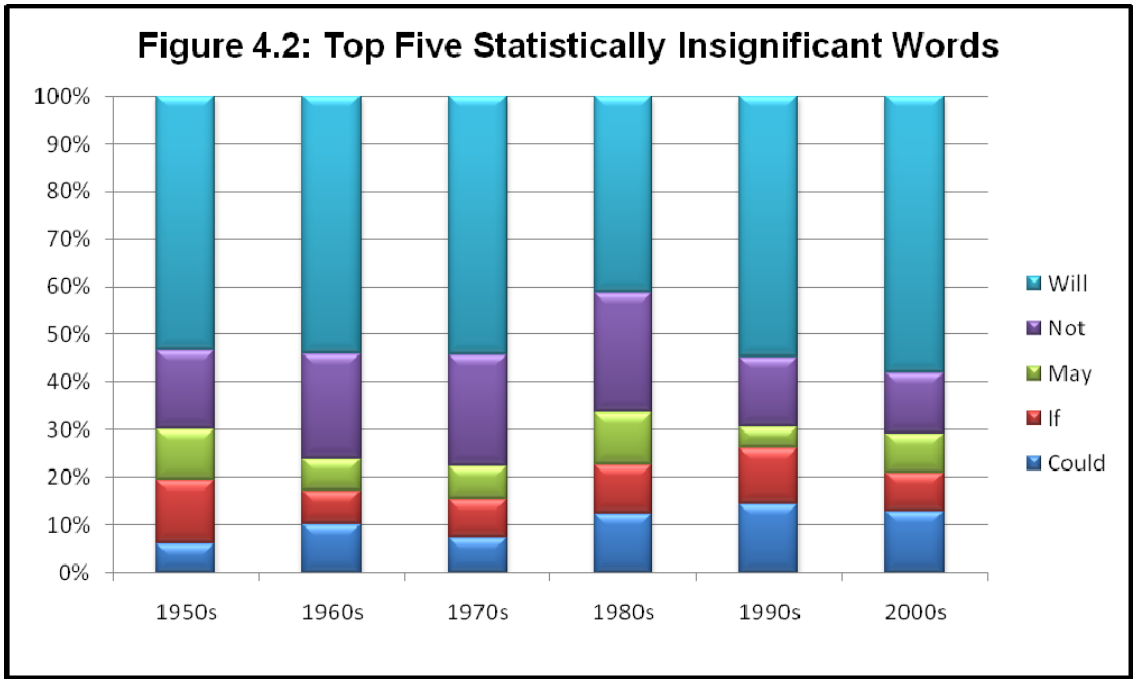
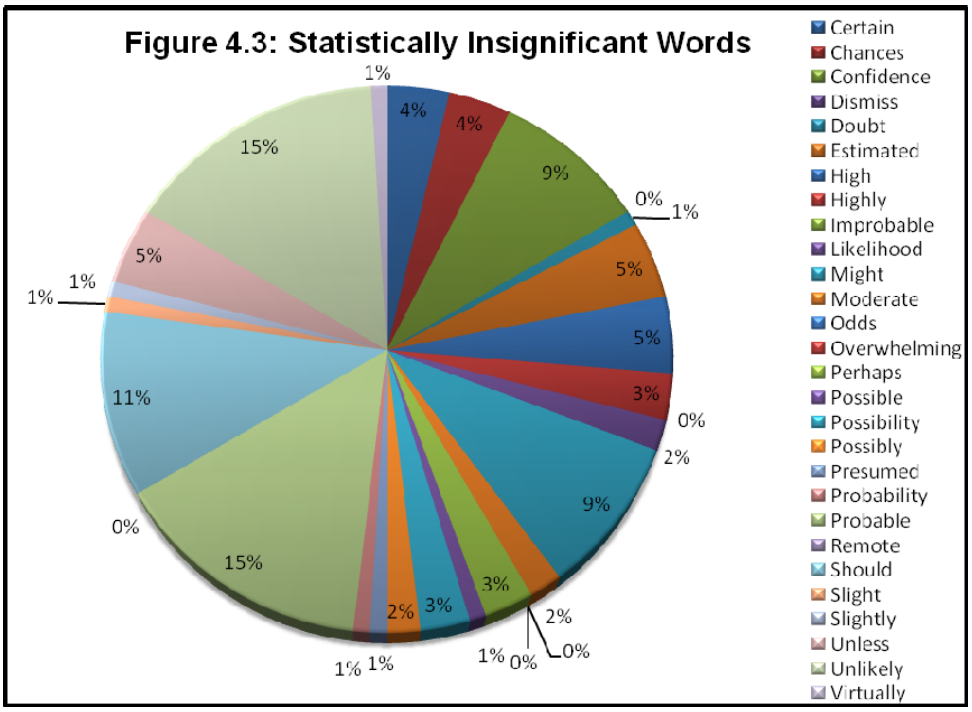


Figure 4.3 of the remaining 28 statistically insignificant results is displayed below. Most prominent on the chart are the words *unlikely*, *high* and the two modals *should* and *might*. *Unlikely* registered close to 70 occurrences throughout the decades, decreasing from 17 in the 1950s to 15 in the 1960s, six in the 1970s, and again increasing to nine in the 1980s, 14 in the 1990s and finally rounding out at seven in the 2000s. The word *high* has been used in the sense 'we assess with high confidence' or 'chances are high' across the decades and it

registered a total of 40 occurrences. Although it is not truly estimative in nature, its usage has increased from five in the 1950s to 12 in the 2000s, most likely due to the NIC's use of this word in conveying analytical assessments. *Should* and *might* were nearly even in their total occurrences across the decades, each registering 39 and 46 hits respectively. *Should* numbered 12 in the 1950s, five in the 1960s, eight in the 1970s, nine in the 1980s, two in the 1990s and three in the 2000s. *Might* has also slightly decreased in usage over the decades, registering 10 occurrences in the 1950s, nine in the 1960s, five in the 1970s, 12 in the 1980s, four in the 1990s and six in the 2000s.

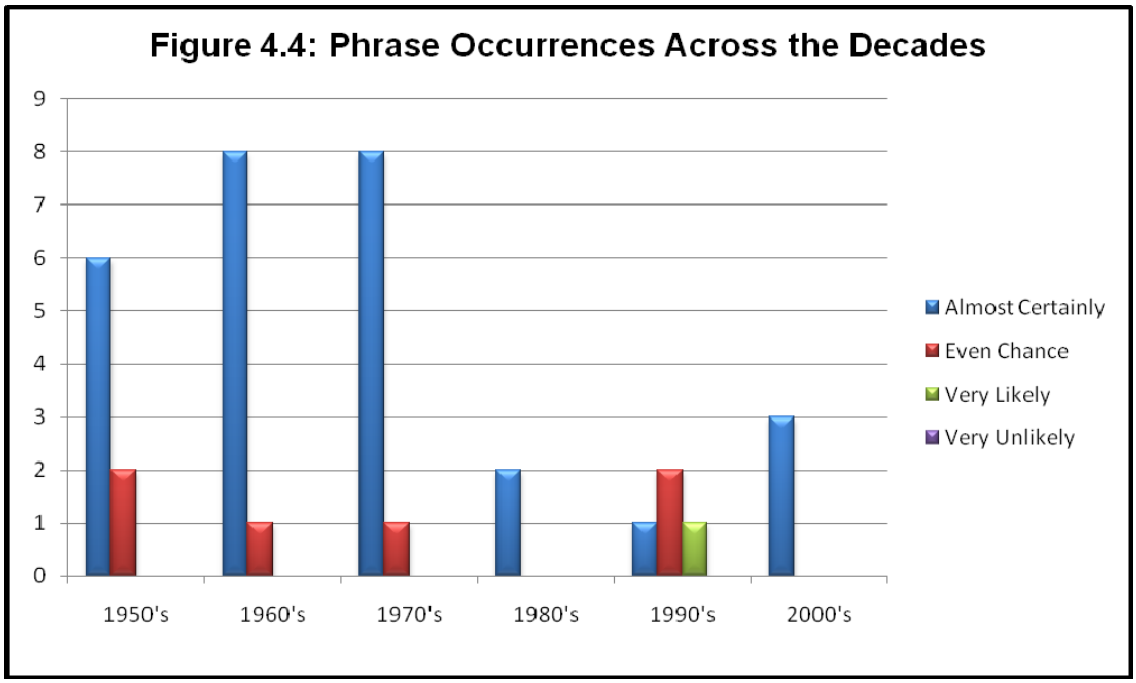


Five words failed to register any occurrences over the decades: *conceivable*, *doubtful*, *fifty-fifty*, *medium* and *presume*. Most notably, three of these fall into the category of words that the NIC would normally reserve for conveying analytical assessments (i.e., 'it is conceivable,' 'it is doubtful' and 'we presume'). It is interesting to note that medium has not been used, even as of the 2000s. This indicates that as a confidence level, analysts currently

involved in the NIE process as of 2006 are either conveying high or low confidence, not medium. Finally, it doesn't appear that analysts use a word like *fifty-fifty* in their estimates, instead opting to use words that indicate a particular likelihood above or below this benchmark.

Phrases

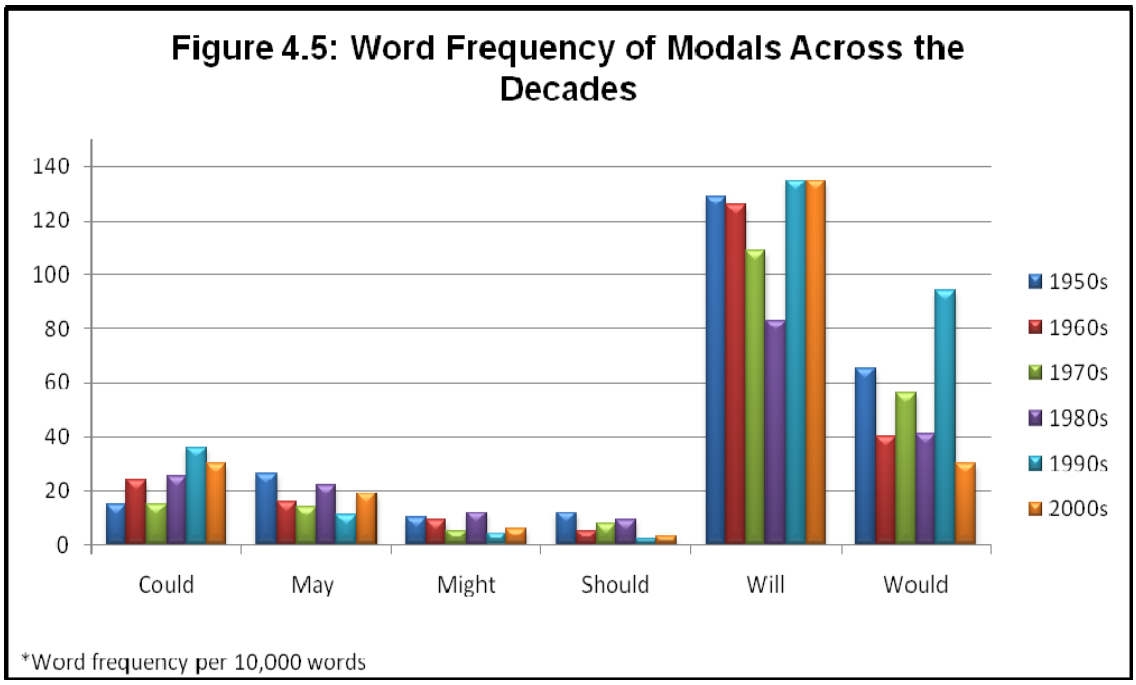
An analysis of 13 phrases was carried out in addition to the 50 words. Of these phrases, only four registered hits: *almost certain*, *even chance*, *very likely* and *very unlikely*. None of the results were statistically significant, but the data is displayed in *Figure 4.4* below. *Almost certainly* exhibits the most distinct pattern across the decades, registering between six and eight occurrences from the Fifties through the Seventies and dropping off to between one and three occurrences from the Eighties up through the present. *Even chance* has not been widely used throughout the years, only registering two hits in the 1950s and 1990s. *Very likely* and *very unlikely* have rarely been used over the decades. Only *very likely* registered one hit in the 1990s. In the normalized data, *very unlikely* did not register any occurrences, but in the raw data, one occurrence was evident in the 2000s. Nine other phrases failed to yield results: *all but certain*, *almost impossible*, *chances a little better*, *chances a little less*, *chances are about even*, *highly probable*, *some slight chance*, *virtually certain*, and *virtually impossible*.



Modals

Word frequency was also examined in English modals, or auxiliaries that can modify the grammatical mood of a verb. *Could* is reported fewer than 40 times each decade, but there was an increase over the course of the 1990s and 2000s to 36 and 30 respectively, up from 15 in the 1950s. *May* and *might* have remained fairly steady over the decades, not demonstrating any significant variability from the 1950s up through the 2000s. *Should* has experienced a decrease from the 1950s to the 2000s from 12 to three; however, the numbers are extremely small to begin with and do not exhibit statistical significance. *Will* and *would* are by far the most popular of the modals, with occurrences hovering around the 100 and 140 mark respectively. Use of *will* appears to have remained steady during the 1990s and 2000s, each with 135 occurrences. The trend of *would* is by far a more tumultuous one, registering 65 occurrences in the 1950s, spiking to 94 occurrences in the 1990s and finally falling to 30 occurrences in the 2000s.

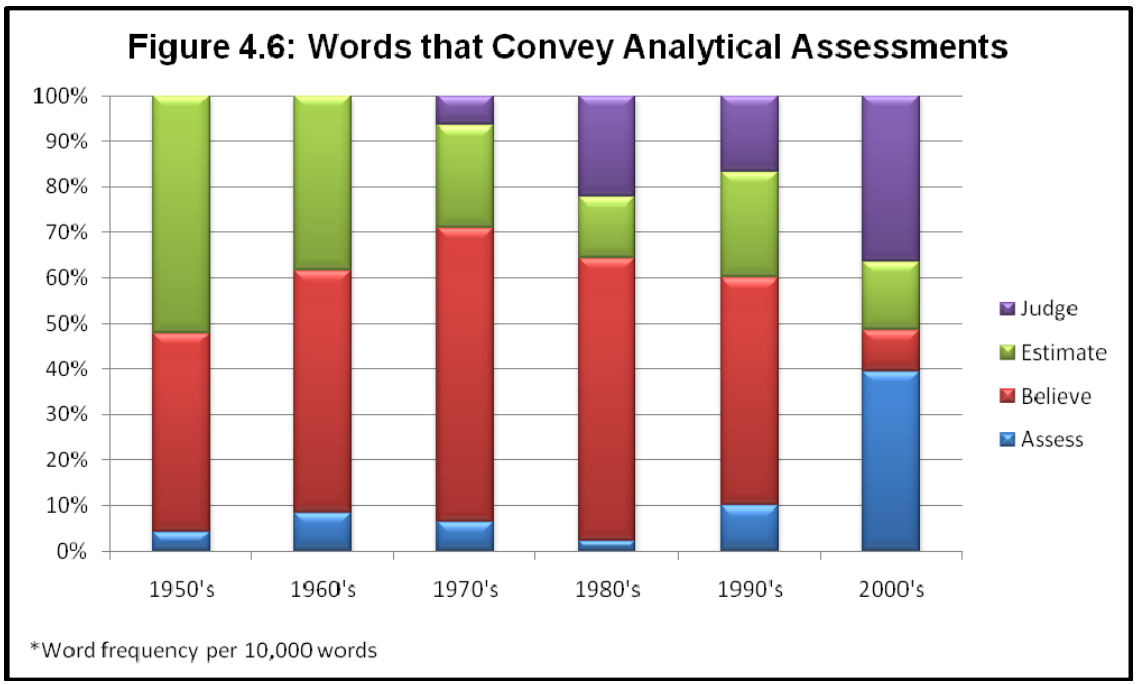
The modals are interesting in that of all the words examined, their absolute usage remains fairly consistent across the decades. They all register high occurrences in comparison to the other words: *could* at 145, *may* at 108, *might* at 46, *should* at 39, *will* at 717 and *would* at 326.



Words that Convey Analytical Assessments

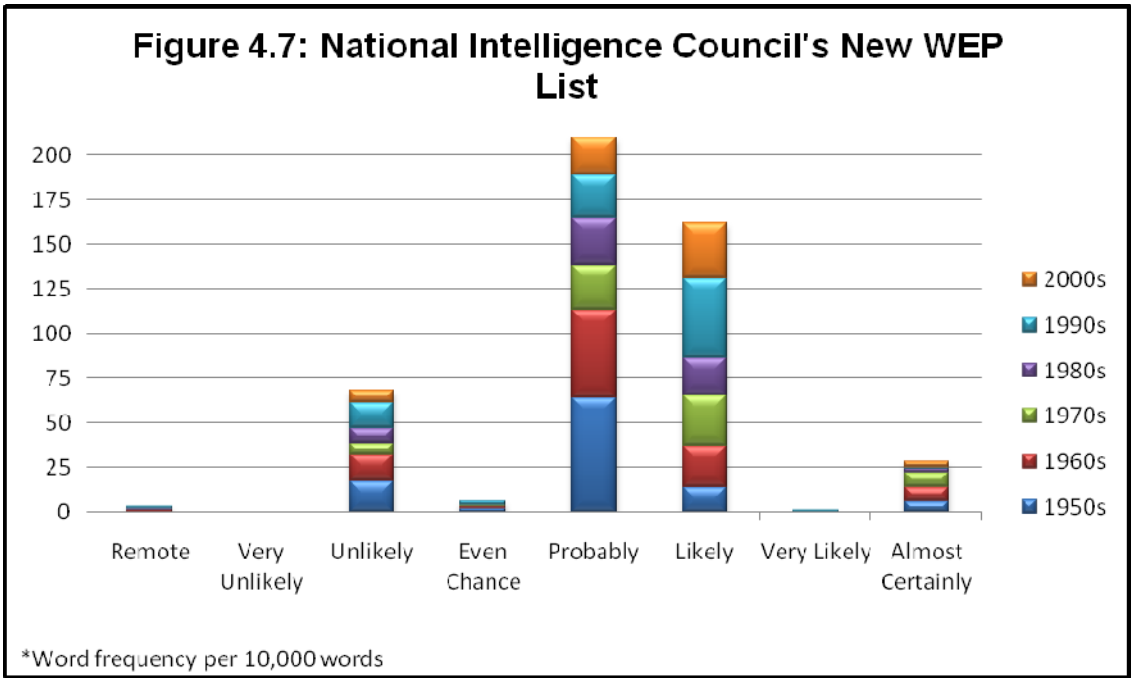
Words that convey analytical assessments such as *judge*, *estimate*, *believe* and *assess* were also examined. The trend demonstrates that the IC primarily employed the words *estimate* and *believe* in the 1950s and 1960s and then adopted the word *believe* for the following three decades. On average, the word *believe* accounted for roughly 53% of the word frequency among these four words from the 1950s through the 1990s. A noticeable change takes place in the 2000s where the words *judge* and *assess* now account for approximately 35% and 40% respectively. Usage of *believe* shrunk to less than 10% and

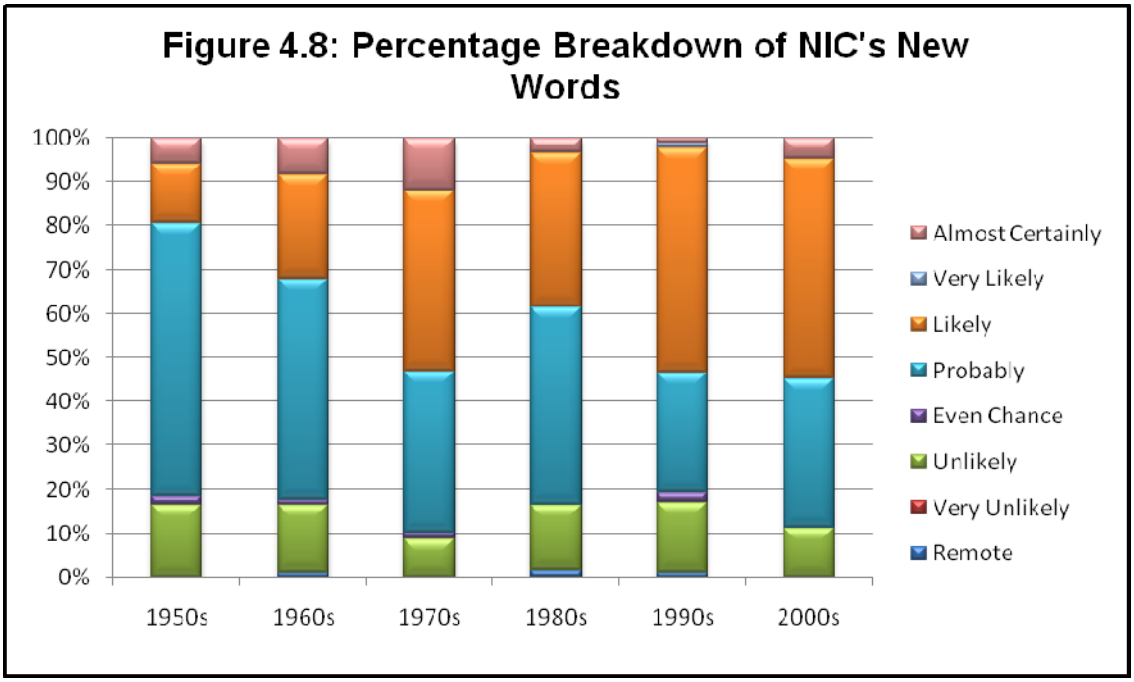
estimate to about 15%. See *Figure 4.6* below for a graphical representation of these differences.



National Intelligence Council Word List

The National Intelligence Council has employed a new word list in NIEs as of 2006, and an assessment of the most recent estimative phrases was carried out. *Probably* and *likely* appear to be the two most utilized words throughout the decades, with over 200 and 150 occurrences respectively. *Unlikely* has close to 75 occurrences and *almost certainly* comes in fourth with a little over 25. Interestingly enough, *remote*, *very unlikely*, *even chance* and *very likely* have few total occurrences over the decades, with *even chance* exhibiting the highest number at six. Specifically examining the 2000s, the only words that analysts seem to have used are *unlikely*, *probably*, *likely* and *almost certainly*, with the latter three indicating that IC personnel involved in the NIE process are hesitant to employ words with a negative connotation.



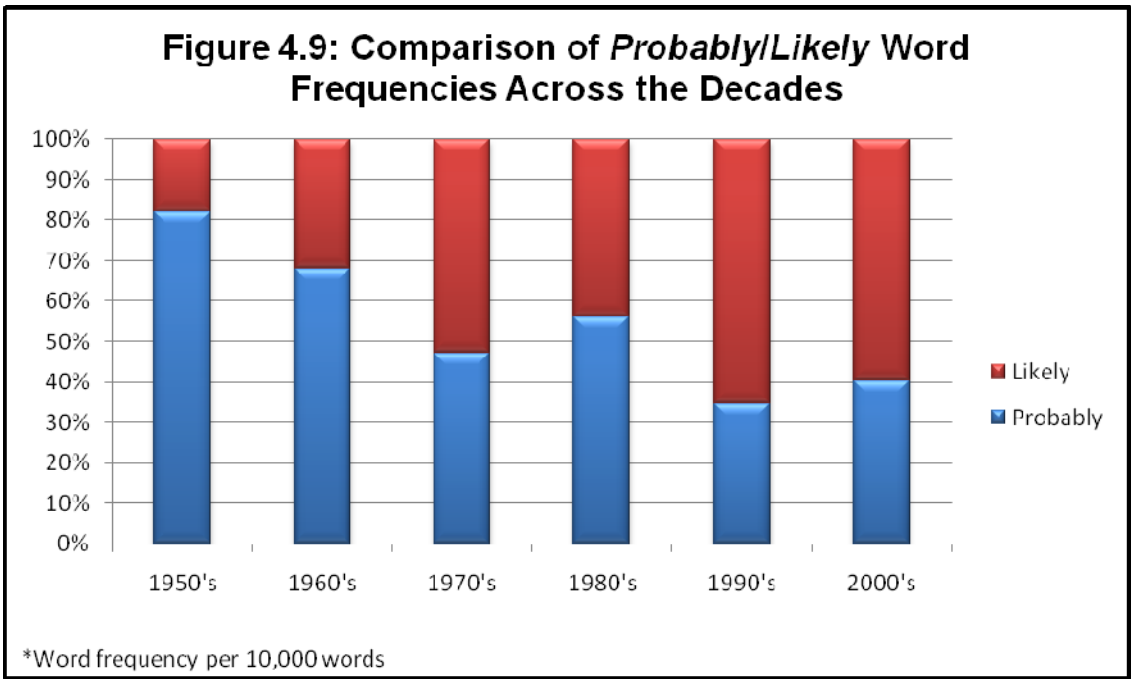


Breaking down the data by decade reveals just how much analysts have employed the words *probably* and *likely*. It appears that *very unlikely* has also been utilized throughout the

years, but it never accounts for more than 20% of the NIC list each decade. Interestingly, when added up across the individual decades, *probably* and *likely* account for close to 75% of word usage. *Almost certainly* accounts for approximately 5% each decade, with the other words all falling below this benchmark.

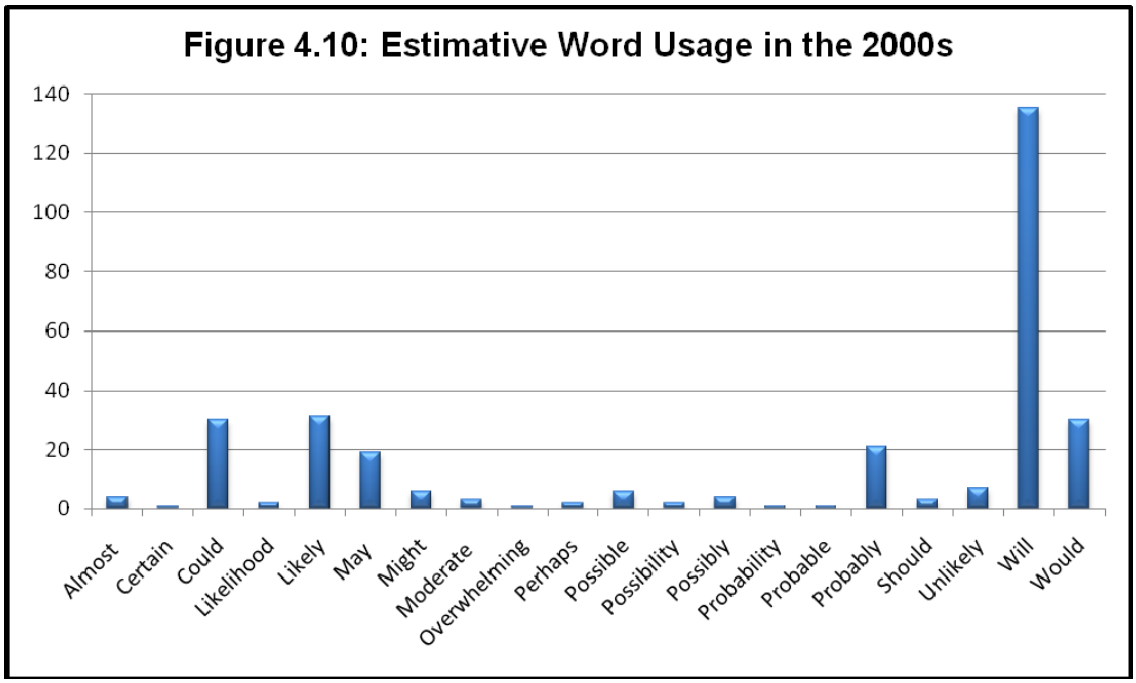
Probably versus Likely

A breakdown of the words *probably* and *likely* also reveals interesting trends. *Probably* appears to have been the word of choice during the 1950s and 1960s, accounting for approximately 82% and 67% during those two decades. The 1970s and 1980s unmask more turbulent times in using these two words where *probably* accounted for approximately 47% and 55% respectively. With 74% and 60%, the 1990s and 2000s clearly demonstrate that the word *likely* has overtaken *probably* in total word frequency. As of the 2000s, *likely* accounts for 31 occurrences while *probably* only accounts for 21, or 60% and 40% of the data respectively. Of the last three NIE's produced with the standardized word list, *likely* has registered only two occurrences while *probably* has been used 15 times. Therefore, it may take some time for the new trend to develop, but it looks like eventually *likely* will overtake *probably* in terms of usage as the trend clearly demonstrates a downward movement.



Estimative Word Usage in the 2000s

Since the NIC's introduction of its new word list in 2006 it becomes important to examine estimative word use as of the beginning of the 2000s. As is evident from the graphic below, NIE's appear to be clouded with certainty by the word *will* being used close to 140 times. The word frequency more than triples that of the next most frequent word. The most popular word preferences as of 2000 in descending order are *likely*, *would*, *could*, *probably* and *may*. None of the other words on the list are used more than 20 times in the past eight years. Interestingly enough, two of the top five words, *likely* and *probably*, are present on the NIC's new list of estimative language. Out of the remaining 20 words in the decade, *unlikely* is the only other word present on the NIC's new list. It appears that analysts still enjoy using modals such as *would*, *could*, *may* and *will*.

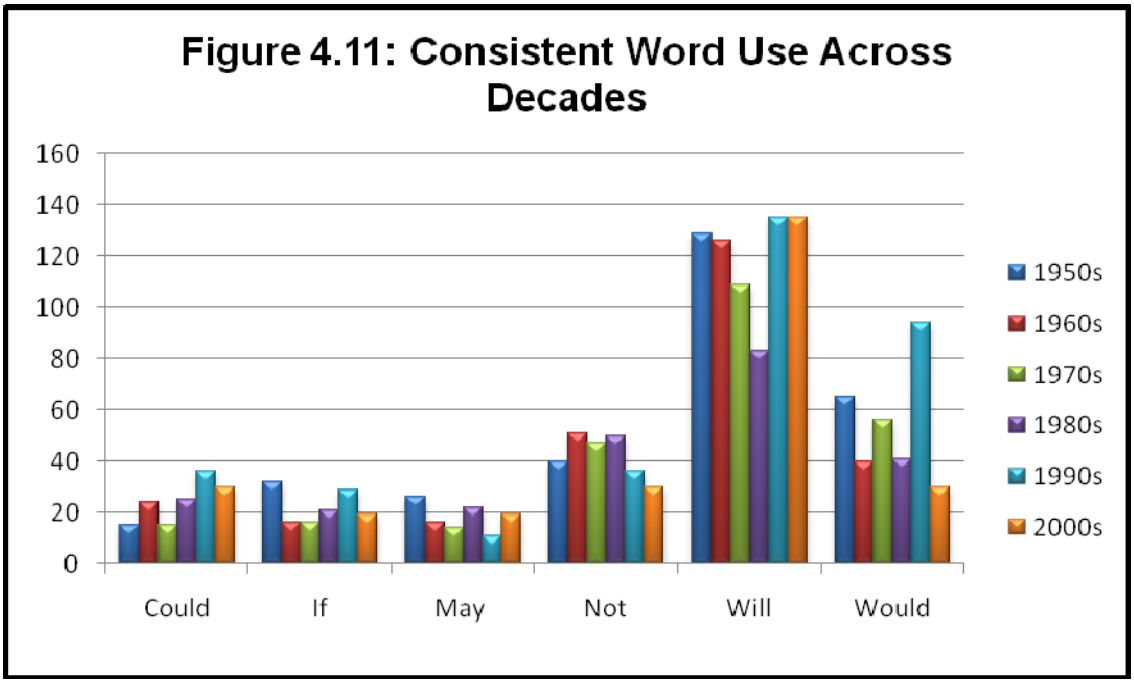


Consistency in Word Usage Across the Decades

There are several words that have been used almost consistently throughout the decades. These words include *could*, *if*, *may*, *not*, *will* and *would*. *Figure 4.12* below graphically displays these trends. Although some of the trends indicate slight variability across decades, the words have been the most consistent of the group of 50. A trend that again jumps out quickly is that of the modals. *Could*, *may*, *will* and *would* have been a constant throughout the decades, indicating that analysts do have an affinity toward this word group.

The trend of *not* in the NIEs appears to indicate that analysts would rather use a positive estimative word coupled with a negative modifier rather than a purely negative word. This trend has remained one of the most stable over the decades. The trend of *if* is also an interesting one. Each decade, the word has been used less than 40 times, but it has a

tendency to mask the real question in an estimate and present a scenario rather than an estimate.



In addition to words that have been consistently used, there are also several words that analysts appear to have discarded over the decades. The words that registered zero occurrences were already discussed with the statistically insignificant results, but others that registered very low occurrences include *certain*, *dismiss*, *doubt*, *impossible*, *improbable*, *odds*, *overwhelming*, *presumed*, *probability*, *remote*, *slight* and *slightly*.

CONCLUSIONS

Trends in Key Judgments and their Implications for the IC

The purpose of this study was to evaluate the use of WEPs in National Intelligence Estimate key judgments and determine if these words have been employed in a standardized manner or have acted to cloud the overall assessments throughout the past 58 years. Of the 50 estimative words tested, only 13, approximately one fourth, tested at a significance level of p=.05 or less. Moreover, only five of the words on that list are truly estimative in nature, with the others indicating a logical judgment or expressing a particular confidence level.

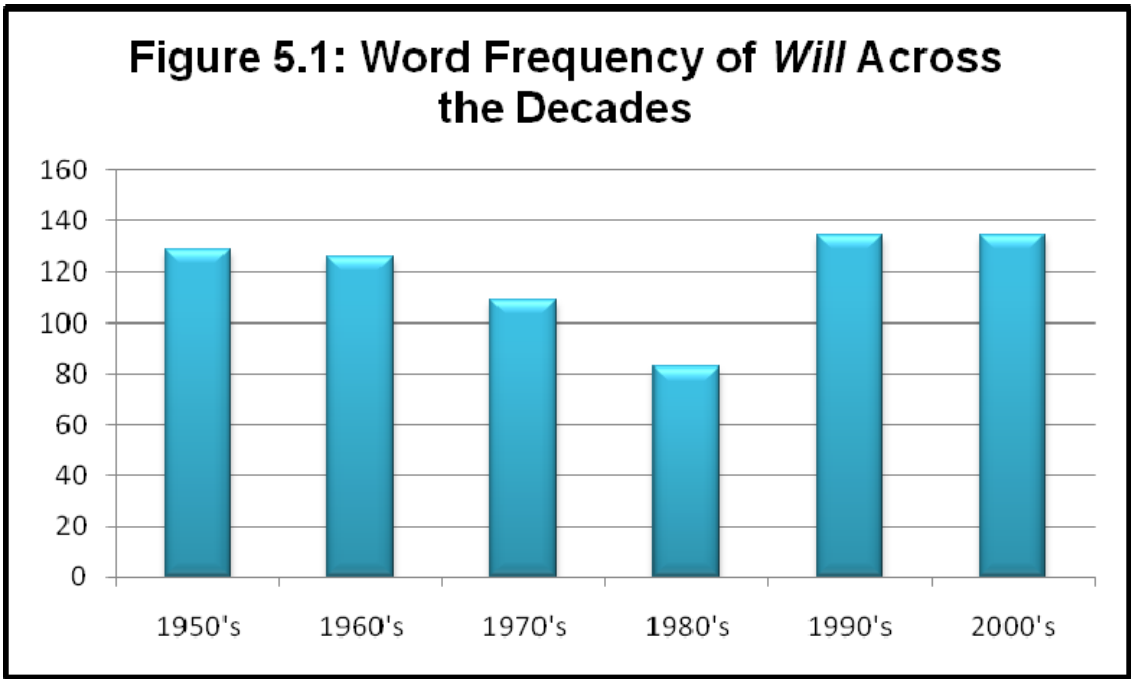
Overall, the data is interesting because the lack of words that demonstrate a trend reveal several important points regarding words of estimative probability. First, intelligence professionals over the decades have not paid attention to how they convey probability to their decision maker. The problem, however, is likely not their fault. As the literature review findings explained, the overall population interprets estimative words differently. While a single person is consistent in their use of verbal probability expressions, a larger group is not. For example, the National Weather Service had assigned a probability to the word *likely* of between 80%-100% while respondents had only equated a 62.5% odd to this word.[64] Practicing physicians had assigned a numerical equivalent ranging from 70%-73%.[65] This makes it difficult to standardize terminology across a group of professionals, and it becomes evident why the method has thus far failed in the IC. Second, it is alarming to think that more consistent trends in the 50 words do not exist, and even more so that this list was not

[64] Aimee Saviers and Larry VanBussum, "Juneau Public Questionairre: Results, Analyses and Conclusions," National Oceanic and Atmospheric Administration 1996-97, http://pajk.arh.noaa.gov/info/articles/survey/intro.htm

[65] DJ Mazur and DH Hickam, "Patients' interpretations of probability terms." J General Internal Medicine 6 (1991): 237-240

entirely comprehensive. It appears that the community has relied heavily on 14 of the 50 words, but the majority of these remaining 36 words have also been used at one point or another across the decades. If decision makers want clarity and consistency in intelligence estimates, they are certainly not receiving it.

One of the most intriguing results of this study was use of the word *will* from the 1950s through the 2000s. It could be argued that *will* is an estimative word indicating near 100% certitude; however, as one of those more 'extreme' words, the researcher expected its use to be of a more limited nature. The word by far had the largest amount of occurrences over the decades, in total being used 717 times out of 60,000 words. Its next closest competitor was the word *would* which registered 326 occurrences, a difference of just about 400. The word *will's* failure to appear as statistically significant is due to its almost consistent usage from the 1950s through the 2000s, which *Figure 5.1* illustrates below.



This trend leads the researcher to believe that NIEs, often times, convey a level of certitude to decision makers that may not be appropriate. The problems with this were detailed in the literature review, but it is likely that use of a word which does not convey a level of probability is extremely detrimental to the IC. Decision makers are left to speculate about the likelihood of a situation because the analysts have neglected to clearly lay out their facts and discern them from logical assumptions. In a speech at Georgetown University on April 28, 2008, Central Intelligence Agency Director General Michael Hayden remarked "Even when we are at the top of our game, we can provide policy advice with insight, with context, but we cannot guarantee absolute certainty of our insight."[66] The word *will*, however, does just that. It reveals to a decision maker with certainty what is really only *likely* to occur. As of 2007, the trend of American intelligence agencies appears to be that of conceding the limits of their knowledge, but it will take some time before this new method becomes the norm. In the Iran's Nuclear Intentions NIE key judgments, the word *will* was still used five times, but oddly enough, in the past two Iraq NIEs, it was only present a total of seven times. Perhaps the IC is beginning to see a decrease in the trend of complete certainty and a preference more towards that of nuanced estimates that accurately convey the degree of likelihood. It is evident, though, that failing to use true estimative words is problematic within a discipline that prides itself on prediction. The country has been witness to the ramifications of this method over the years, most notably in massive intelligence failure.

The National Intelligence Council has been promulgating a standardized list of estimative words since 2006, but results of this study seem to indicate that they have only

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[66] Julia Cai and Avni Mehta, "Kissinger, Hayden Reflect on Former CIA Chief," The Hoya.com, April 29. 2008, News section

been utilizing a small part of that list; however, it is important to note that few NIEs have been produced during this short time frame. The words at the extreme ends of the scale have very few occurrences, with *almost certainly* being used only three times during the 2000s and *remote* not being used at all. It may be that use of certain words causes fewer problems when dealing with approval. With the IC's new trend of conceding knowledge, words such as *probably* and *likely* convey an appropriate degree of likelihood, but one that is not at the upper and lower bounds of the scale. The NIE process is often a contentious one, and it may also be that in order to produce an estimate that is consistent with the viewpoints of every agency analysts are forced to concede and use a word that incorporates both the approving and dissenting opinions of others. If this is the case, then a standardized list of words, whether from an individual agency or from the Directorate of National Intelligence, might not make a tremendous impact on the IC. Obviously it will take time to persuade other analysts in the community to use the new list, but the body which has produced and promised to use these new words must in fact follow through and persuade other agencies to embrace a list that will inject consistency into the IC.

A more thorough examination of the words *probably* and *likely* is also worth conducting as these two words are now synonyms for one another in the NIC's new list of estimative words. It is extremely evident that there has been a shift in the use of these two words. The word *probably* appears to have been dominant throughout the 1950s and 1960s, with some change taking place during the 1970s and 1980s. *Likely* seems to have become the word of choice in the 1990s and 2000s, and it will be interesting to see whether a shift takes place over the next decade. The weather forecasting profession exhibits large variance in the meaning of the word *likely* while the medical field has shown fairly consistent results

in assigning percentages to *probable*. Medical studies suggest that physicians perceive *probable* in the upper 70% range and *likely* in the lower 70% range. Perhaps these words have very different meanings for people and grouping them together may result in further confusion for both the analyst and decision maker. This researcher would suggest eliminating the word *probably* from the new NIC list. Whether the larger population believes these words are synonyms or not, it will serve to eradicate any confusion when a decision maker attempts to enact policy.

Although *will* clearly seemed to be the most popular estimative word over the decades, other trends do emerge from the probabilistic terminology tested in the study. The English modals, or the auxiliaries that can modify the grammatical mood of a verb, revealed that besides *will*, *would* has also been heavily employed in NIEs throughout the decades. The modals are somewhat interesting because out of all the estimative terminology, they seem to be, in this researcher's opinion, words that are most difficult to equate with individual odds. Interestingly enough, Dieter Mindt, in his 1995 book *An Empirical Grammar of the English Verb: Modal Verb,* stated that the three most frequently used modals are *would* (28%), *could* (17%) and *will* (17%).[67] In the modals data, results seem to mirror that of Mindt's hypothesis in terms of the three most popular words, but not when it comes to word frequency. The discrepancy is likely due to the fact that NIEs do not closely mimic everyday speech. However, the trend does demonstrate that analysts in the community need to pay more attention to modals. In the majority of word probability studies conducted, experimenters fail to include these words in data sets. Slightly alarming is not only the

[67] Dieter Mindt, "An Empirical Grammar of the English Verb: Modal Verbs." Teaching English as a Second or Foreign Language 3, no. 1 (1997): 192.

neglect of these words but also the fact that Mindt stated the word *may* expresses a probability of 97%, an odd that many in the community would arguably disagree with.

Two modals do appear in the NIC's explanation of estimative language on page five of its new NIE format: *might* and *may*. The council explains that these terms "reflect situations in which we are unable to assess the likelihood, generally because relevant information is unavailable, sketchy or fragmented."[68] However, in the three most recent NIEs, additional modals have also appeared. *Will* has been used 24 times, *would* 18 times and *could* 14 times. One has to then beg the question if these other modals are meant to convey the same type of meaning or are more in line with its overall verbal probability scale? If authors are claiming that the modal *may* expresses a 97% probability, then perhaps the NIC is not using modals in the correct way. If analysts feel comfortable employing them in estimates, then this researcher would suggest that further studies are carried out on this particular word group to eliminate some of the mystery surrounding their actual probabilities and the odds equated with them.

Interesting trends also exist within words that convey analytical assessments. It appears that the current trend is headed toward using *we judge* and *we assess* rather than *we estimate* or *we believe* which were more prevalent in the 1950s and 1960s. This shift is likely due to the more authoritative nature of *judge* and *assess*. *Judge* is particularly problematic in that it conveys a judicial tone, one of hearing evidence or legal arguments to pass judgments. *Estimate* and *believe* seem to convey a level of uncertainty that the other two words do not exhibit. This is a risky development as it may lead decision makers astray and force them to follow an analysis that they believe is entirely correct in its assessment.

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[68] National Intelligence Council, "Iran: Nuclear Intentions and Capabilities," November 2007 Key Judgments, http://www.dni.gov/press_releases/20071203_release.pdf

The real question begged is have there been any differences between word preference in the 1950s and that of the 2000s? The answer is yes, but not a resounding one. Comparing the 1950s to the 2000s, eight words appear to have remained consistent: *would*, *probably*, *unlikely*, *could*, *likely*, *may*, *almost* and *will*. This list does not include words such as the confidence indicators, *not*, *if* and *even*, but only those that convey a true estimative tone. However, there are some notable problems with these words. First, although there is consistency in the word list, the expressions that have in fact been used are not considered 'good' WEPs. Six modals are listed, including the highly problematic word of certainty *will*, as well as words like *almost* and *possible* that lack consistent meaning. Second, and perhaps more importantly, the average use of the vast majority of 50 words is so low that it is difficult to discern any identifiable trends or patterns. Most of the words on the list below (disregarding *will* and *would* whose usage consistently measured in the hundreds each decade) averaged less than fifty hits every ten years. Therefore this list, coupled with the remaining words that were used sporadically across the decades, indicates a lack of consistency in estimative word usage throughout the years. In other words, there have been 'fads' across the decades but it is unlikely that they are tied to any sort of standardized usage. Analysts have been consistently using the same words but their inherent meaning has been different for various decision makers over time. This practice of inconsistency has not only led to confusion in determining what estimates are attempting to convey but also massive intelligence failure.

Research Recommendations

There are several routes to take when conducting further research in this field. First, it may be worth exploring verbal probability expressions in the medical field and truly determining why and how physicians are able to clearly communicate probability to patients. The possibility exists that patients are able to better perceive probabilities through spoken rather than written word, as they have body language and voice intonation as cues to assist them. Through research such as this, it may then become possible to apply a similar model to the intelligence field and produce a list that professionals both agree upon and can understand. There are additional medical studies that were not included in the literature review and these studies appear to substantiate the claim that the medical profession has come to some sort of agreement on a list of probability expressions.

Furthermore, the word list examined in this study was extremely subjective. Phrases were not examined until it was near completion due to limitations in the word frequency software. The program now includes the ability to count phrases and it may be worthwhile to use the existing data and examine, from a more comprehensive viewpoint, some of the phrases that have been employed in the IC over the years.

The category of modals has proven to be an impetus in the use of WEPs within the professional intelligence community. This researcher would suggest that a survey be carried out within the IC to determine how employees perceive these words and the odds that they equate with them. Some researchers have claimed that they convey a high level of probability while the NIC is now using them to convey assessments in which they are not entirely confident.

A limitation of this study was that it only counted words of estimative probability in key judgments. While this researcher doubts that there are more consistent trends elsewhere, it may be interesting to analyze the body of the NIEs. This will provide future researchers with more data, and if there are differing trends between the key judgments and remainder of the document, they can be brought to the surface.

Finally, the British Ministry of Defense (MOD) has apparently been able to standardize a list of estimative words for use within the defense community. It might be helpful to examine their word list and compare it to the US intelligence community. If there is inherent understanding in a particular word list perhaps it would also aid US analysts in standardizing their own list or adopting the British MOD's.

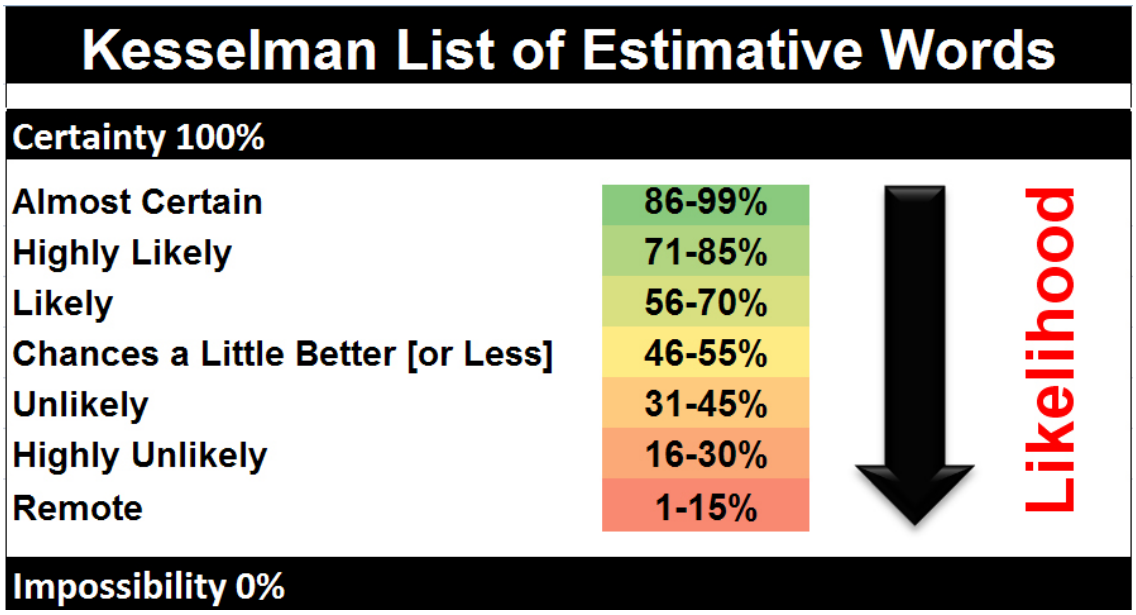
Moving Forward

Throughout this thesis there have been numerous mentions of the need to standardize a list of estimative words within the intelligence community, and the research findings further substantiate this claim. While probabilistic words are not entirely responsible for preventing intelligence failure, without clear estimative language, failure becomes inevitable. The purpose of intelligence, ultimately, is to reduce uncertainty for the decision maker. It doesn't matter how much information analysts have at their fingertips or how reliable they believe their sources to be…if the analysis is not clearly conveyed to a decision maker, it means nothing. Sherman Kent was on the correct path when he first proposed assigning values to qualitative expressions, and it is this researcher's recommendation that the IC adopt this method or one similar to it. Since the NIC has already begun using a new list of words, it is important that the remainder of the IC either accept this list and include it in the

Directorate of National Intelligence's Analytic Integrity and Standards or create a list that analysts and decision makers alike are able to understand and employ in daily practice. Furthermore, assigning percentages to this list will ensure that when one analyst at a particular agency says X is likely to happen, an analyst at another agency will understand the odds of its occurrence.

This issue prompts the researcher to suggest the *Kesselman List of Estimative Words* for use within the intelligence community. It builds on Sherman Kent's original WEP list in the 1960s and the National Intelligence Council's current list as well as draws from Mercyhurst College's WEP list. The new scale includes seven words of estimative probability which is in line with what Kent and the NIC have proposed; however, it differs in its phraseology and odds equivalents. The percentile ranges are broken down into groups of 15%, except for the middle range of *chances a little better [or less]* which was assigned only 10% and the upper and lower ranges which number 14%. Absolute certainty or impossibility generally is not conveyed in intelligence assessments, but the two extremes are represented at the top and bottom of the new scale.

Figure 5.2: Kesselman List of Estimative Words



Most importantly, the list uses words that large groups of people perceive in similar manners. Subjects have never had problems with the extreme ends of a scale; therefore, perceptions of *almost certain* and *remote* as well as *highly likely* and *highly unlikely* should remain fairly constant. It is important to note that these terms are present in the NIC's new word list, although they vary slightly. Rather than using *almost certainly*, this researcher believes that it is possible to use *almost certain* in far more grammatical structures, thus the elimination of *–ly*. Second, the word *highly* conveys a much clearer picture with *likely* and *unlikely* than does *very,* so those two phrases were also tweaked.

Where the problems appear, however, are with the words buried in the middle of the scale. In weather forecasting, respondents of the Juneau survey indicated that the word *likely* conveyed a 62.5% numerical equivalent and in the medical professions physicians have indicated that the word's value is approximately 70%. An odds equivalent in the scale above of 56-70% mirrors that of researchers' findings in several disciplines. Most notably, use of only the word *likely,* rather than *likely*/*probably* as synonyms for one another (as in the NIC's new scale), should serve to eliminate confusion and standardize that particular percentile range.

The next question to tackle was how to convey odds that fell directly above or below 50%. The terms *chances are even* and *fifty-fifty* tells a decision maker nothing and essentially asks them to toss a coin in the air. Therefore, a term was needed that would convey odds slightly above or below the halfway benchmark and *chances a little better [or less]* does exactly this. Only assigning the category 10% forces the analyst to make a call depending on whether the chances are indeed better or less than a particular situation coming to fruition. For example, if an analyst wants to convey that certain odds are better, they

would have to equate the statement with at least 51%. It may sound as if 51% is not much different than 50%, but saying in essence that there is the slightest probability something may occur is a progress within the IC.

Finally, this list is not only extremely easy to use but also simple for analysts to remember and produce on their own if they did not have a copy with them. The words are arranged in such a way that the top of the list generally mirrors that of the bottom (with the exceptions of *almost certain* and *remote*): *highly likely* realizes its counterpart in *highly unlikely* and *likely* and *unlikely* mirror each other as well. Analysts simply need to remember that each category is broken down into groups of 15% except for the middle category at 10% and the two upper boundaries which will never reach complete certainty or impossibility. The scale also eliminates the need for synonyms in estimative language. If these words can be used consistently, analysts will always know exactly what they are attempting to convey and decision makers will receive clarity, allowing them to enact policy that is in line with an analyst's thinking.

While there is an understanding of the value of consistent terminology in the IC, it has yet to be operationalized. With the increased scrutiny that the IC is likely to receive in the new information age, it is only to their benefit to adopt such a list. While the *Kesselman List of Estimative Words* will likely be tweaked by others in the community, it is a step in the right direction. Analysts have an obligation to communicate as effectively as they can the results of their estimates. The best case scenario is that the NIC and the IC take into consideration this new estimative scale above and produce several more iterations of their own list until employees of the community can come to agreement on a set of clear-cut words that all are both willing to accept and employ in daily practice.

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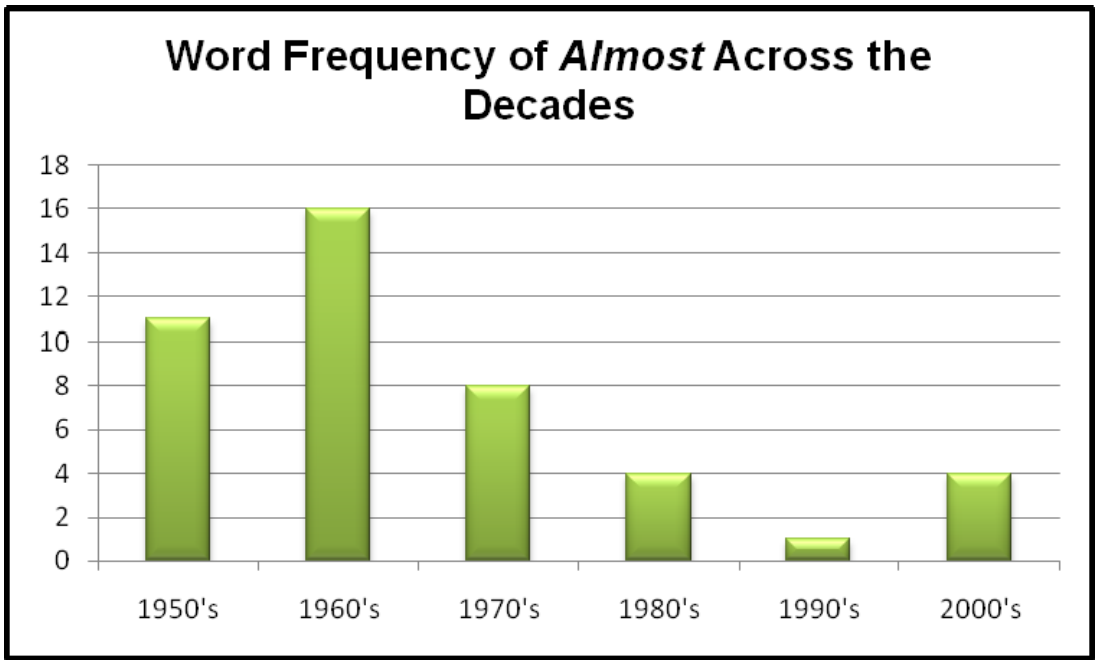
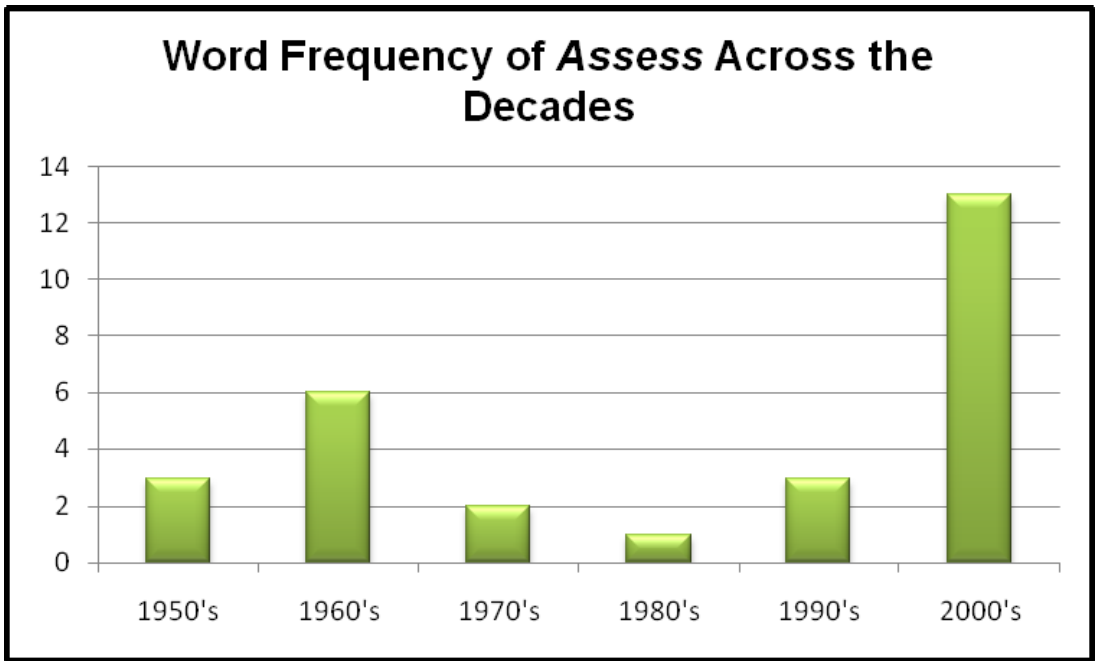
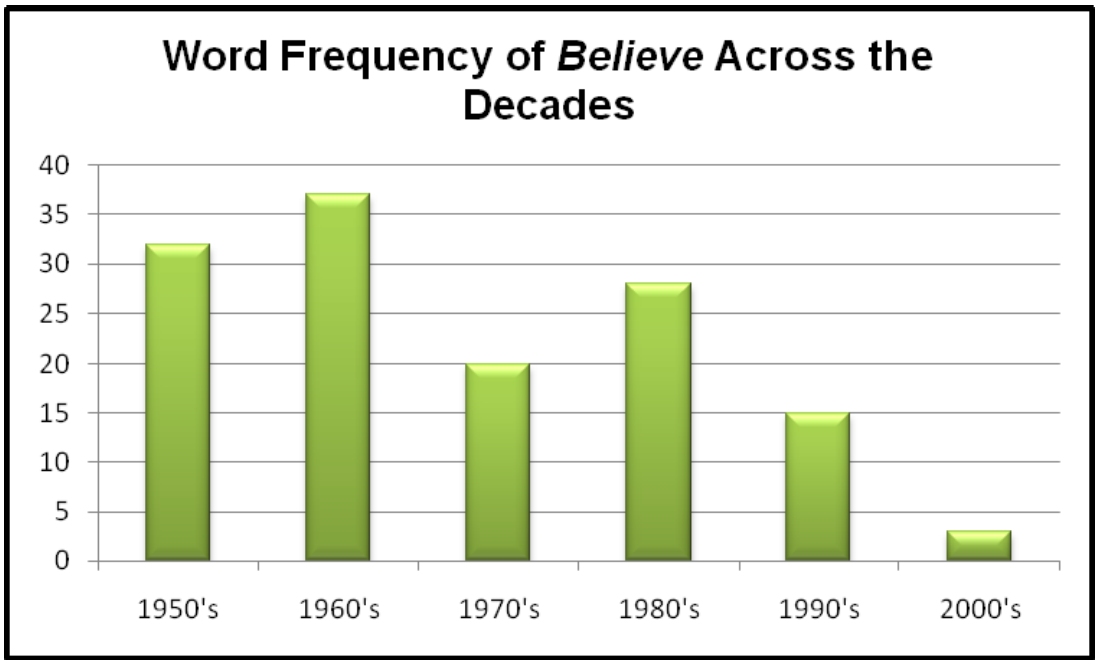
APPENDICES

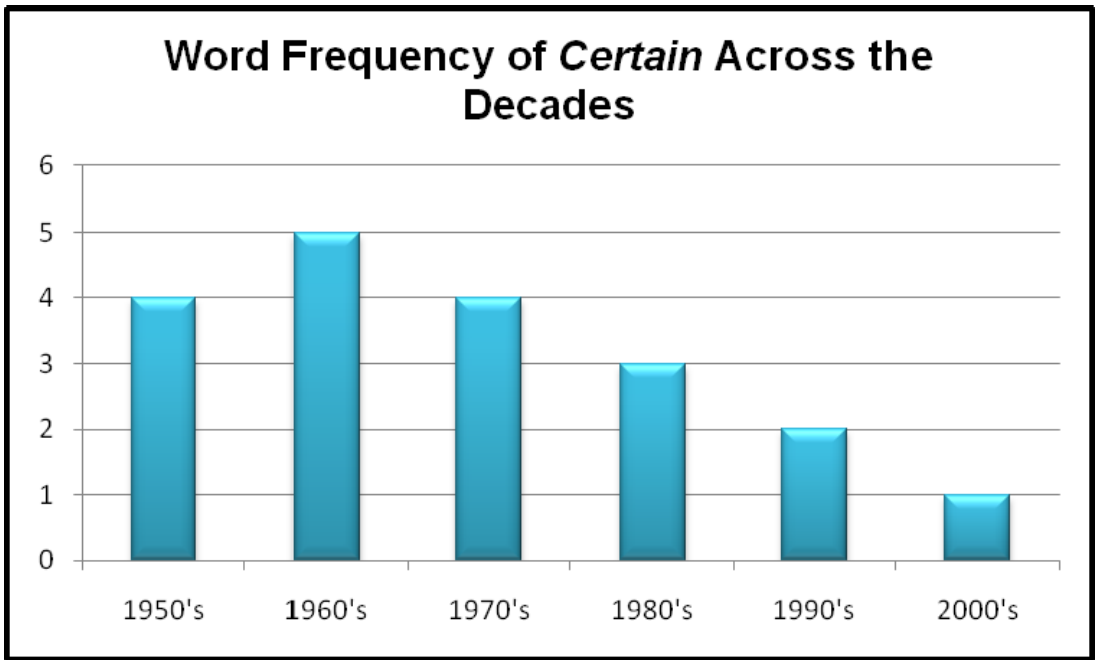
Appendix A: Normalized Word Frequency Histograms Across the Decades

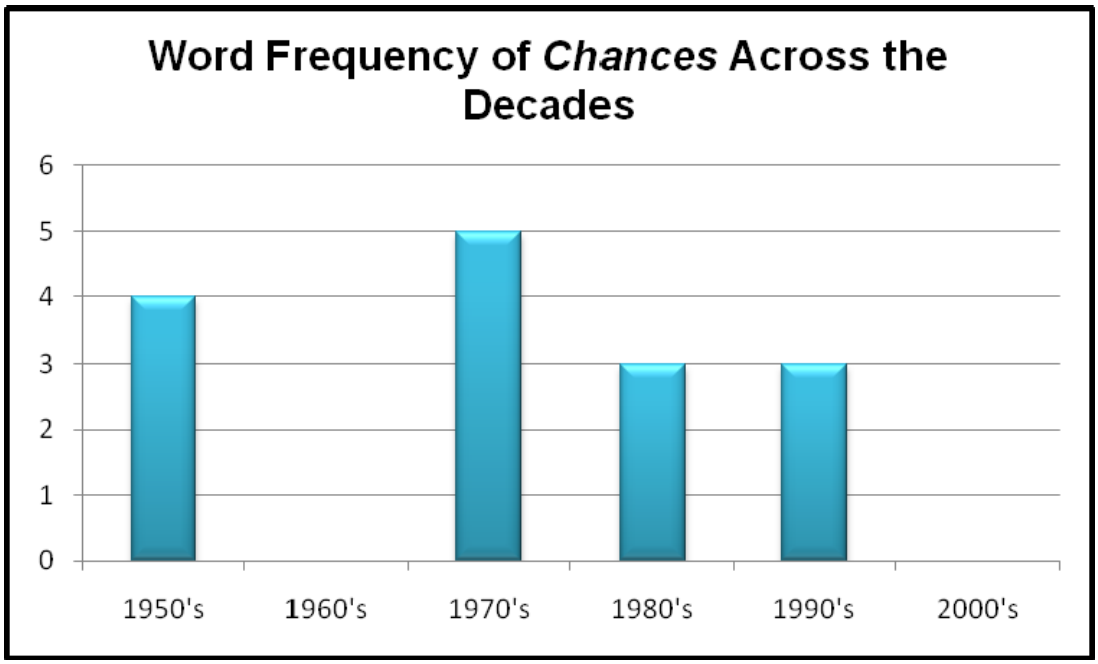
The following histograms display normalized data sets for each word examined in the study (i.e. word frequency per 10,000 words). Green charts indicate words that were statistically significant while blue charts represent words that were statistically insignificant.

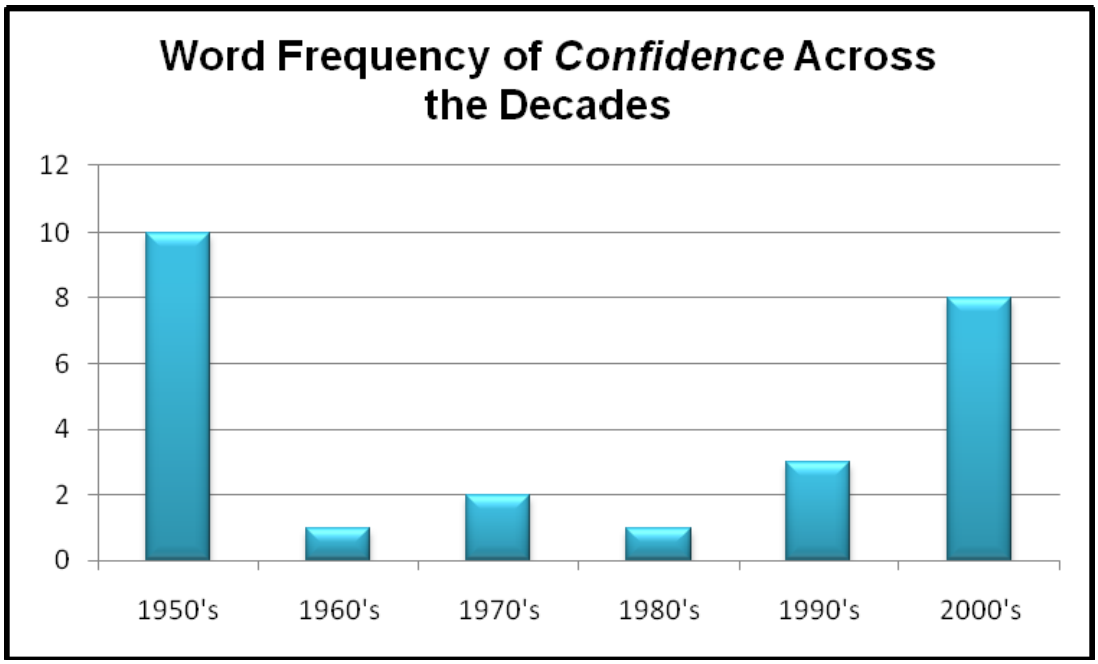


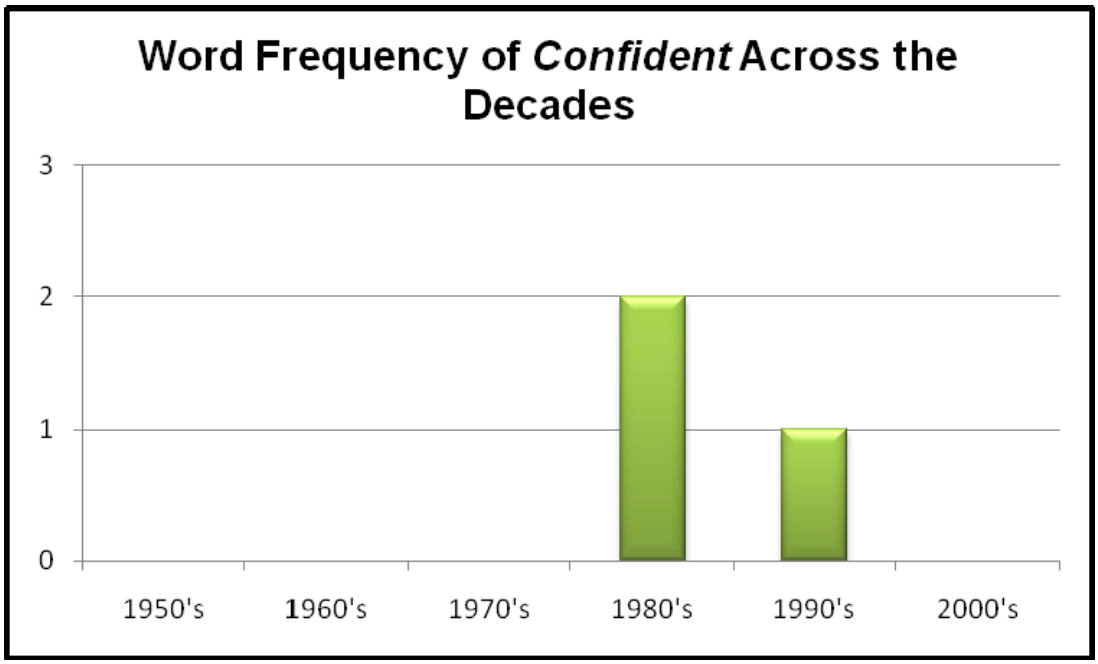


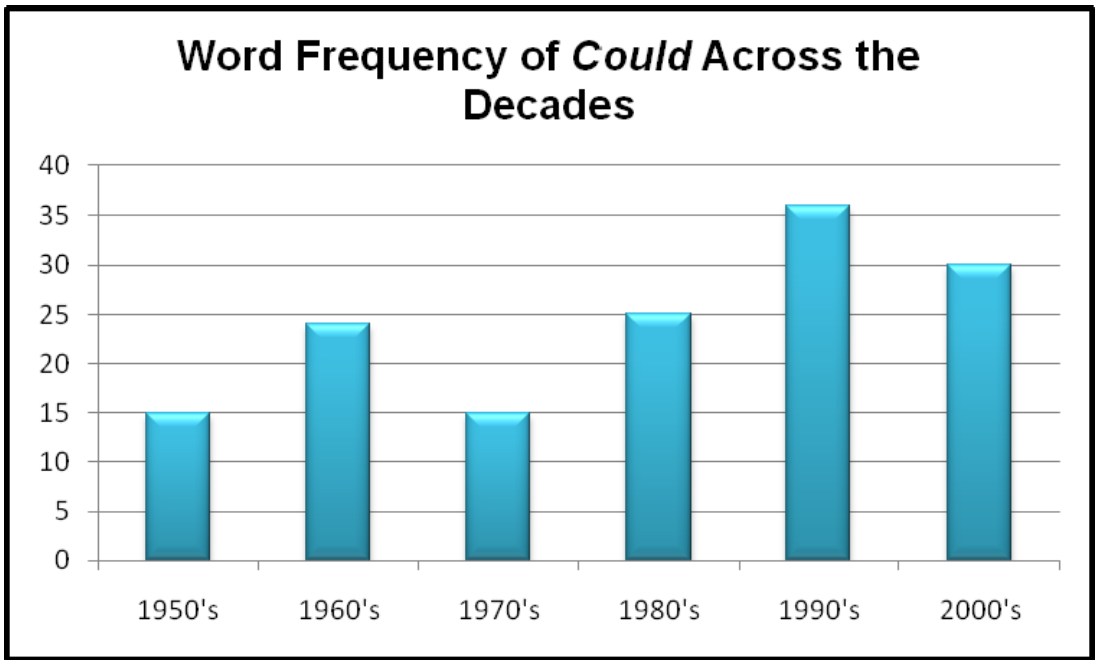

Word Frequency of *Believe* Across the Decades
40
35
30
25
20
15
10
5
0
1950's
1960's
1970's
1980's
1990's
2000's

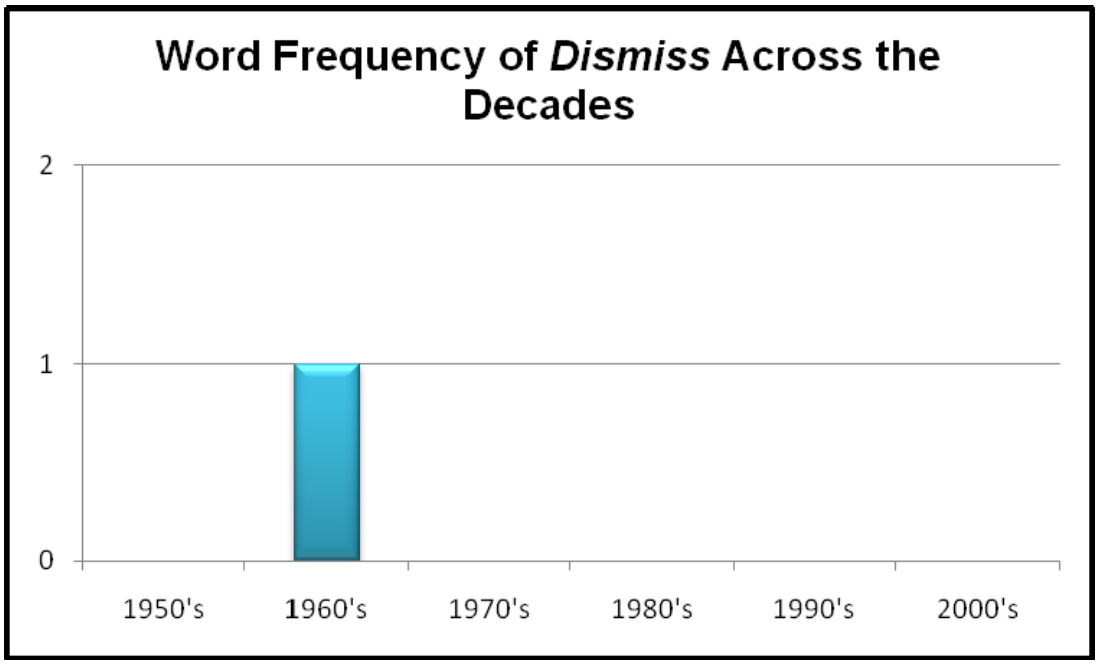

Word Frequency of *Certain* Across the Decades
6
5
4
3
2
1
0
1950's
1960's
1970's
1980's
1990's
2000's

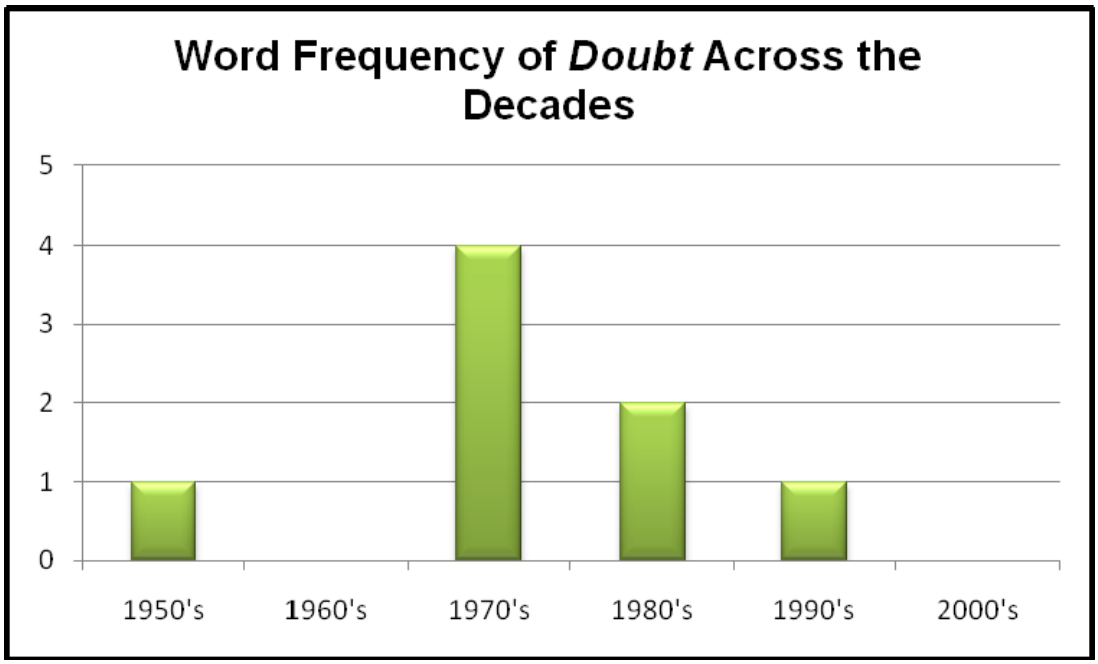

Word Frequency of *Chances* Across the Decades
6
5
4
3
2
1
0
1950's
1960's
1970's
1980's
1990's
2000's

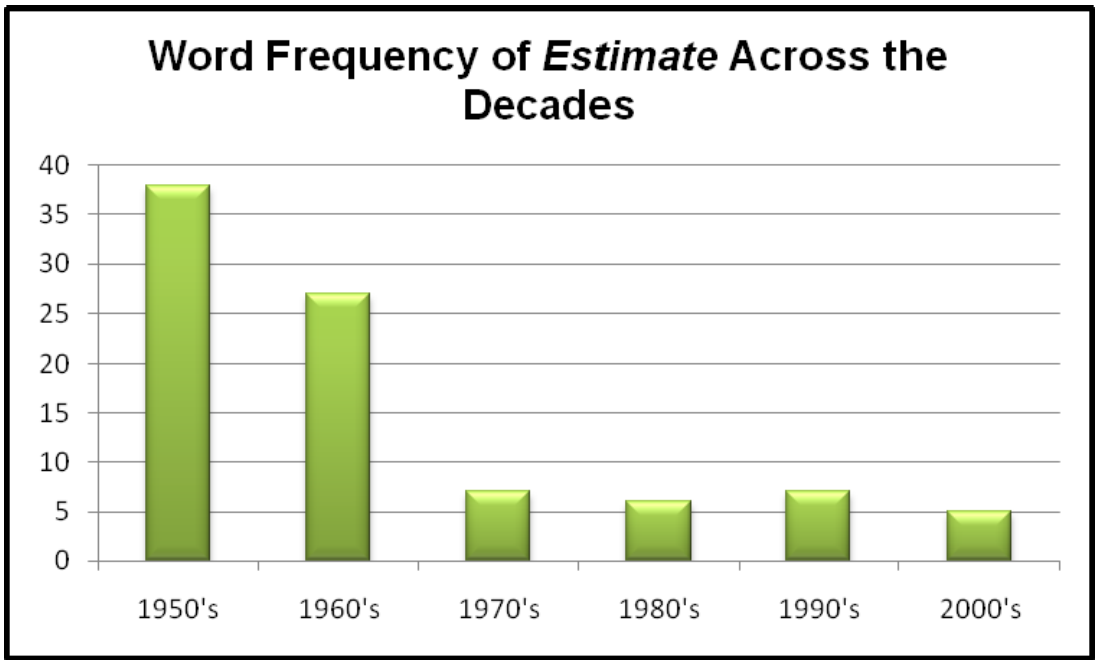

Word Frequency of *Confidence* Across the Decades
12
10
8
6
4
2
0
1950's
1960's
1970's
1980's
1990's
2000's

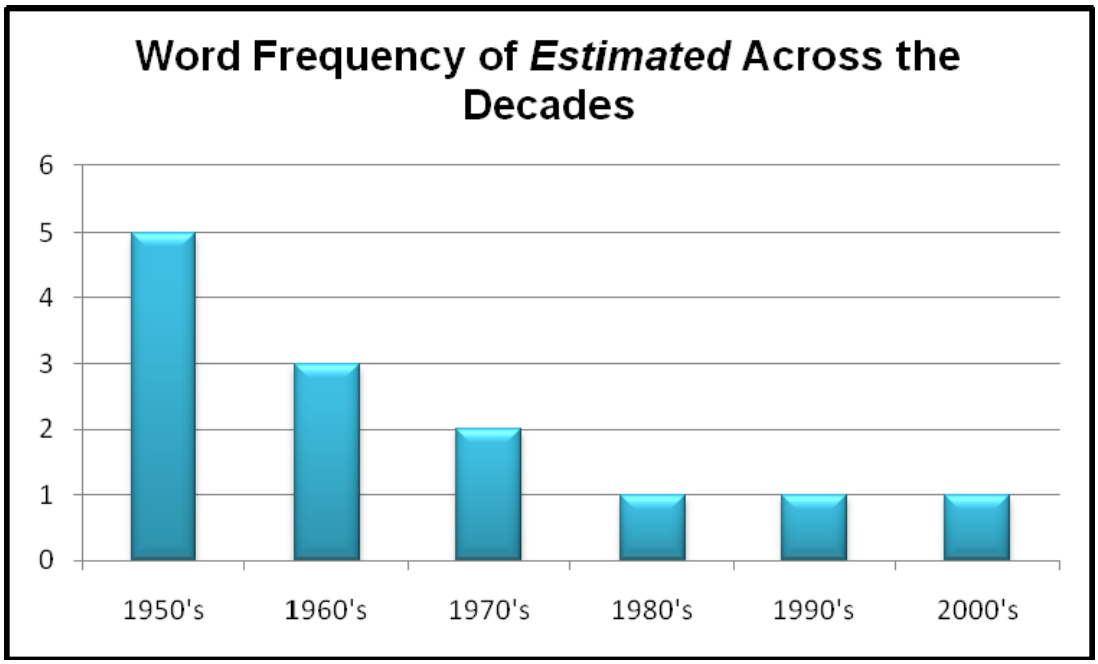

Word Frequency of *Confident* Across the Decades
3
2
1
0
1950's
1960's
1970's
1980's
1990's
2000's

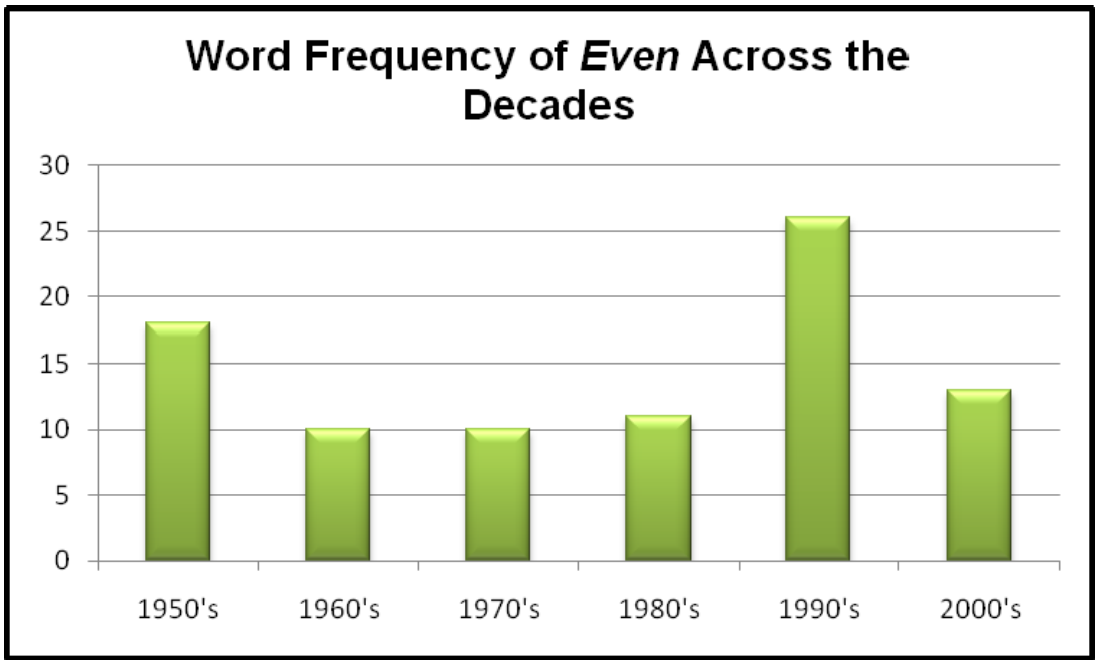

Word Frequency of *Could* Across the Decades
40
35
30
25
20
15
10
5
0
1950's
1960's
1970's
1980's
1990's
2000's

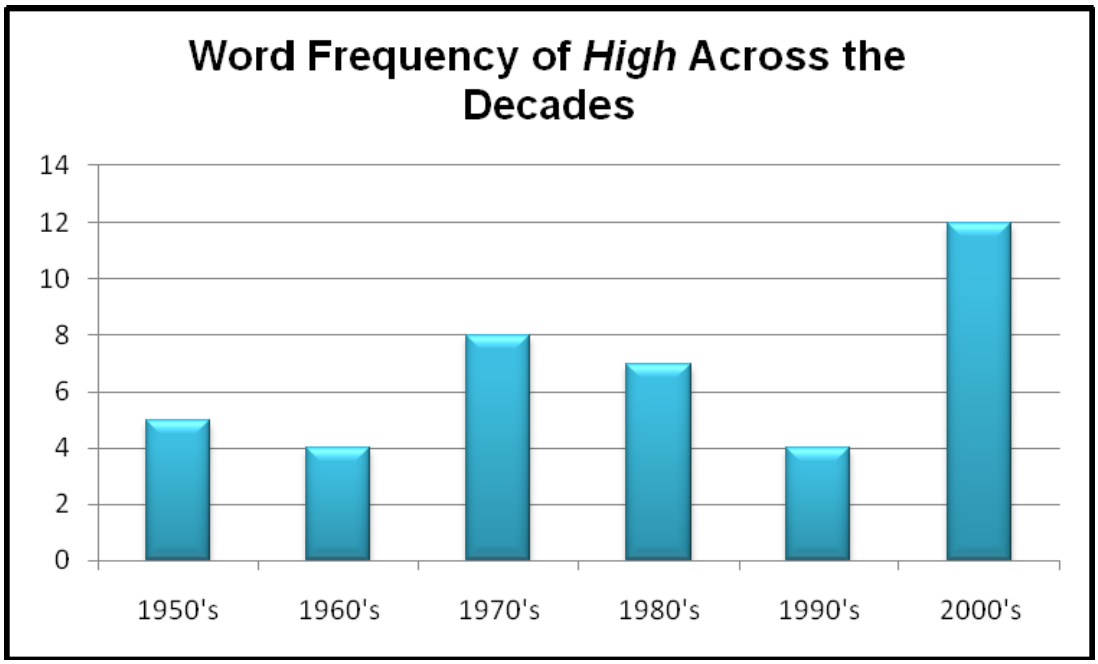

Word Frequency of *Dismiss* Across the Decades
2
1
0
1950's
1960's
1970's
1980's
1990's
2000's

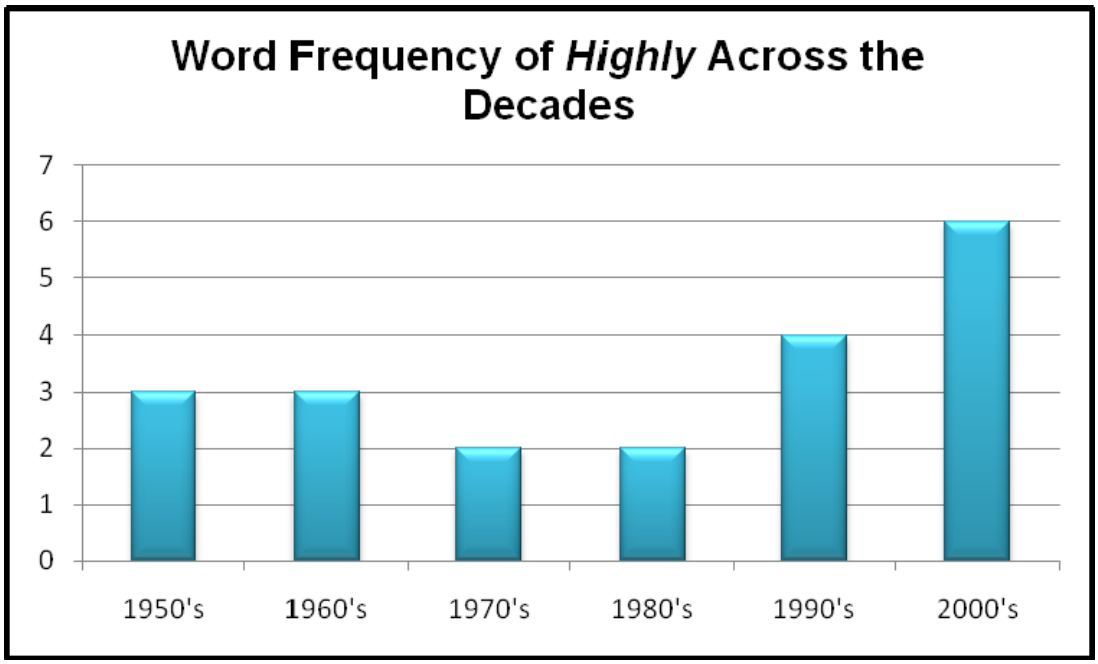

Word Frequency of *Doubt* Across the Decades
5
4
3
2
1
0
1950's
1960's
1970's
1980's
1990's
2000's

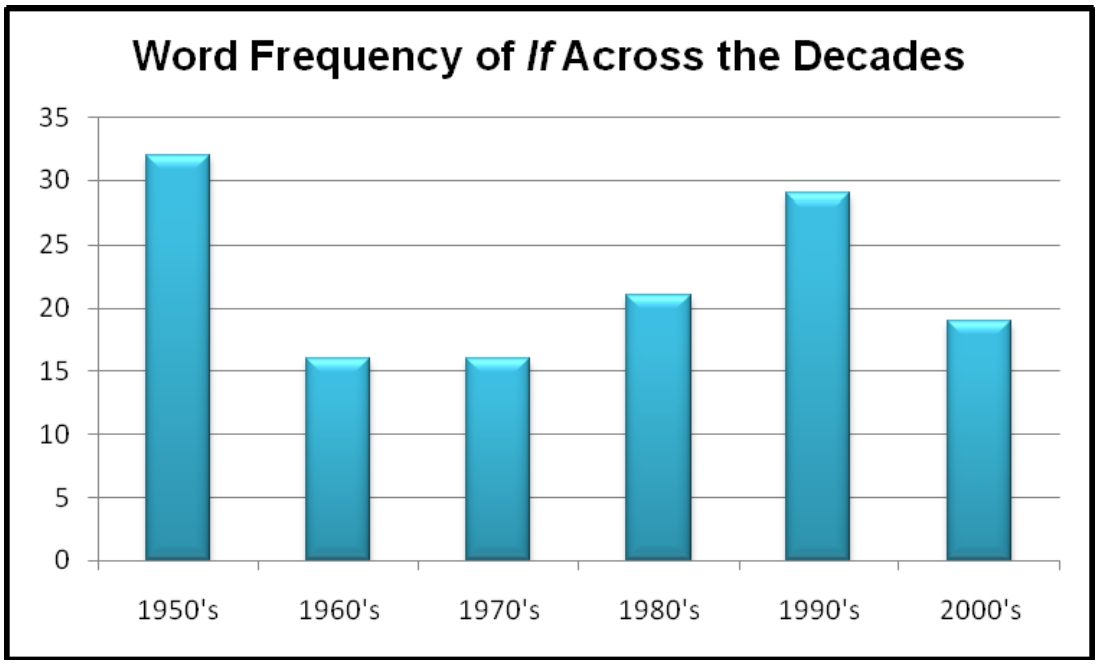

Word Frequency of *Estimate* Across the Decades
40
35
30
25
20
15
10
5
0
1950's
1960's
1970's
1980's
1990's
2000's

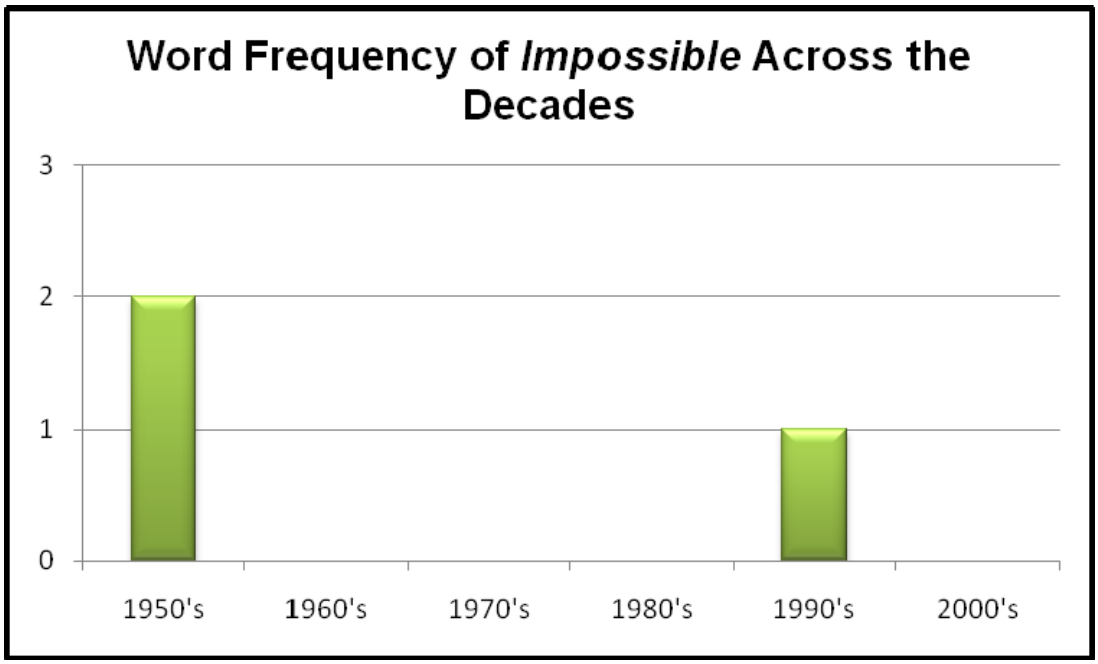

Word Frequency of *Estimated* Across the Decades
6
5
4
3
2
1
0
1950's
1960's
1970's
1980's
1990's
2000's

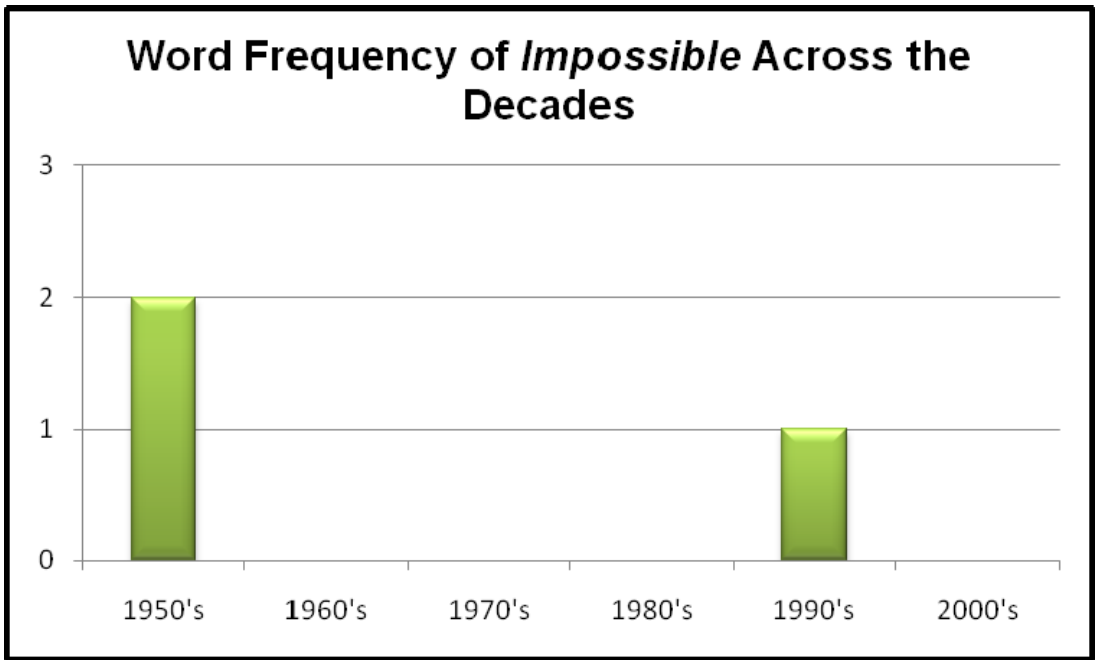

Word Frequency of *Even* Across the Decades
30
25
20
15
10
5
0
1950's
1960's
1970's
1980's
1990's
2000's

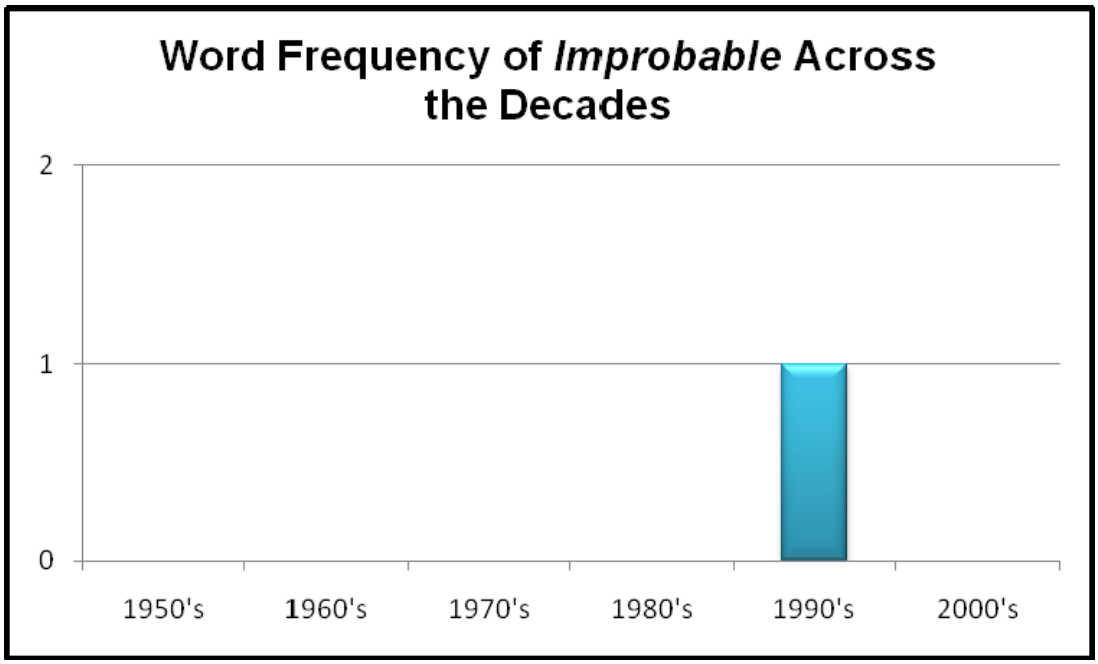

Word Frequency of *High* Across the Decades
14
12
10
8
6
4
2
0
1950's
1960's
1970's
1980's
1990's
2000's

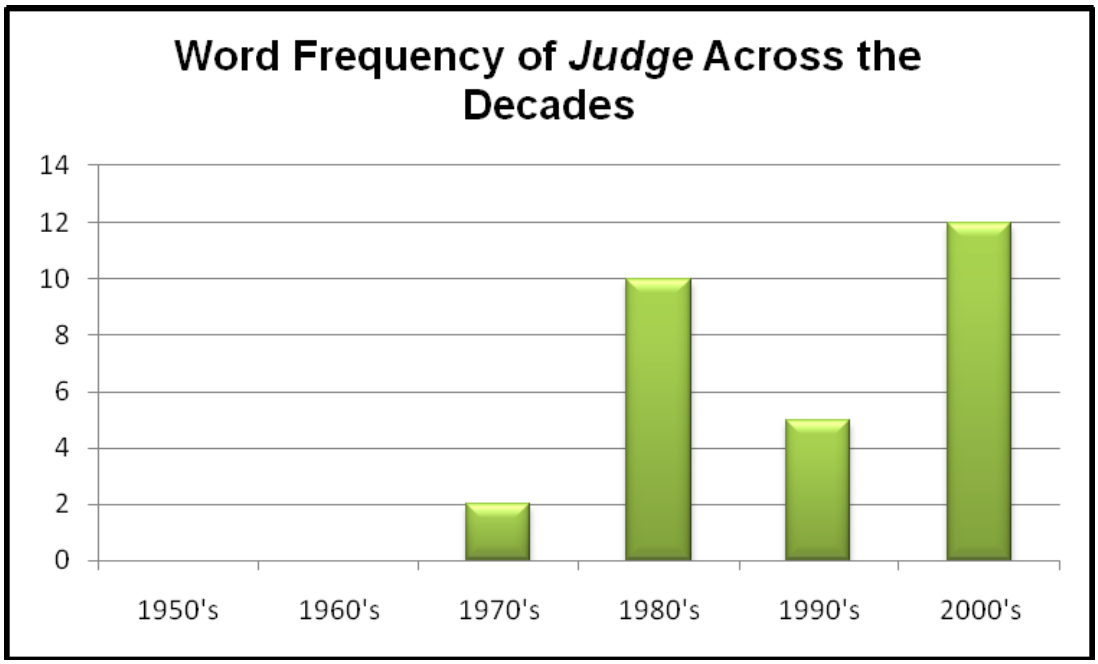

Word Frequency of *Highly* Across the Decades
7
6
5
4
3
2
1
0
1950's
1960's
1970's
1980's
1990's
2000's

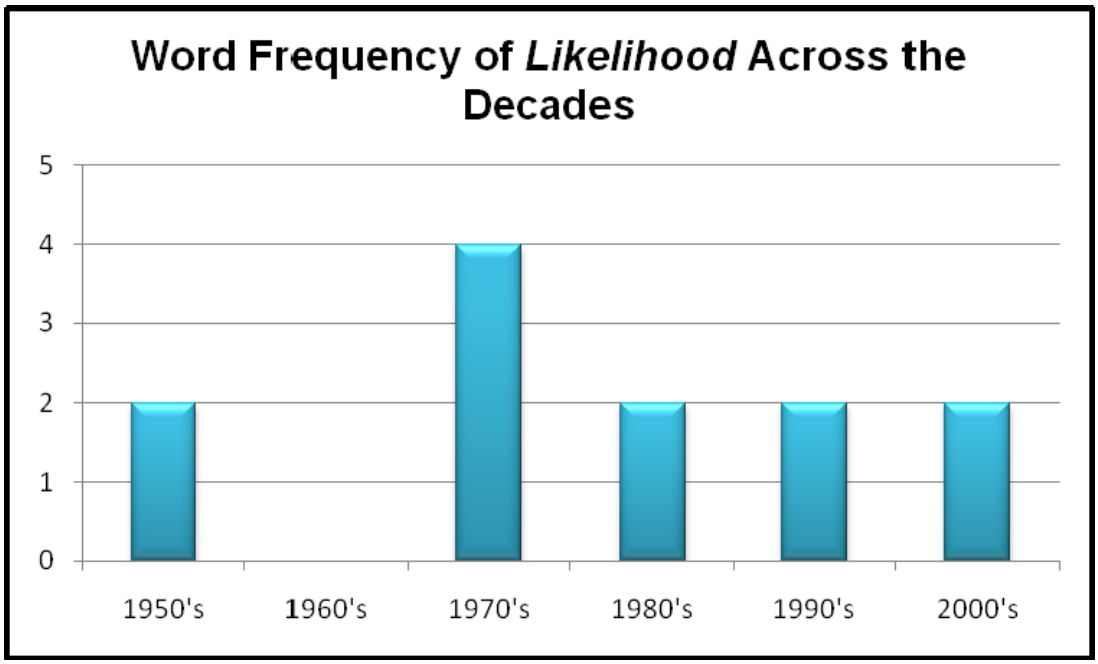

Word Frequency of *If* Across the Decades
35
30
25
20
15
10
5
0
1950's
1960's
1970's
1980's
1990's
2000's

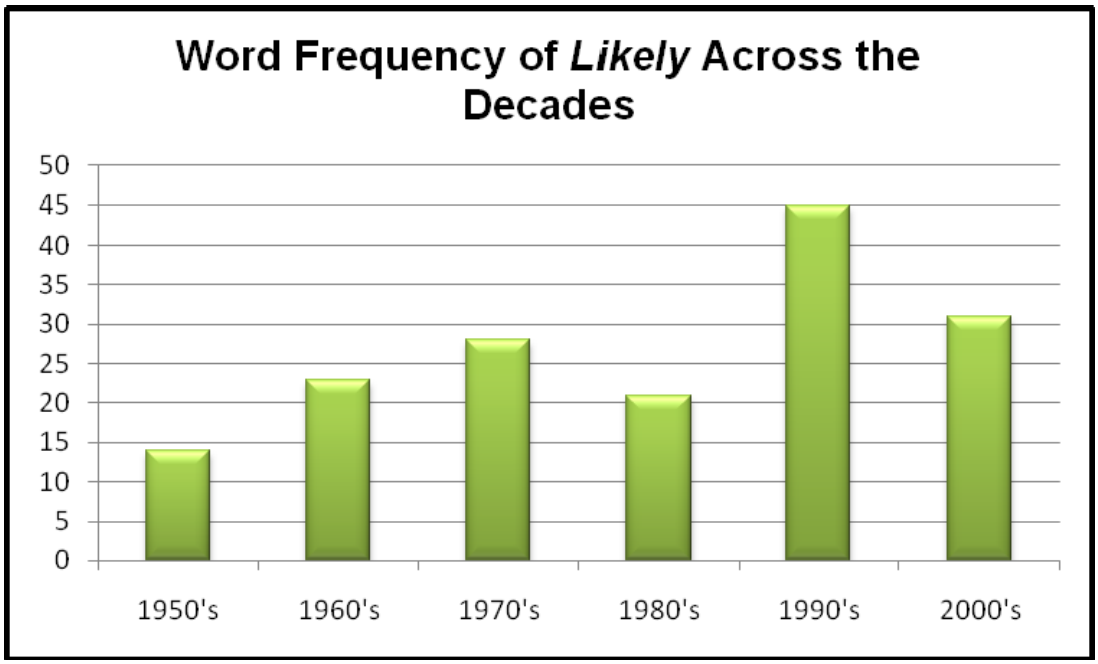

Word Frequency of *Impossible* Across the Decades
3
2
1
0
1950's
1960's
1970's
1980's
1990's
2000's

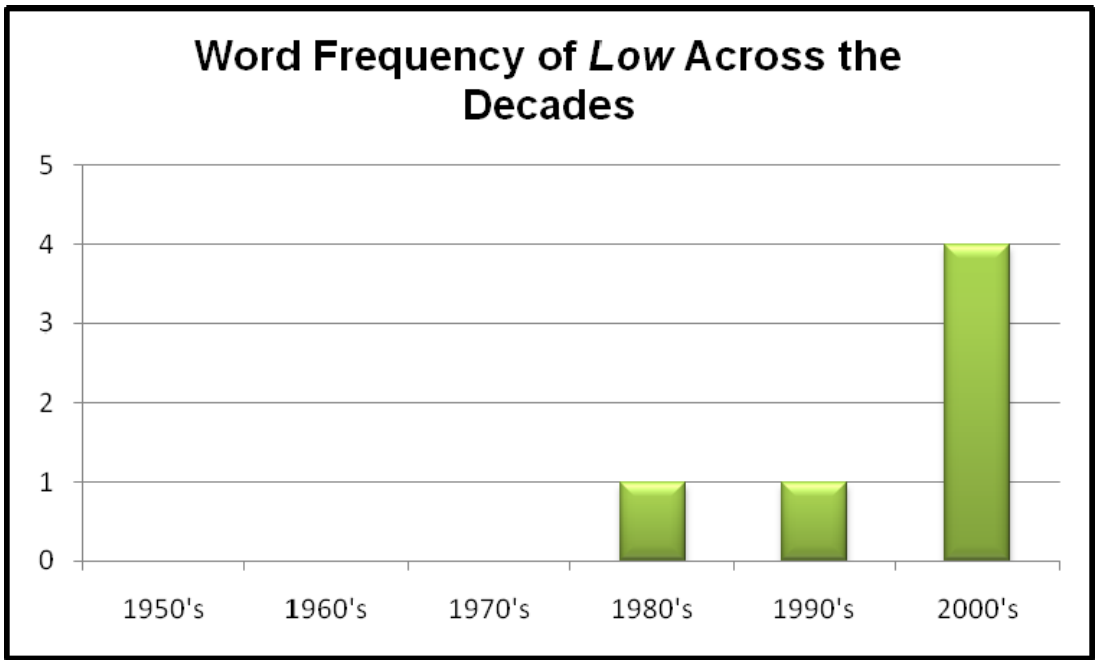

Word Frequency of *Impossible* Across the Decades
3
2
1
0
1950's
1960's
1970's
1980's
1990's
2000's

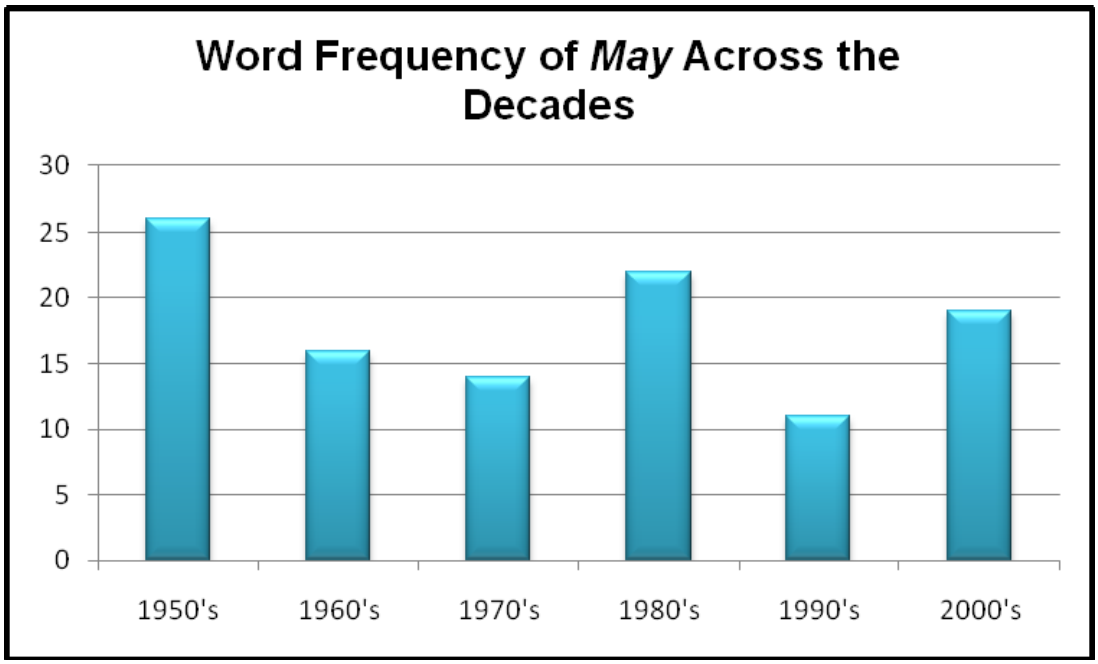

Word Frequency of *Improbable* Across the Decades
2
1
0
1950's
1960's
1970's
1980's
1990's
2000's

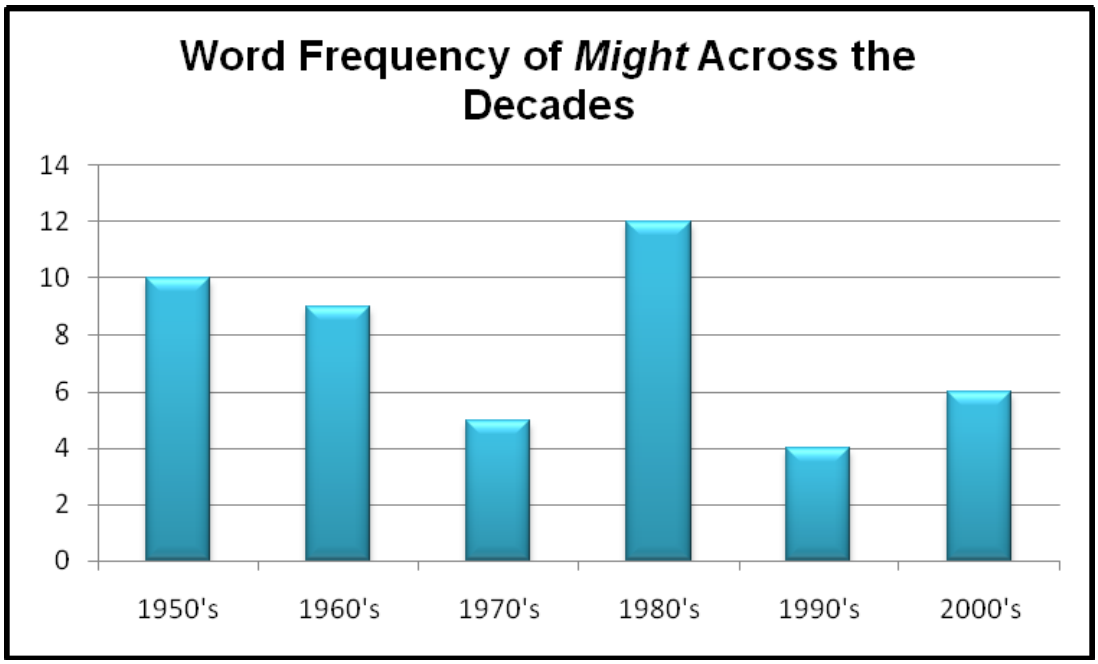

Word Frequency of *Judge* Across the Decades
14
12
10
8
6
4
2
0
1950's
1960's
1970's
1980's
1990's
2000's

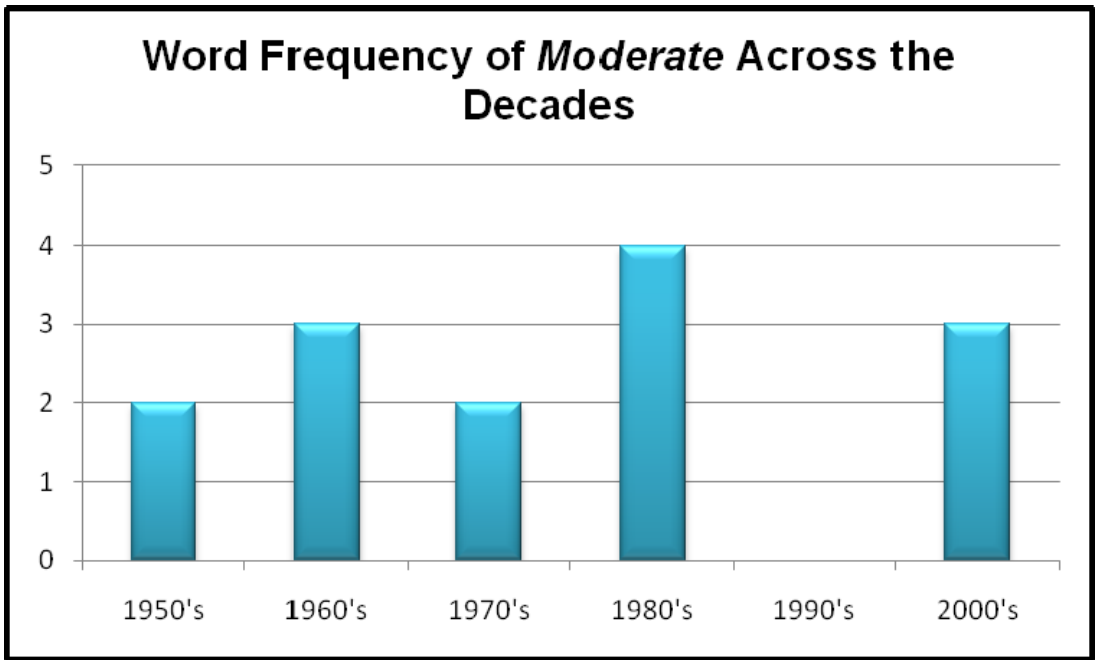

Word Frequency of *Likelihood* Across the Decades
5
4
3
2
1
0
1950's
1960's
1970's
1980's
1990's
2000's

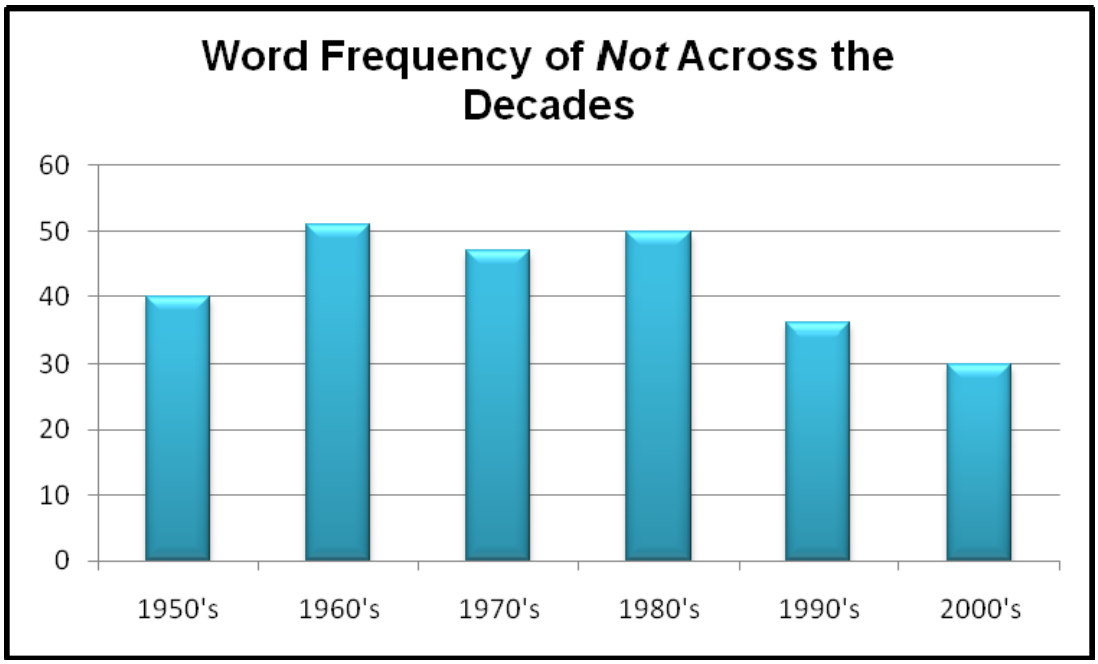

Word Frequency of *Likely* Across the Decades
50
45
40
35
30
25
20
15
10
5
0
1950's
1960's
1970's
1980's
1990's
2000's

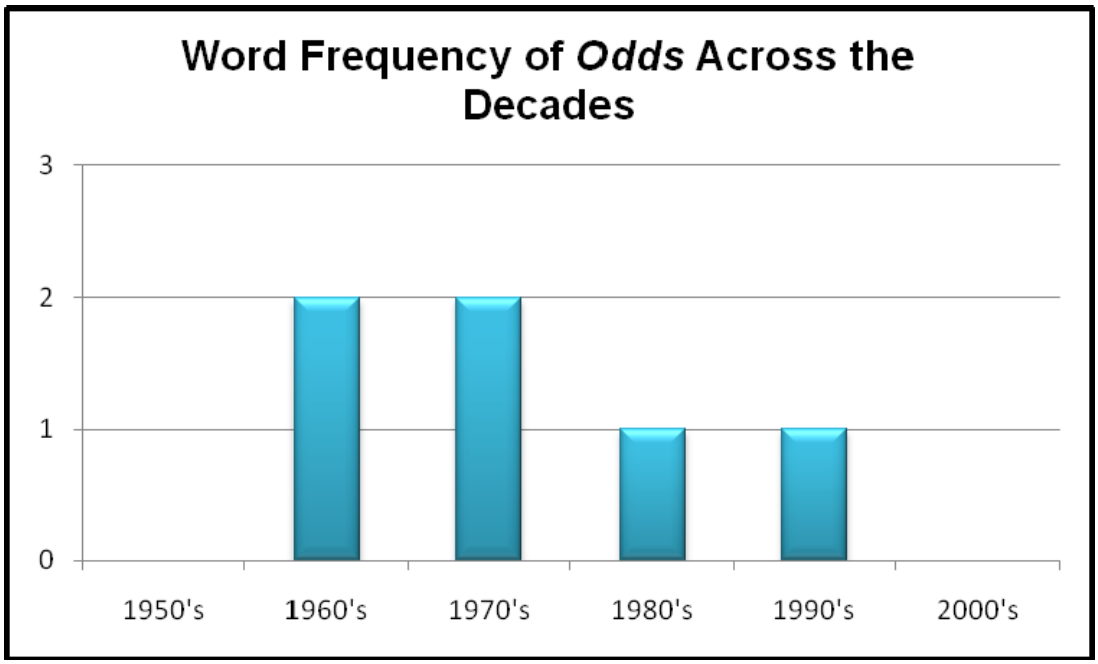

Word Frequency of *Low* Across the Decades
5
4
3
2
1
0
1950's
1960's
1970's
1980's
1990's
2000's

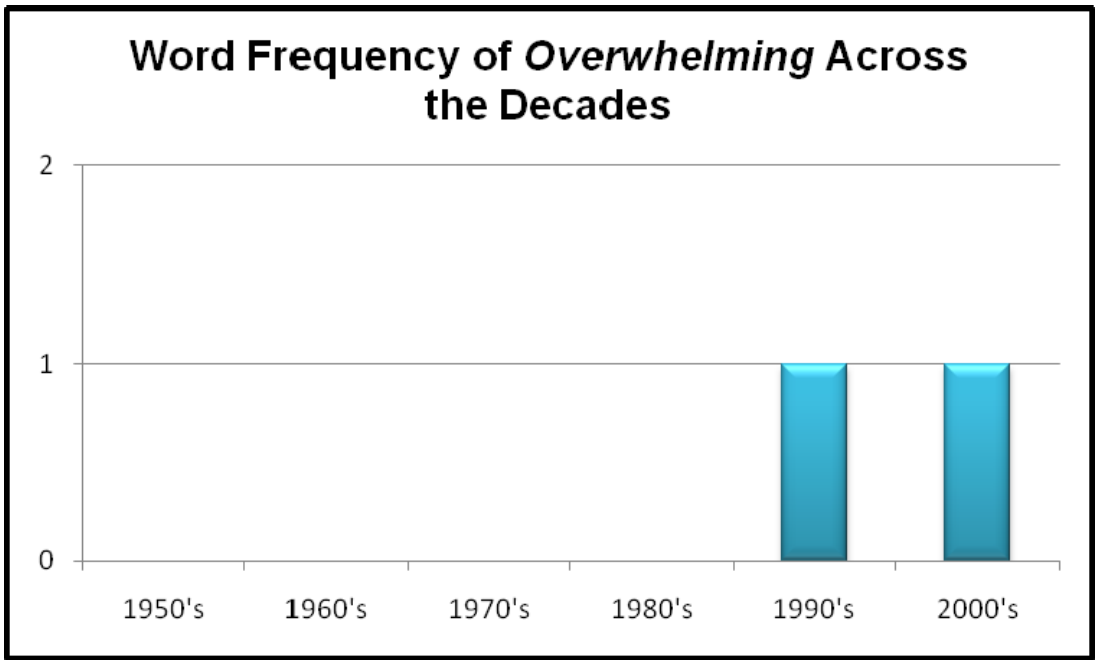

Word Frequency of *May* Across the Decades
30
25
20
15
10
5
0
1950's
1960's
1970's
1980's
1990's
2000's

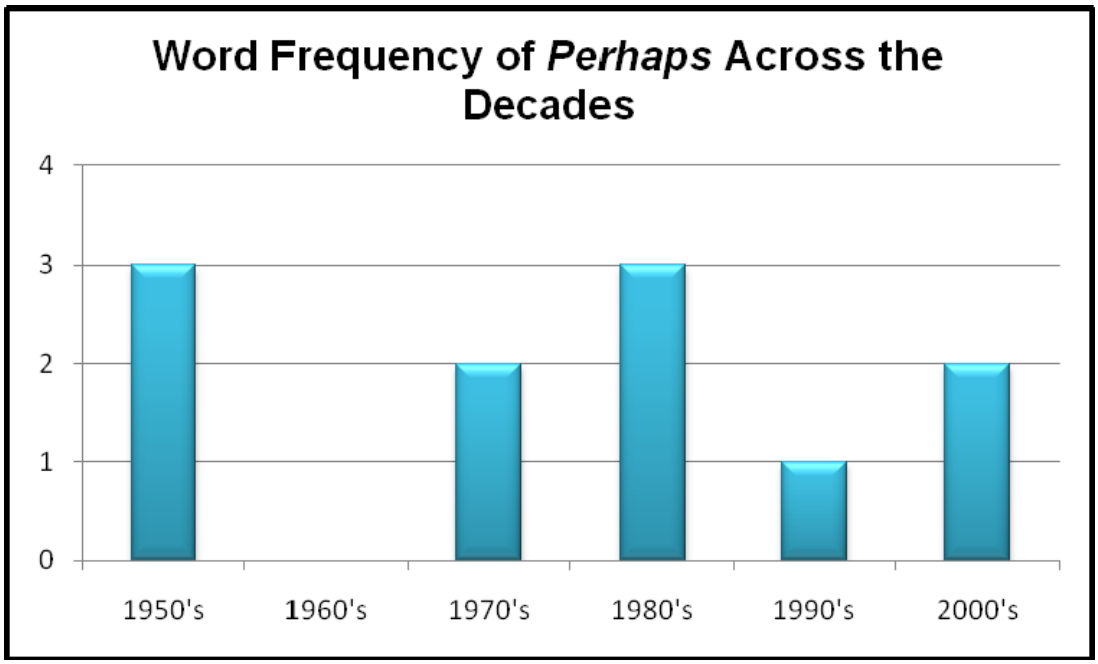

Word Frequency of *Might* Across the Decades
14
12
10
8
6
4
2
0
1950's
1960's
1970's
1980's
1990's
2000's

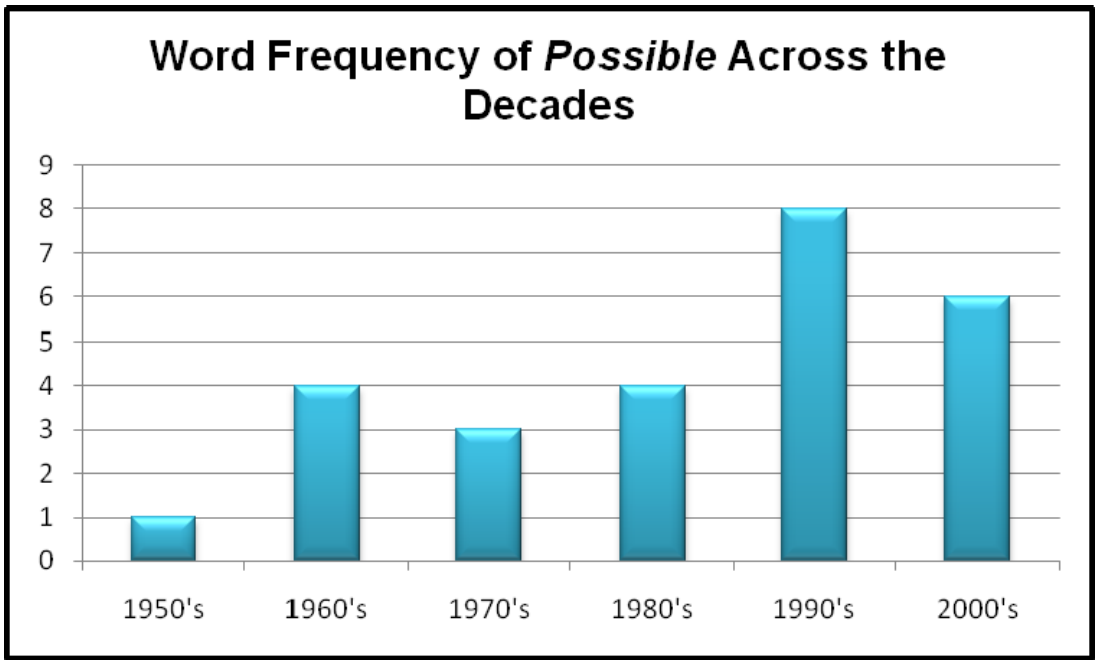

Word Frequency of *Moderate* Across the Decades
5
4
3
2
1
0
1950's
1960's
1970's
1980's
1990's
2000's

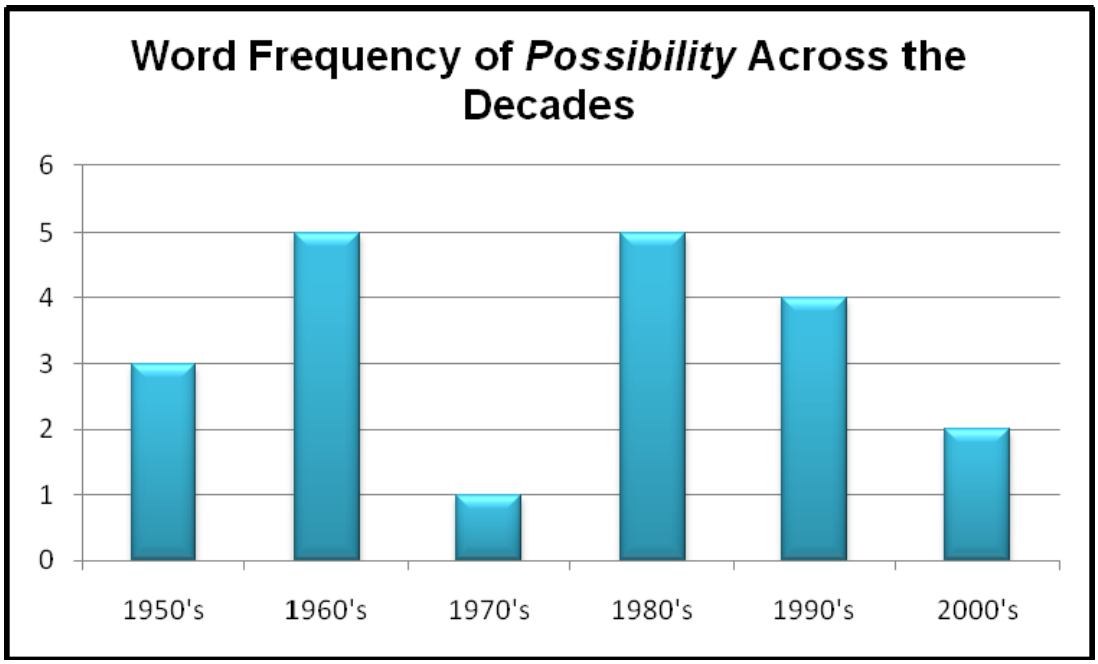

Word Frequency of *Not* Across the Decades
60
50
40
30
20
10
0
1950's
1960's
1970's
1980's
1990's
2000's

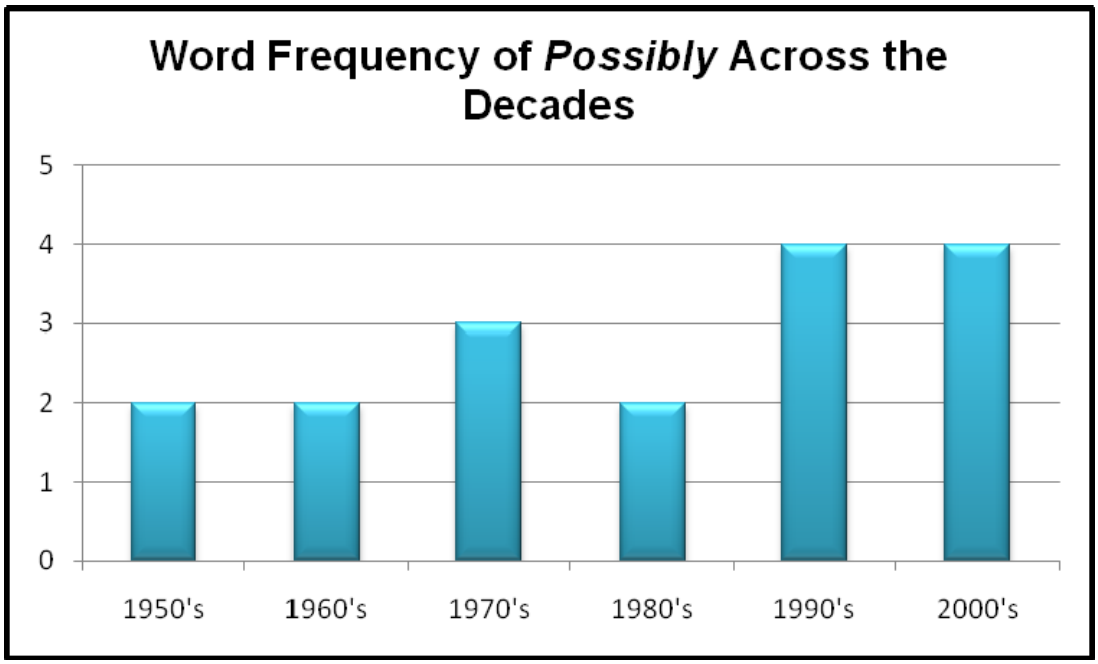

Word Frequency of *Odds* Across the Decades
3
2
1
0
1950's
1960's
1970's
1980's
1990's
2000's

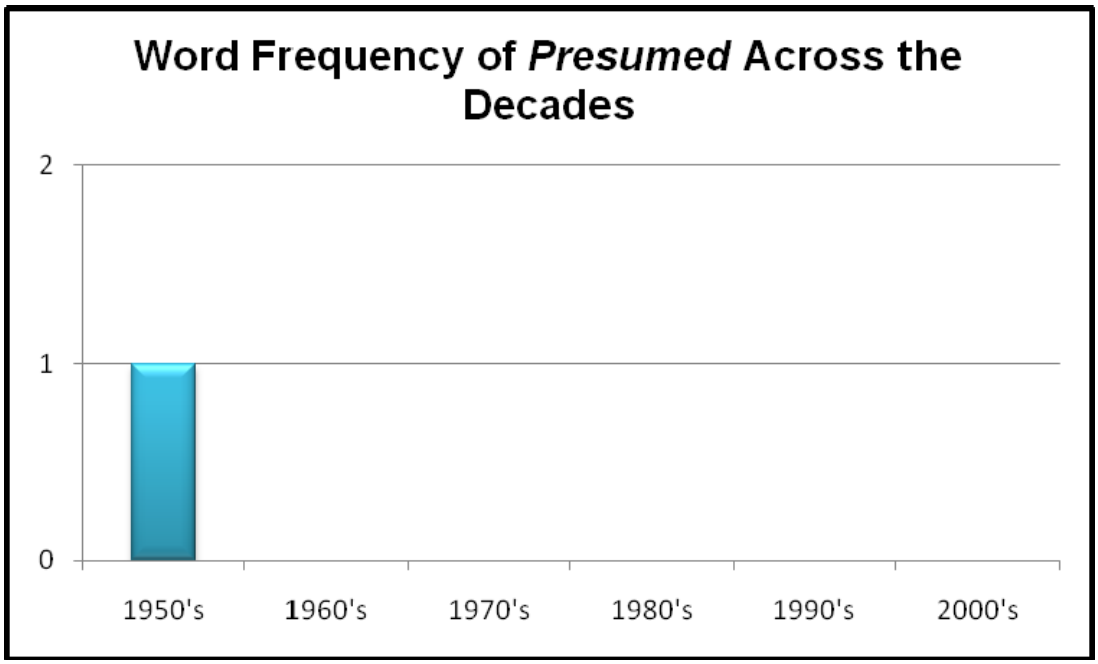

Word Frequency of *Overwhelming* Across the Decades
2
1
0
1950's
1960's
1970's
1980's
1990's
2000's

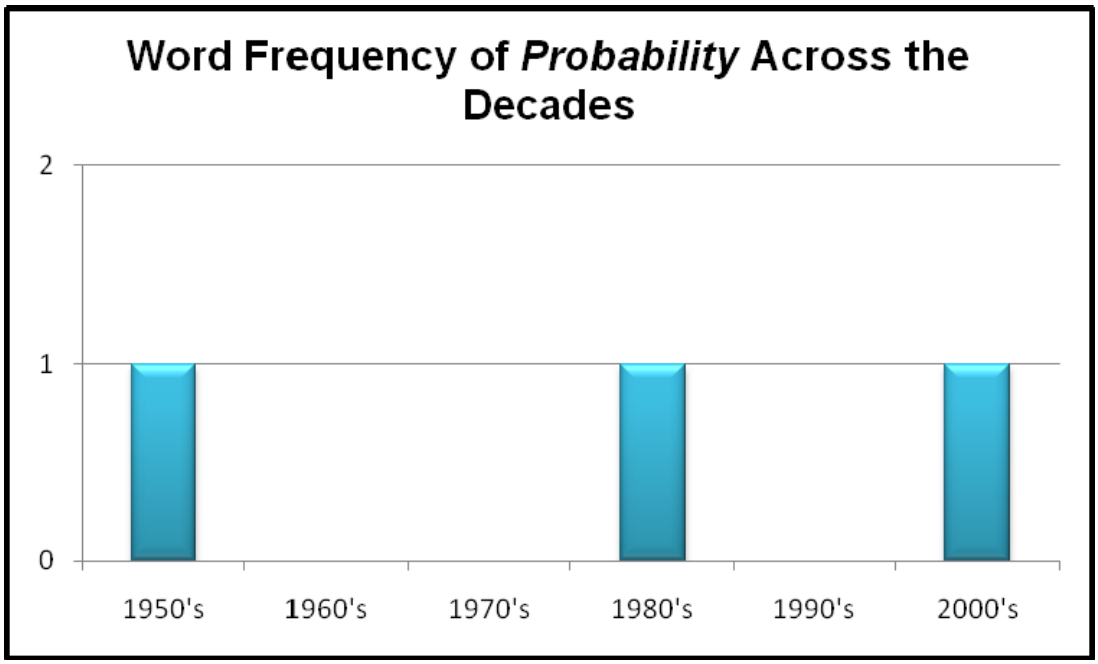

Word Frequency of *Perhaps* Across the Decades
4
3
2
1
0
1950's
1960's
1970's
1980's
1990's
2000's

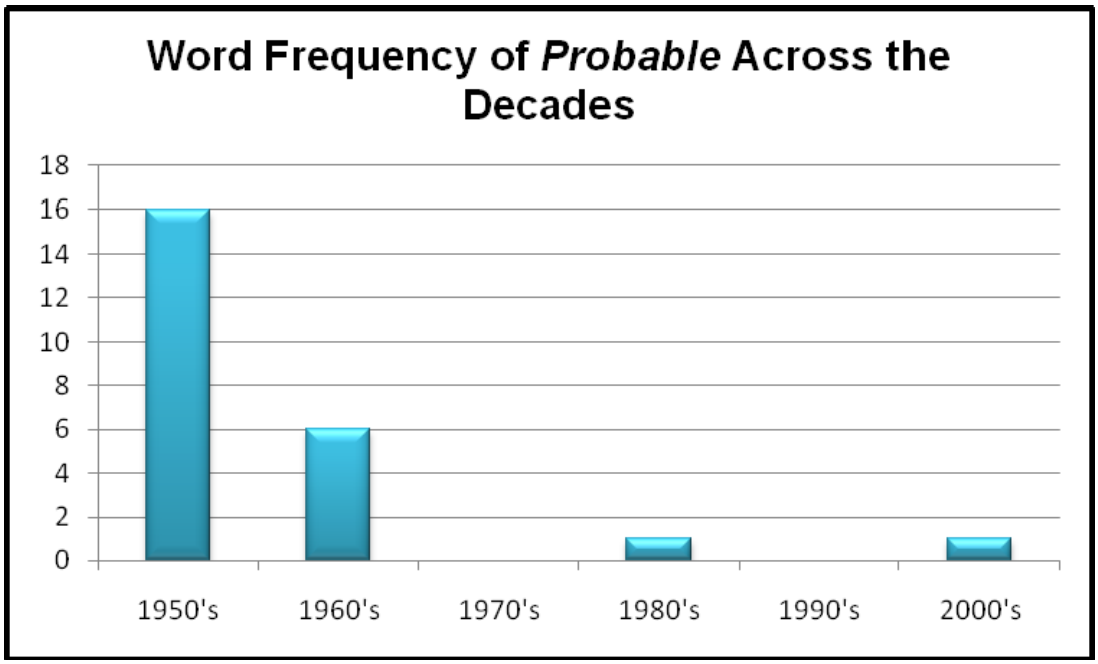

Word Frequency of *Possible* Across the Decades
9
8
7
6
5
4
3
2
1
0
1950's
1960's
1970's
1980's
1990's
2000's

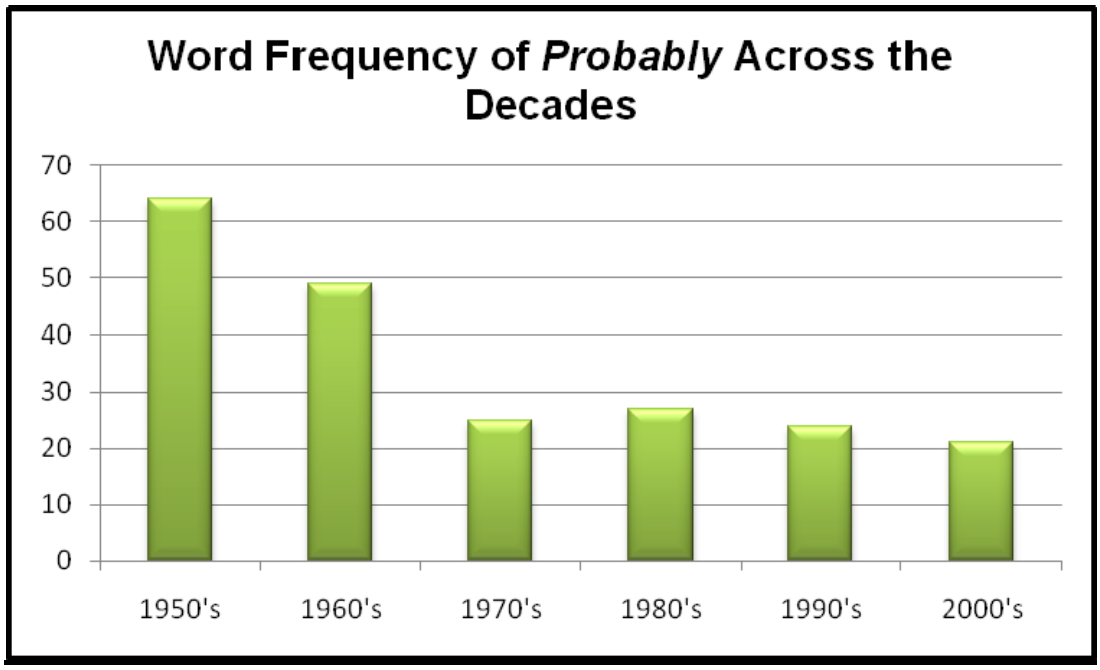

Word Frequency of *Possibility* Across the Decades
6
5
4
3
2
1
0
1950's
1960's
1970's
1980's
1990's
2000's

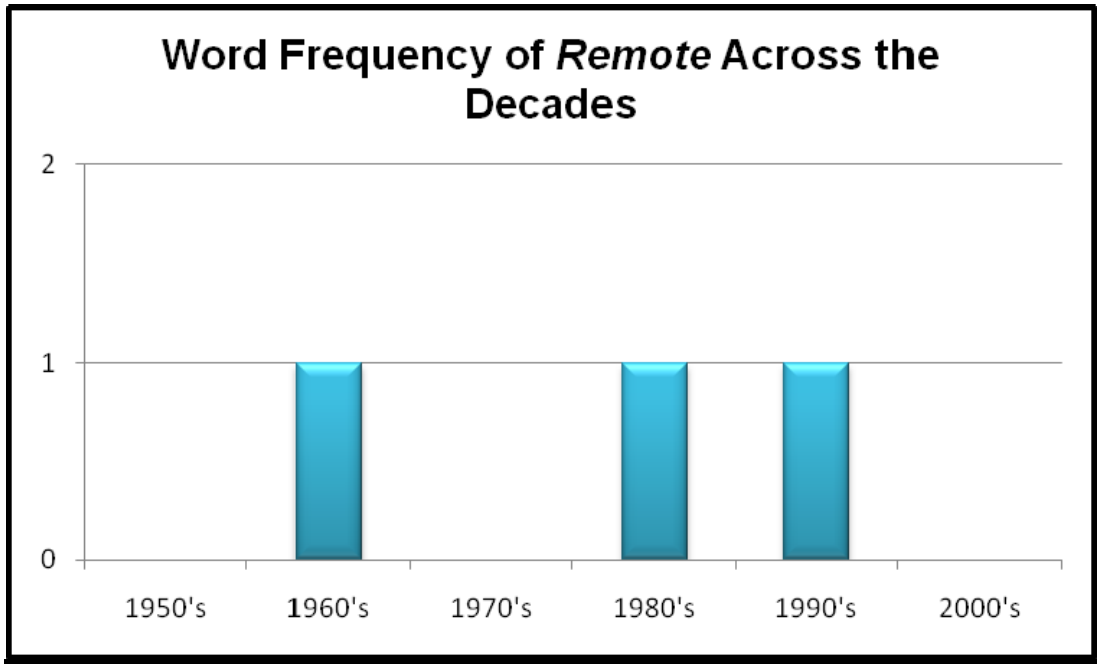

Word Frequency of *Possibly* Across the Decades
5
4
3
2
1
0
1950's
1960's
1970's
1980's
1990's
2000's

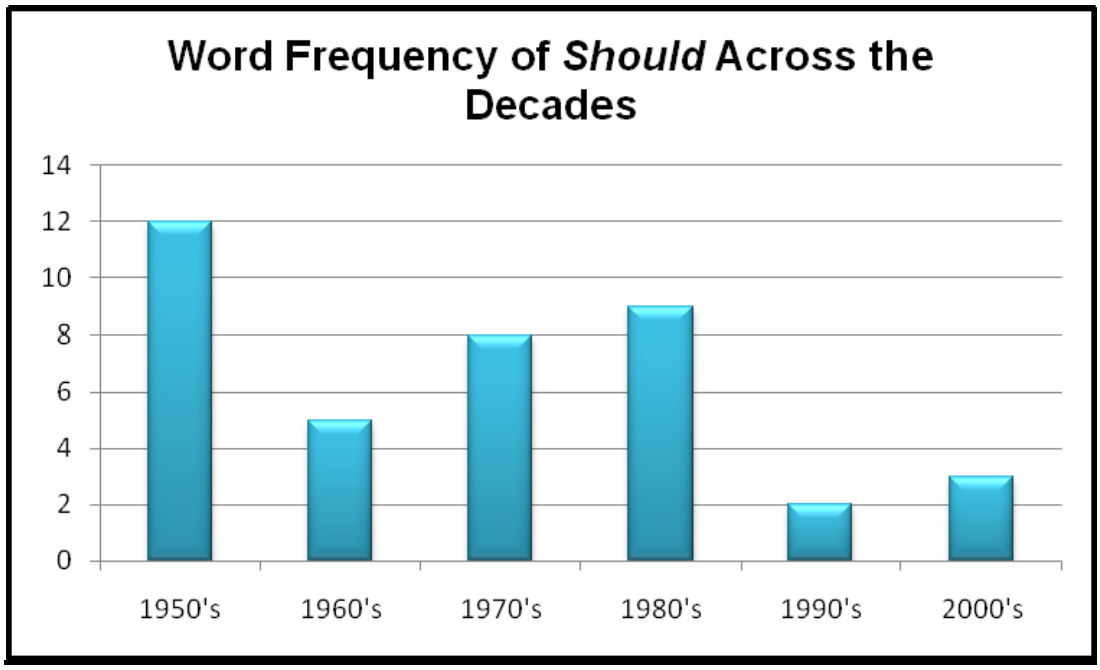

Word Frequency of *Presumed* Across the Decades
2
1
0
1950's
1960's
1970's
1980's
1990's
2000's

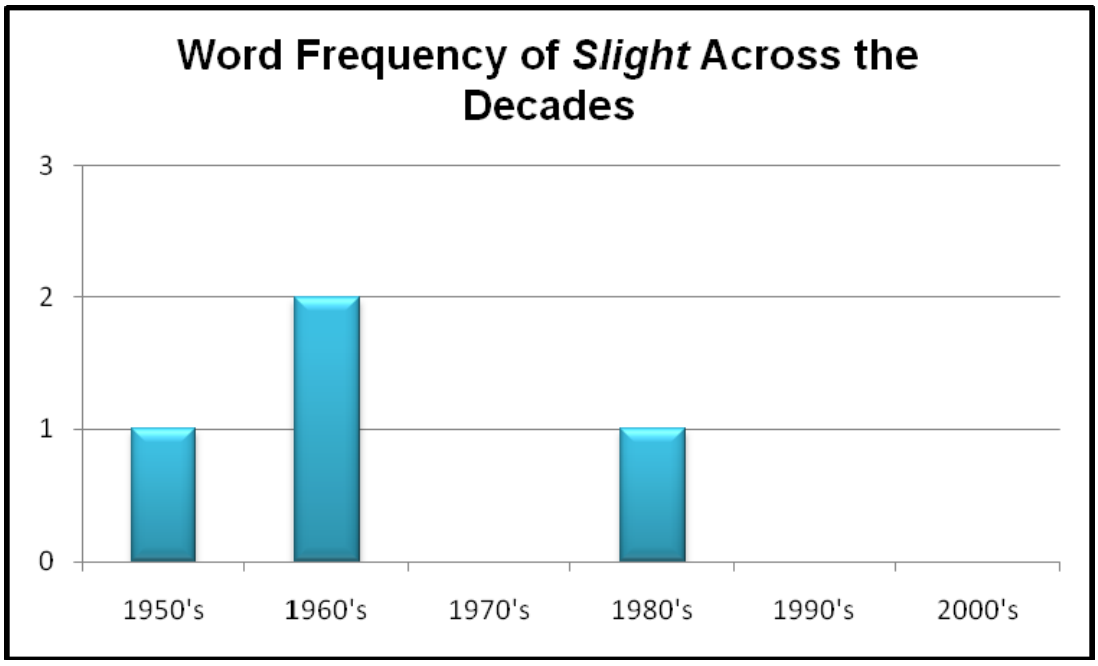

Word Frequency of *Probability* Across the Decades
2
1
0
1950's
1960's
1970's
1980's
1990's
2000's

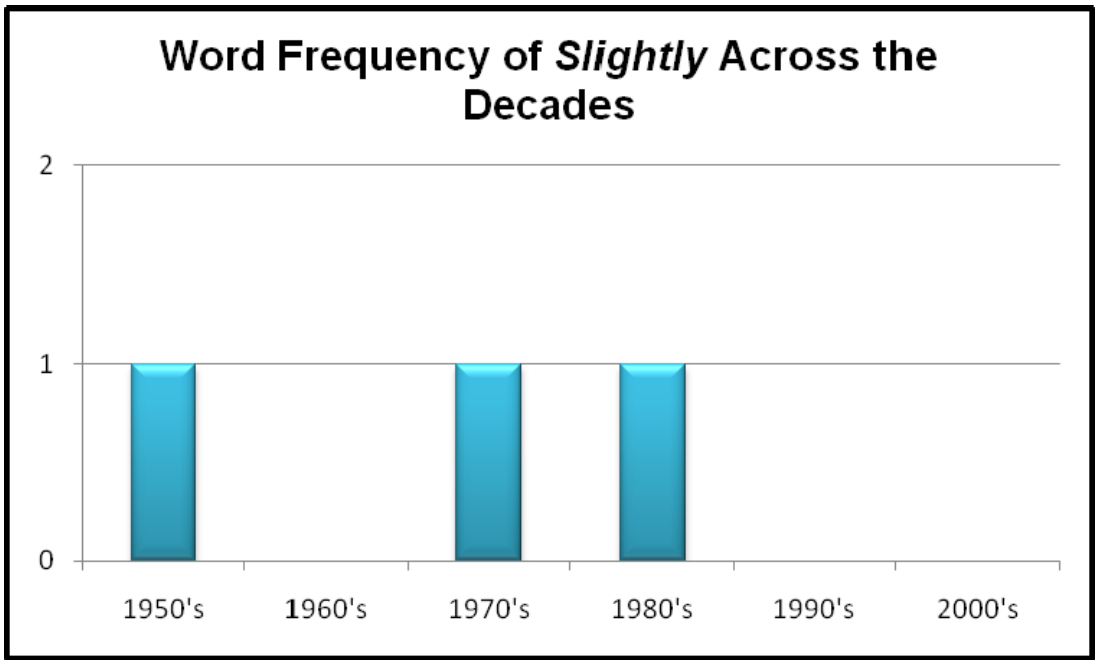

Word Frequency of *Probable* Across the Decades
18
16
14
12
10
8
6
4
2
0
1950's
1960's
1970's
1980's
1990's
2000's

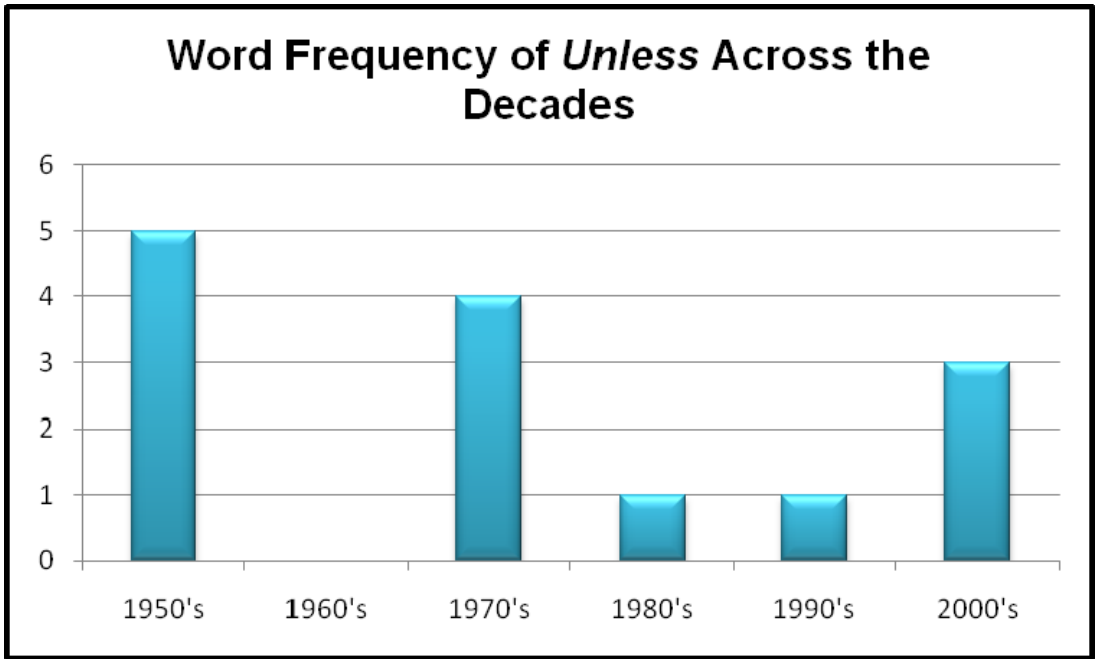

Word Frequency of *Probably* Across the Decades
70
60
50
40
30
20
10
0
1950's
1960's
1970's
1980's
1990's
2000's

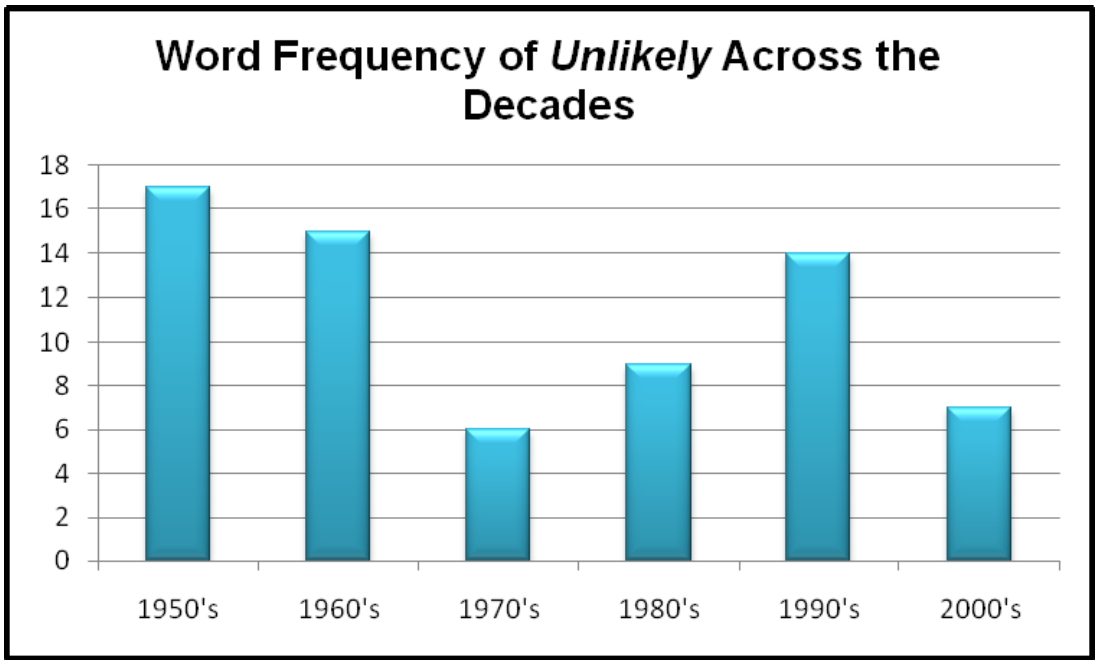

Word Frequency of *Remote* Across the Decades
2
1
0
1950's
1960's
1970's
1980's
1990's
2000's

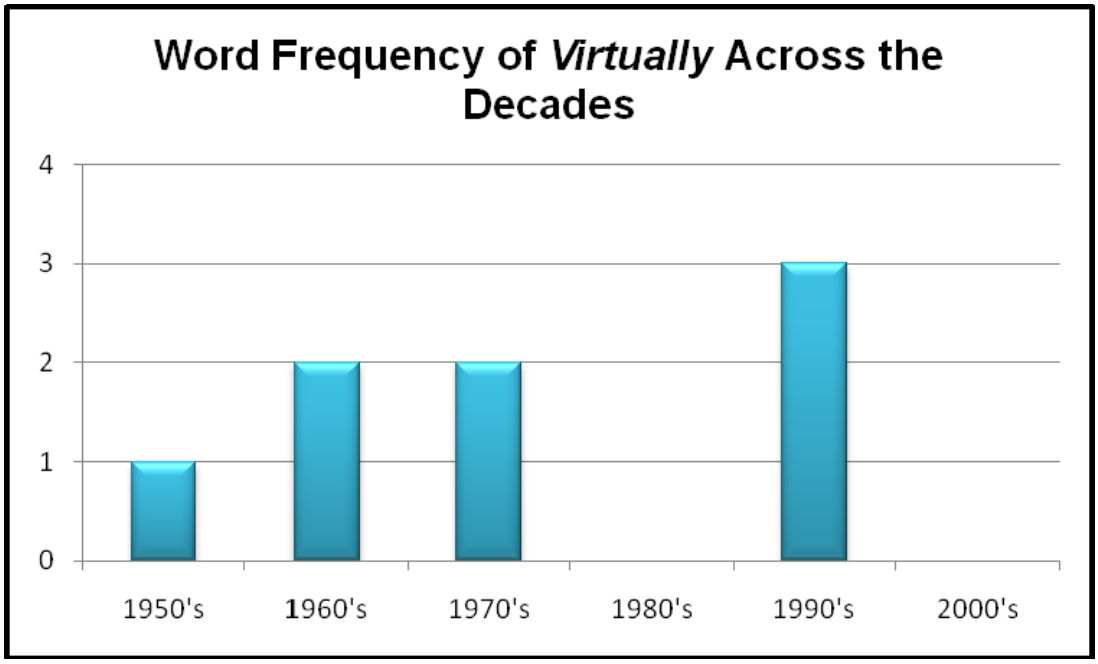

Word Frequency of *Should* Across the Decades
14
12
10
8
6
4
2
0
1950's
1960's
1970's
1980's
1990's
2000's

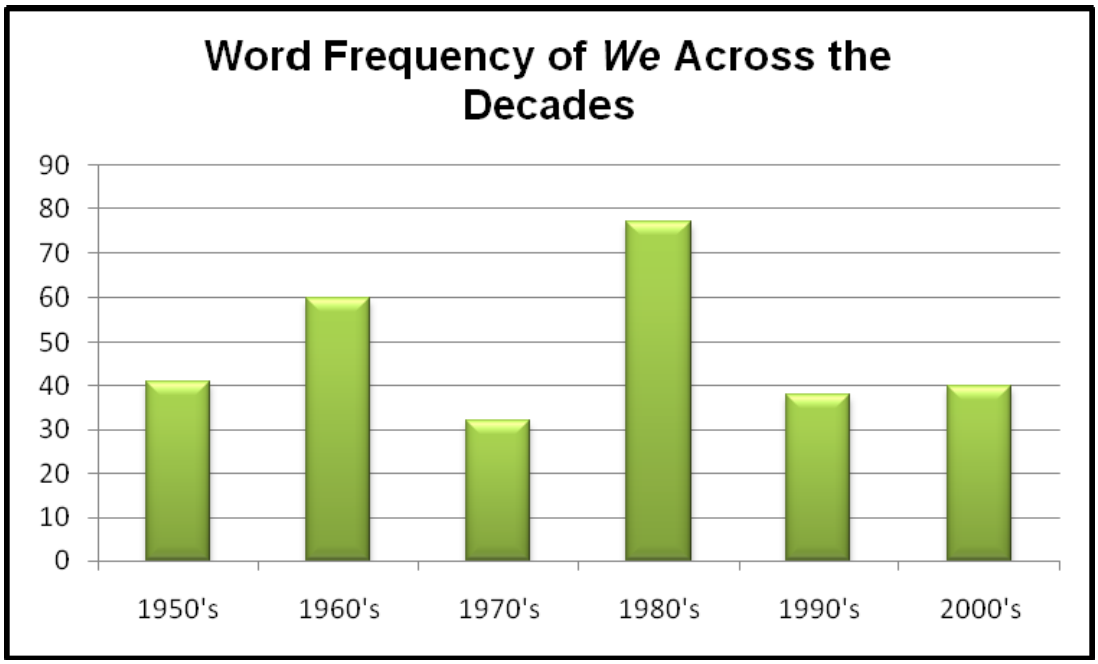

Word Frequency of *Slight* Across the Decades
3
2
1
0
1950's
1960's
1970's
1980's
1990's
2000's

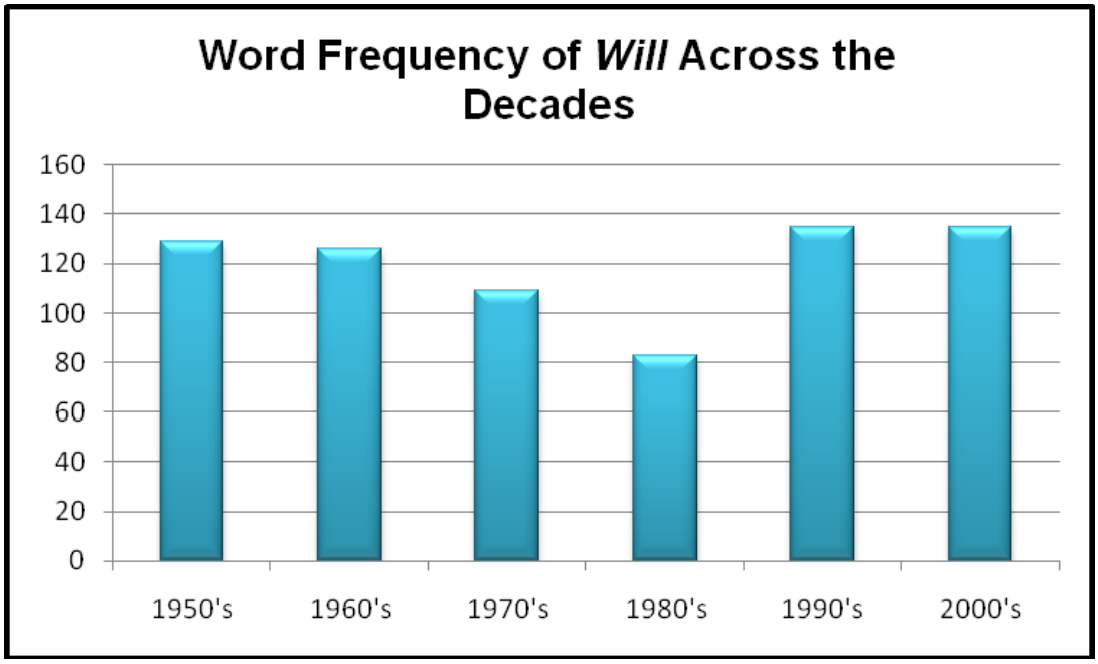

Word Frequency of *Slightly* Across the Decades
2
1
0
1950's
1960's
1970's
1980's
1990's
2000's

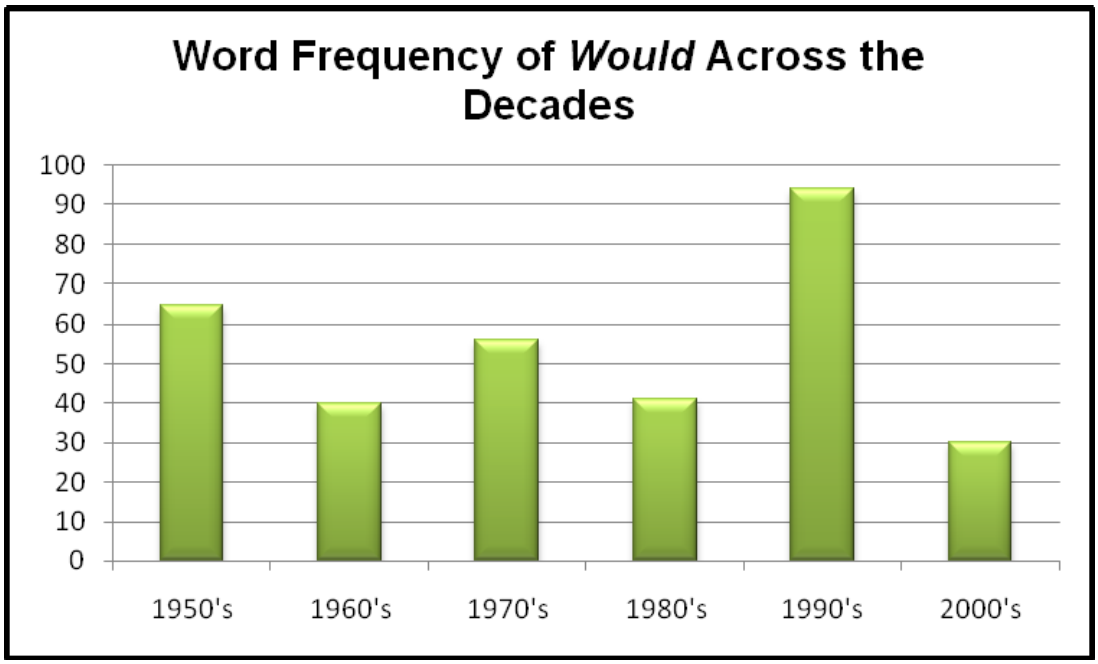

Word Frequency of *Unless* Across the Decades
6
5
4
3
2
1
0
1950's
1960's
1970's
1980's
1990's
2000's

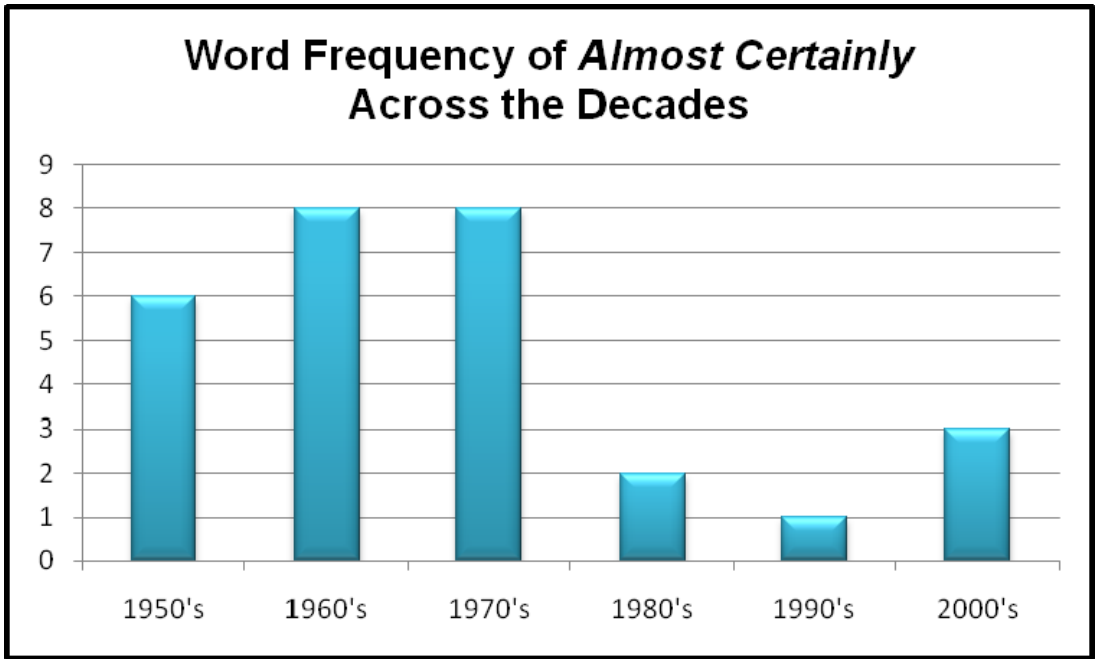

Word Frequency of *Unlikely* Across the Decades
18
16
14
12
10
8
6
4
2
0
1950's
1960's
1970's
1980's
1990's
2000's

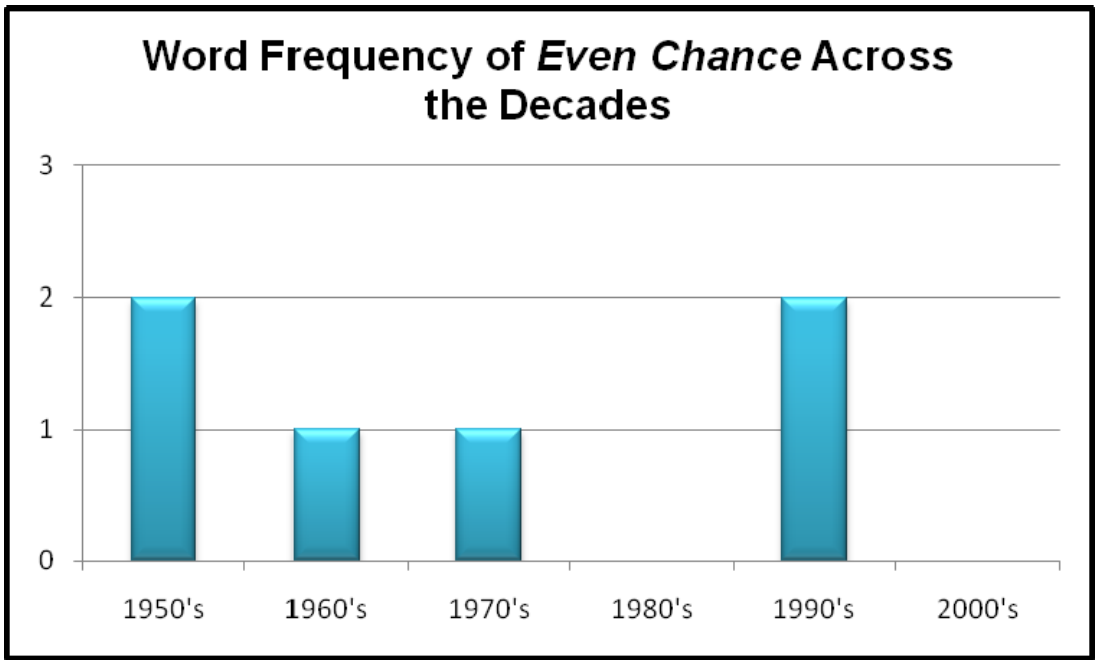

Word Frequency of *Virtually* Across the Decades
4
3
2
1
0
1950's
1960's
1970's
1980's
1990's
2000's

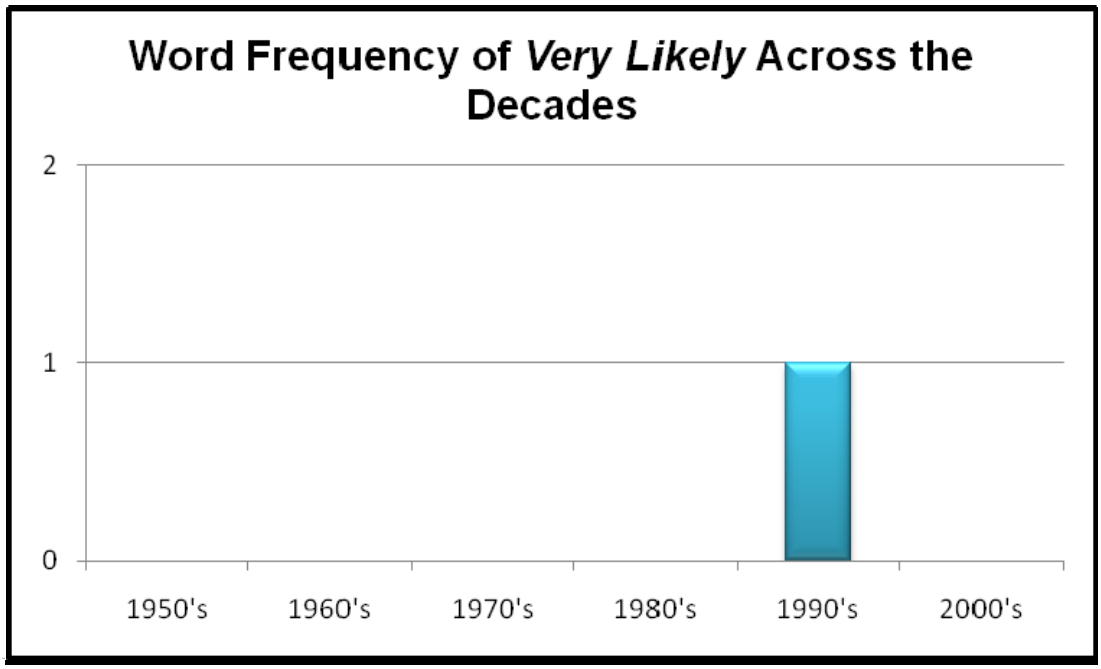

Word Frequency of *We* Across the Decades
90
80
70
60
50
40
30
20
10
0
1950's
1960's
1970's
1980's
1990's
2000's


Word Frequency of *Will* Across the Decades
160
140
120
100
80
60
40
20
0
1950's
1960's
1970's
1980's
1990's
2000's


Word Frequency of *Would* Across the Decades
100
90
80
70
60
50
40
30
20
10
0
1950's
1960's
1970's
1980's
1990's
2000's


Word Frequency of *Almost Certainly* Across the Decades
9
8
7
6
5
4
3
2
1
0
1950's
1960's
1970's
1980's
1990's
2000's


Word Frequency of *Even Chance* Across the Decades
3
2
1
0
1950's
1960's
1970's
1980's
1990's
2000's


Word Frequency of *Very Likely* Across the Decades
2
1
0
1950's
1960's
1970's
1980's
1990's
2000's

Appendix C: Word and Phrase Raw Data

NUMBER	YEAR	TOPIC	Almost	Assess	Believe	Certain	Chances	Conceivable	Confidence	Confident	Could	Dismiss	Doubt	Doubtful	Estimate	Estimated	Even	Fifty-fity	High
1	50	SVT	0			1					2					1			
7	50	SVT	0		1		1		1		1					1	2		
9	50	TKY	0		1						2		1		2		2		
10	50	YUG	0	1	2						6				2		1		
13	50	YUG	0								2				3		1		
14	50	GER	1		3										1				
18	50	CHL	1								1				2				
19	50	IRN	1				1								3		1		
23	50	INS	0	1							2				3		2		
24	50	SVT	2		11	1	1								5		1		2
30	50	SVT	0		5		1				1				2		2		
31	50	LAO	1		2		1								4		1		
33	50	TKY	2												1		2		
34	50	SVT	1		3	1					1				1		2		
35	50	LAO	0		1										1				
36	50	GHA	1												1				
37	50	EUR	1	1	2						1				1		2		
38	50	SVT	0								1				9	4			2
42	50	LAO	1		5										5		2		
43	50	SVT	2	1	5	2									3		2		3
			14	4	41	5	5	0	1	0	20	0	1	0	49	6	23	0	7
45	60	CUB	1		7						4	1			1	1	3		
47	60	GER	2	1	2						1						1		
48	60	JAP	5												1				
49	60	YUG			1	2									1		5		
50	60	LAO			2	1					2				4	2			
51	60	CHN	2		5										2				
52	60	INS	1		1										1				
53	60	VIE		1	4				1										
54	60	SVT	1		1						1				2				
55	60	BRZ		1	1										2		1		
56	60	EUR			4						2				2				
57	60	ARG	3	1	1						1				3				
58	60	ME		1							1								
59	60	BRZ	1		1	2					1				2				
60	60	INS		1							1				1				1
61	60	YUG			2						2								
62	60	JAP			1	1													
63	60	VIE			1						3				2		1		2
64	60	SVT	1		8						7				6				2
65	60	BRZ	1	1							1				1				
			18	7	42	6	0	0	1	0	27	1	0	0	31	3	11	0	5
66	70	MEX			1														
67	70	LAO	2		2				1						1				
68	70	SVT																	
69	70	IRN	3			1					1				1		1		1
70	70	JAP				1					1						2		
71	70	CHL	2														2		
72	70	SVT		1							1						1		
73	70	SVT			3		1				1		1			1			1
74	70	AFR	1			1													1
75	70	SVT			2						4				1	1			
76	70	VIE		1	2	1	1						2		1				
77	70	SVT	1		1						1					1			1
78	70	SVT			4		1				2		1		1				2
79	70	CHL					2				3						2		
80	70	BRZ	2								1								1
81	70	CUB			3												1		1
82	70	SVT				1	1				2		1				3		
83	70	MEX			2				1		2								2
84	70	SVT			4				1						2		1		1
85	70	RHO			2						1				2				
			11	2	26	5	6	0	3	0	20	0	5	0	9	3	13	0	11

NUMBER	YEAR	TOPIC	Almost	Assess	Believe	Certain	Chances	Conceivable	Confidence	Confident	Could	Dismiss	Doubt	Doubtful	Estimate	Estimated	Even	Fifty-fity	High
86	80	SVT	2		2		1				1				2		1		3
87	80	SVT			2						5								
88	80	POL			8		1			1	7		2		2				3
89	80	SVT				4					1								
90	80	SVT			2	1					1						1		
91	80	POL			1						2						3		1
92	80	YUG	1		2						2						3		
93	80	SAL			1						1								2
94	80	PAN	1		3														
95	80	SVT			4					1	3						2		
96	80	SVT									1				1		1		
97	80	SVT			6	1	1		1		2								
98	80	GUA			3						2								
99	80	SVT			2												2		
100	80	AFR	2		1						4					2	1		3
101	80	CHL			6		2			1	2		1						
102	80	SVT			2				1		2				1		2		
103	80	SVT			1						3				1		1		1
104	80	SVT			1						1				3		2		
105	80	EUR	1	1	2					1	4				1				
			7	1	49	6	5	0	2	4	44	0	3	0	11	2	19	0	13
106	90	EUR									1				1		6		
107	90	YUG															1		
108	90	SVT			3	1	1				3		1						
109	90	SVT			3						7				2		2		
110	90	SVT			3				1		3				1		3		1
111	90	IRN			2										1		3		
112	90	SVT									1						1		1
113	90	SVT			2		3		2						1		4		2
114	90	BRZ							1								1		
115	90	IRQ																	
116	90	AFR			2												2		
117	90	IRQ									2						1		
118	90	HAI			1						1								
119	90	CUB									1						3		
120	90	GLO															2		
121	90	NAM	1	1	1	1			1	1	5				3		2		
122	90	SVT	1			1					2				1	1	2		1
123	90	GLO									5						2		1
124	90	GLO		3	3						17						2		
125	90	CHN			1						3								
			2	4	21	3	4	0	5	1	51	0	1	0	10	1	37	0	6
126	2000	GLO									2					1			2
127	2000	GLO	1			1											2		
128	2000	GLO									1								
129	2000	GLO			1						1						1		1
130	2000	GLO	1								3						1		1
131	2000	GLO			2						4						2		
132	2000	GLO									2						2		1
133	2000	SVT	1	1							1						2		
134	2000	GLO			1										2	1	2		1
135	2000	GLO	1								5						3		
136	2000	IRQ		5	1		1		1		6						1		
137	2000	SVT	1	2							1						1		
138	2000	GLO	3	1		1					18						9		2
139	2000	GLO		8							6				1				
140	2000	SVT	1								1						1		
141	2000	IRQ	1	1	1						7				4		1		
142	2000	IRQ		3							5				2				2
143	2000	IRN		11					19		2				2				8
144	2000	SVT			1	1					5						2		11
145	2000	GLO									2						1		
			10	32	7	3	1	0	20	0	72	0	0	0	11	2	31	0	29

NUMBER	YEAR	TOPIC	Highly	If	Impossible	Improbable	Judge	Likelihood	Likely	Low	May	Medium	Might	Moderate	Not	Odds	Overwhelming	Perhaps	Possible
1	50	SVT													1				
7	50	SVT		6	1				1		9				4			2	
9	50	TKY		6									2		3				
10	50	YUG		2	1				1		4				2				1
13	50	YUG		1				1							2				
14	50	GER	1	2				1					1		2				
18	50	CHL		3	1				5		4				3				
19	50	IRN		2					2					1	4				
23	50	INS		1					1		1		2		1			1	
24	50	SVT		2					1		2		1		5				
30	50	SVT		1							1		2		3				
31	50	LAO		3					1		1				5				
33	50	TKY	1	2					1		4		1		2				
34	50	SVT		1					1						4				
35	50	LAO	1	1							1				3				
36	50	GHA		2					1		1		1		3				
37	50	EUR	1	1					1		1		2		1				
38	50	SVT																	
42	50	LAO		5							1			1	2				
43	50	SVT							2		4		1		1			1	
			4	41	3	0	0	2	18	0	34	0	13	2	51	0	0	4	1
45	60	CUB		2							5		1	2	11				
47	60	GER		4					4				1		3				
48	60	JAP		1											1				
49	60	YUG									1				3				
50	60	LAO	1	2					1		3				1				1
51	60	CHN	1						1						1	1			
52	60	INS		1					1		1		1		1				
53	60	VIE							1						1				1
54	60	SVT							2				1		4				1
55	60	BRZ							1		1			1	3				
56	60	EUR													2				
57	60	ARG	1	3					1		1		3	1	2				
58	60	ME							2						1	1			
59	60	BRZ							3		3		1		5				
60	60	INS		1															
61	60	YUG							3				1		1				
62	60	JAP							2				1		4				
63	60	VIE		3					1						5				
64	60	SVT	1	1							2				8				2
65	60	BRZ							3		1				2				
			4	18	0	0	0	0	26	0	18	0	10	4	59	2	0	0	5
66	70	MEX					1		1				1		1				
67	70	LAO							1						1				1
68	70	SVT		1					2		1		1		2				
69	70	IRN		1				1			1		1		1				1
70	70	JAP		1				1	4					1	5				
71	70	CHL		3			1		4		1		2		2				1
72	70	SVT		1					4		1				4			1	
73	70	SVT	1	1				1	1										
74	70	AFR							2		1				4				
75	70	SVT									3				6				
76	70	VIE		4				1			4			1	3	1		1	
77	70	SVT							1		1				3				
78	70	SVT		1					3		1				3				1
79	70	CHL		2					2						1	1		1	
80	70	BRZ	1						1						4				
81	70	CUB							2				1		2				
82	70	SVT	1	3					3						2				
83	70	MEX									1				2				
84	70	SVT		2			1		2		3			1	10				
85	70	RHO		1				1	4				1		6				
			3	21	0	0	3	5	37	0	18	0	7	3	62	2	0	3	4

NUMBER	YEAR	TOPIC	Highly	If	Impossible	Improbable	Judge	Likelihood	Likely	Low	May	Medium	Might	Moderate	Not	Odds	erwhelmi	Perhaps	Possible
86	80	SVT							2		2			1	5				
87	80	SVT		4					1				2		1			1	
88	80	POL		8					1		1				3				1
89	80	SVT							1						5				
90	80	SVT		3					2		1		1		4				
91	80	POL		2					3		5				3	1			
92	80	YUG	1	2			1		4		1				7				
93	80	SAL		6			1	1	4		3		1		8				
94	80	PAN							1		1				1				1
95	80	SVT						1					2		7				
96	80	SVT					2				2		1		2				
97	80	SVT		2					5		4		1		8			2	
98	80	GUA		1			2		3						6				
99	80	SVT	1								2		5		7				
100	80	AFR		3					1		8							1	
101	80	CHL		3			2	1	4	2	4		3	6	4			1	1
102	80	SVT					5	1			2		4		2				3
103	80	SVT					1		1		2		1		5			1	
104	80	SVT	1	2			3								8				
105	80	EUR	1	1			1		4						2				1
			4	37	0	0	18	4	37	2	38	0	21	7	88	1	0	6	7
106	90	EUR		1					3		1				4			1	
107	90	YUG							2						3				
108	90	SVT		1	1			1	5	1					1				2
109	90	SVT		1				1	6		1		1		1				
110	90	SVT		3					8						4			1	1
111	90	IRN							1		1				1				
112	90	SVT		1					4		1				1				
113	90	SVT	2	3			3	1	4		3				5	1			2
114	90	BRZ	1	2					2		1		1		5	1			
115	90	IRQ		2					6		2		1		3				
116	90	AFR							2						2		1		1
117	90	IRQ		6					1		1				3				1
118	90	HAI		1															
119	90	CUB	1	7					2				2		2				1
120	90	GLO		2															
121	90	NAM	1	4			1		2	1			1		6				
122	90	SVT	1	4					4		1				2				
123	90	GLO		2					3		3								1
124	90	GLO		1		1	3		10		1				3				
125	90	CHN													5				3
			6	41	1	1	7	3	65	2	16	0	6	0	51	2	1	2	12
126	2000	GLO	2						5	1	2				1		1		
127	2000	GLO							5			1			2				
128	2000	GLO							3						3				4
129	2000	GLO	1						2		6				3				
130	2000	GLO	1	3			1	1	11	1	2								
131	2000	GLO		5					6		2				1				
132	2000	GLO		2					2		6				5				
133	2000	SVT	2	1					1	1					6				1
134	2000	GLO		2					7		3				1		1		
135	2000	GLO		4				1	2				1		2				1
136	2000	IRQ	3	6			5		4	1			3		4				
137	2000	SVT	2	1											1				1
138	2000	GLO		4				2	13	1	18		4		14			4	6
139	2000	GLO		3			4	1	4		1		1						
140	2000	SVT	2	1					2						1				1
141	2000	IRQ		4			2		1				2		3				
142	2000	IRQ		2			5		1	1			1		3				
143	2000	IRN	1	5			11			1	2		2	7	10				1
144	2000	SVT	1	1					6	3	2				10				
145	2000	GLO		2							1				3				
			15	46	0	0	28	5	75	10	45	1	14	7	73	0	2	4	15

NUMBER	YEAR	TOPIC	Possibility	Possibly	Presume	Presumed	Probability	Probable	Probably	Remote	Should	Slight	Slightly	Unless	Unlikely	Virtually	We	Will	Would
1	50	SVT				1			2									4	
7	50	SVT		2				1	3		4			1	2		2	23	5
9	50	TKY							9									3	3	13
10	50	YUG	1						1		1				1		3		8
13	50	YUG						2	5		2	1		1	3		1	5	6
14	50	GER						2	2						5	1	3	10	2
18	50	CHL						4	5		1							7	9
19	50	IRN						2	4						1			8	2
23	50	INS						2	3		1				4		1	7	4
24	50	SVT	1						8		1							9	18	6
30	50	SVT							4						1			4	4	3
31	50	LAO		1				1	8		1		1	1	3		2	9	2
33	50	TKY						1	6					1	1			16	4
34	50	SVT	1						2		1						3	7	5
35	50	LAO	1				1	1	2					1			1	4	1
36	50	GHA						3	4		1			1				3	1
37	50	EUR							3		1				1		5	7	2
38	50	SVT															4	7	
42	50	LAO						1	7		1						5	9	7
43	50	SVT						1	5		1						7	15	4
			4	3	0	1	1	21	83	0	16	1	1	6	22	1	53	166	84
45	60	CUB						1	8		1						11	6	7
47	60	GER							5		1				1		2	11	5
48	60	JAP	1					1	6									15	2
49	60	YUG						1	1						1		3	7	
50	60	LAO							1			2					7		3
51	60	CHN	2						4						1		5	10	1
52	60	INS							1						2		1		
53	60	VIE													1		4	4	
54	60	SVT							3								1	4	2
55	60	BRZ	1						4						1		1	7	1
56	60	EUR						1	4								5	7	4
57	60	ARG							1		2				1		1	5	5
58	60	ME									1				2	1		7	
59	60	BRZ							4								3	12	
60	60	INS						1	2							1		5	1
61	60	YUG							1	1	1						2	3	2
62	60	JAP							4								2	13	
63	60	VIE						1	3								3	8	
64	60	SVT	2	1				1	4						5		18	17	8
65	60	BRZ		1											2			4	5
			6	2	0	0	0	7	56	1	6	2	0	0	17	2	69	145	46
66	70	MEX												1			5	5	1
67	70	LAO							3								2	2	2
68	70	SVT							2								1	3	2
69	70	IRN		1					3		2					1		2	7
70	70	JAP							4					1			2	24	1
71	70	CHL												1			1	1	10
72	70	SVT	1	1							1							7	3
73	70	SVT							1		1				1		6	2	4
74	70	AFR							1						1	1	2	10	3
75	70	SVT							3								4	4	
76	70	VIE							1		1		1				1	4	5
77	70	SVT							1						1		2	7	
78	70	SVT		1					4		2			1	2		5	13	
79	70	CHL							2									11	1
80	70	BRZ							1		1				1			9	1
81	70	CUB							3						1		2	9	7
82	70	SVT		1					2					1	1			6	9
83	70	MEX									2						3	9	2
84	70	SVT															4	10	
85	70	RHO							2								2	7	16
			1	4	0	0	0	0	33	0	10	0	1	5	8	2	42	145	74

NUMBER	YEAR	TOPIC	Possibility	Possibly	Presume	Presumed	Probability	Probable	Probably	Remote	Should	Slight	Slightly	Unless	Unlikely	Virtually	We	Will	Would
86	80	SVT							7		1				1		13	9	2
87	80	SVT							5		1						5		5
88	80	POL	2				1	1	2						2		13	15	9
89	80	SVT																	2
90	80	SVT		1				1	1					1			4	11	
91	80	POL		2					3						2		3	6	
92	80	YUG							1		2				2		2	5	13
93	80	SAL							5		2						3	15	3
94	80	PAN							1		4				1		5	8	7
95	80	SVT							1								7		1
96	80	SVT	3						1	1							15	6	1
97	80	SVT		1					2		1						8	7	5
98	80	GUA	1						3						1		9	17	
99	80	SVT							2			1		1			3	2	2
100	80	AFR	1												3		1	8	1
101	80	CHL							5		1		1		1		11	4	2
102	80	SVT							4								8	11	2
103	80	SVT							3						1		6	10	4
104	80	SVT							1						1		8	9	4
105	80	EUR	1								3						11	3	9
			8	4	0	0	1	2	47	1	15	1	1	2	15	0	135	146	72
106	90	EUR															1	21	3
107	90	YUG							1						2			17	
108	90	SVT		1					3						2		4	11	16
109	90	SVT							1								3	6	16
110	90	SVT	1						3								4	16	31
111	90	IRN							2						1		4	17	1
112	90	SVT															1	3	1
113	90	SVT	1														9	23	2
114	90	BRZ	1						1						1			8	5
115	90	IRQ							3		1						1	4	1
116	90	AFR		1					2						2	1	2	11	4
117	90	IRQ													2		1	8	2
118	90	HAI							3						1	1	1	2	10
119	90	CUB		1					4							2		3	7
120	90	GLO															1	10	1
121	90	NAM	2	1					3	1	1				6		15	9	15
122	90	SVT							1									14	4
123	90	GLO	1						1					1	1			3	2
124	90	GLO		2					6					1	2		7	7	4
125	90	CHN									1								10
			6	6	0	0	0	0	34	1	3	0	0	2	20	4	54	193	135
126	2000	GLO							1									14	
127	2000	GLO															2	33	
128	2000	GLO							1		1							15	1
129	2000	GLO									1				1			44	1
130	2000	GLO					2							1	2		3	20	5
131	2000	GLO		2					2					1	3			5	4
132	2000	GLO	1						1		1						4	16	
133	2000	SVT							2						1		4	4	1
134	2000	GLO							1								3	18	
135	2000	GLO		1					4								2	2	8
136	2000	IRQ		3					14						1		4	3	13
137	2000	SVT													2		5	1	4
138	2000	GLO	2	1					4		1			2	1	1	15	90	5
139	2000	GLO							2		2			1			13	13	8
140	2000	SVT													2		3	1	2
141	2000	IRQ						1			1			1	1		3	4	8
142	2000	IRQ							7					1	1		9	15	4
143	2000	IRN	1						8						2		26	5	6
144	2000	SVT		2				1	1		1							15	1
145	2000	GLO						1	2								1	8	1
			4	9	0	0	2	3	50	0	8	0	0	7	17	1	97	326	72

NUMBER	YEAR	TOPIC	All But Certain	Almost Certainly	Almost Impossible	Chances A Little Better	Chances A Little Less	Chances Are About Even	Even Chance	Highly Probable	Some Slight Chance	Very Likely	Very Unlikely	Virtually Certain	Virtually Impossible
1	50	SVT													
7	50	SVT													
9	50	TKY													
10	50	YUG													
13	50	YUG													
14	50	GER		1											
18	50	CHL		1											
19	50	IRN		1											
23	50	INS							1						
24	50	SVT		1											
30	50	SVT													
31	50	LAO													
33	50	TKY		1											
34	50	SVT		1											
35	50	LAO													
36	50	GHA													
37	50	EUR		1					1						
38	50	SVT													
42	50	LAO		1					1						
43	50	SVT													
			0	8	0	0	0	0	3	0	0	0	0	0	0
45	60	CUB													
47	60	GER													
48	60	JAP		3											
49	60	YUG													
50	60	LAO													
51	60	CHN		2											
52	60	INS		1											
53	60	VIE													
54	60	SVT													
55	60	BRZ							1						
56	60	EUR													
57	60	ARG		2											
58	60	ME													
59	60	BRZ													
60	60	INS													
61	60	YUG													
62	60	JAP													
63	60	VIE													
64	60	SVT		1											
65	60	BRZ													
			0	9	0	0	0	0	1	0	0	0	0	0	0
66	70	MEX													
67	70	LAO		2											
68	70	SVT													
69	70	IRN		3											
70	70	JAP													
71	70	CHL		2											
72	70	SVT													
73	70	SVT													
74	70	AFR		1											
75	70	SVT													
76	70	VIE													
77	70	SVT		1											
78	70	SVT													
79	70	CHL													
80	70	BRZ		1											
81	70	CUB							1						
82	70	SVT													
83	70	MEX													
84	70	SVT													
85	70	RHO													
			0	10	0	0	0	0	1	0	0	0	0	0	0

NUMBER	YEAR	TOPIC	All But Certain	Almost Certainly	Almost Impossible	Chances A Little Better	Chances A Little Less	Chances Are About Even	Even Chance	Highly Probable	Some Slight Chance	Very Likely	Very Unlikely	Virtually Certain	Virtually Impossible
86	80	SVT													
87	80	SVT													
88	80	POL													
89	80	SVT													
90	80	SVT													
91	80	POL													
92	80	YUG		1											
93	80	SAL													
94	80	PAN		1											
95	80	SVT													
96	80	SVT													
97	80	SVT													
98	80	GUA													
99	80	SVT													
100	80	AFR		1											
101	80	CHL													
102	80	SVT													
103	80	SVT													
104	80	SVT													
105	80	EUR													
			0	3	0	0	0	0	0	0	0	0	0	0	0
106	90	EUR													
107	90	YUG													
108	90	SVT													
109	90	SVT													
110	90	SVT													
111	90	IRN													
112	90	SVT													
113	90	SVT							1						
114	90	BRZ													
115	90	IRQ													
116	90	AFR													
117	90	IRQ													
118	90	HAI													
119	90	CUB							1						
120	90	GLO													
121	90	NAM		1											
122	90	SVT													
123	90	GLO													
124	90	GLO							1			1			
125	90	CHN													
			0	1	0	0	0	0	3	0	0	1	0	0	0
126	2000	GLO													
127	2000	GLO													
128	2000	GLO													
129	2000	GLO													
130	2000	GLO													
131	2000	GLO													
132	2000	GLO													
133	2000	SVT		1											
134	2000	GLO													
135	2000	GLO		1											
136	2000	IRQ													
137	2000	SVT		1											
138	2000	GLO		2											
139	2000	GLO													
140	2000	SVT		1											
141	2000	IRQ		1											
142	2000	IRQ													
143	2000	IRN											1		
144	2000	SVT										1			
145	2000	GLO													
			0	7	0	0	0	0	0	0	0	1	1	0	0

Appendix C: National Intelligence Estimates Code Sheet

CODE	NAME
1-50-SVT	Soviet Capabilities and Intentions in Latin America
2-50-SVT	Soviet Capabilities and Intentions
3-50-CHN	Chinese Communist Intervention in Korea
4-50-SVT	Soviet Participation in the Air Defense of Manchuria
5-50-SVT	Soviet Intentions in the Current Situation
6-50-SVT	Probable Soviet Moves to Exploit the Present Situation
7-50-SVT	Probable Soviet Reactions to a Remilitarization of Western Germany
8-51-ME	The Importance of Iranian and Middle East Oil to Western Europe Under Peacetime Conditions
9-51-TKY	Turkey's Position in the East-West Struggle
10-51-YUG	Probability of an Invasion of Yugoslavia in 1951
11-51-BRT	The British Position in Egypt
12-51-SVT	Soviet Control of the European Satellites and their Economic and Military Contributions to Soviet Power, Through Mid-1953
13-52-YUG	Probable Developments in Yugoslavia and the Likelihood of Attack Upon Yugoslavia, Through 1952
14-52-GER	Probable Political Developments in the West German Situation During 1952
15-52-GER	Probable Developments in Eastern Germany Through 1952
16-52-IRN	Probable Developments in Iran Through 1953
17-52-SVT	Probable Soviet Bloc Courses of Action, Through Mid-1953
18-53-CHL	Probable Developments in Chile
19-53-IRN	Probable Developments in Iran Through 1954
20-53-INS	Probable Developments in Indonesia
21-53-BRZ	Probable Developments in Brazil
22-53-EGY	Probable Developments in Egypt
23-54-INS	The Probable Outlook for Indonesia Through 1954
24-54-SVT	Soviet Capabilities and Main Lines of Policy Through Mid-1959
25-54-ME	Probable Developments in the Arab States
26-54-AFR	Probable Developments in North Africa
27-54-GER	Probable Developments in East Germany Through 1955
28-55-SVT	Probable Soviet Response to the Ratification of the Paris Agreements
29-55-SVT	Soviet Guided Missile Capabilities and Probable Programs
30-55-SVT	The Implications of the Austrian Treaty for the Policies of the USSR and Other States
31-55-LAO	Probable Developments in Laos to July 1956
32-55-SVT	Probable Intelligence Warning of Soviet Attack on the US Through Mid-1958
33-56-TKY	Turkey as an Ally
34-57-SVT	Stability of the Soviet Satellite Structure
35-57-LAO	Probable Developments in Laos Over the Next Few Months
36-57-GHA	The Outlook for Ghana
37-58-EUR	Outlook for Stability in the Eastern European Satellites
38-58-SVT	The Soviet Atomic Energy Program
39-58-ME	Prospects and Consequences of Arab Unity Moves
40-58-INS	Probable Developments in Indonesia
41-58-POL	The Outlook in Poland
42-59-LAO	The Outlook for Laos
43-59-SVT	Soviet Science and Technology
44-59-EUR	Political Stability in the European Satellites

45-60-CUB	Communist Influence in Cuba
46-60-SVT	The Soviet Attitude and Tactics on the Berlin Problem
47-60-GER	The Situation and Prospects in East Germany
48-61-JAP	Prospects for Japan
49-61-YUG	Outlook for Yugoslavia
50-62-LAO	Relative Military Capabilities of Opposing Forces in Laos
51-62-CHN	Prospects for Communist China
52-63-INS	Indonesia's International Orientation
53-63-VIE	Prospects in South Vietnam
54-64-SVT	Soviet Foreign Policy
55-64-BRZ	The Political Situation in Brazil
56-65-EUR	Eastern Europe and the Warsaw Pact
57-65-ARG	Prospects for Argentina
58-66-ME	The Eastern Arab World
59-66-BRZ	The Outlook for Brazil
60-67-INS	Prospects for Indonesia
61-67-YUG	The Yugoslav Experiment
62-68-JAP	Main Trends in Japan's External Relations
63-68-VIE	The Vietnam Situation
64-69-SVT	The Soviet Space Program
65-69-BRZ	The Situation in Brazil
66-70-MEX	The Prospects for Mexico
67-70-LAO	The Communist View of the Situation in Laos
68-70-SVT	Soviet Policies in the Middle East and Mediterranean Area
69-70-IRN	Iran's International Position
70-70-JAP	Japan in the Seventies: The Problem of National Power
71-70-CHL	The Outlook for Chile
72-71-SVT	Soviet Policy in Asia
73-71-SVT	Soviet Strategic Defenses
74-72-AFR	South Africa in a New Decade
75-72-SVT	Soviet Strategic Defenses
76-73-VIE	Short-Term Prospects for Vietnam
77-73-SVT	Soviet Space Programs
78-74-SVT	Soviet Forces for Intercontinental Conflict Through 1985
79-75-CHL	Prospects for Chile
80-75-BRZ	The Outlook for Brazil
81-75-CUB	Cuba's Changing International Role
82-76-SVT	Implications of the 1975 Soviet Harvest
83-76-MEX	Mexico Under Jose Lopez-Portillo: Problems and Prospects for US-Mexican Relations
84-77-SVT	Soviet Strategic Objectives
85-77-RHO	Rhodesia -- Looking Ahead
86-80-SVT	Prospects for Soviet Military Technology and R&D
87-80-SVT	Soviet Military Options in Iran
88-81-POL	Poland’s Prospects Over the Next Six Months
89-81-SVT	Soviet Support for International Terrorism and Revolutionary Violence
90-82-SVT	Soviet Short-Term Options in South Asia
91-82-POL	Poland's Prospects Over the Next 12-18 Months
92-83-YUG	Yugoslavia: An Approaching Crisis?
93-83-SAL	Near-Term Military Prospects for El-Salvador
94-84-PAN	Panama: Prospects for the Election

95-84-SVT	Implications of Recent Soviet Military-Political Activities
96-85-SVT	Soviet Space Programs
97-85-SVT	Soviet Military Support to Angola: Intentions and Prospects
98-86-GUA	Guatemala: Prospects for the New Government
99-86-SVT	The Soviet Bloc Role and International Terrorism and Revolutionary Violence
100-87-AFR	Sub-Saharan Africa: Implications of the AIDS Pandemic
101-87-CHL	Chile: Prospects for Democratic Transition
102-88-SVT	Soviet Policy During the Next Phase of Arms Control in Europe
103-88-SVT	Gorbachev's Economic Programs: The Challenges Ahead
104-89-SVT	Soviet Naval Strategy and Programs Toward the 21st Century
105-89-EUR	Warning of War in Europe: Changing Warsaw Pact Planning and Forces
106-90-EUR	The Future of Eastern Europe
107-90-YUG	Yugoslavia Transformed
108-90-SVT	The Deepening Crisis in the USSR: Prospects for the Next Year
109-91-SVT	Implications of Alternative Soviet Futures
110-91-SVT	The Republics of the Former USSR: The Outlook for the Next Year
111-91-IRN	Iran Under Rafsanjani: Seeking a New Role in the World Community?
112-91-SVT	The Winter of the Soviet Military: Cohesion or Collapse?
113-92-SVT	Russia Over the Next Four Years: The Prospects for Democratization and Marketization
114-92-BRZ	Brazil: President Collor's Prospects on the Eve of the Rio Summit
115-92-IRQ	Saddam Husayn: Likely To Hang On
116-92-AFR	South Africa: Weathering the Storm
117-92-IRQ	The Kurds: Rising Expectations, Old Frustrations
118-93-HAI	Haiti Over the Next Few Months
119-93-CUB	Cuba: The Outlook for Castro and Beyond
120-93-GLO	Global Humanitarian Emergencies
121-95-NAM	Emerging Missile Threats to North America During the Next 15 Years
122-99-SVT	Environmental Outlook in Russia
123-99-GLO	Global Humanitarian Emergencies: Trends and Projections, 1999-2000
124-99-GLO	Foreign Missile Developments and the Ballistic Missile Threat to the United States Through 2015
125-99-CHN	Recent Chinese Leadership Priorities and their Implications for the United States
126-00-GLO	The Global Infectious Disease Threat and its Implications for the United States
127-00-GLO	E-Commerce at the Grass Roots: Implications of a "Wired" Citizenry in Developing Nations
128-00-GLO	East Asia and the United States: Current Status and Five Year Outlook
129-01-GLO	Growing Global Migration and its Implications for the United States
130-01-GLO	Global Humanitarian Emergencies: Trends and Projections, 2001-2002
131-01-GLO	Foreign Missile Developments and the Ballistic Missile Threat to the United States Through 2015
132-01-GLO	The Global Technology Revolution: Bio/Nano/Materials Trends and their Synergies with Information Technology by 2015
133-02-SVT	Safety and Security of Russian Nuclear Facilities and Military Forces
134-02-GLO	The Next Wave of HIV/AIDS: Nigeria, Ethiopia, Russia, India and China
135-03-GLO	SARS Down but Still a Threat
136-03-IRQ	Iraq's Continuing Program for Weapons of Mass Destruction
137-04-SVT	Safety and Security of Russian Nuclear Facilities and Military Forces
138-05-GLO	Mapping the Global Future
139-06-GLO	Trends in Global Terrorism: Implications for the United States
140-06-SVT	Safety and Security of Russian Nuclear Facilities and Military Forces

141-07-IRQ	**Prospects for Iraq's Stability: A Challenging Road Ahead**
142-07-IRQ	**Prospects for Iraq's Stability: Some Security Progress but Political Reconciliation Elusive**
143-07-IRN	**Iran: Nuclear Intentions and Capabilities**
144-00-SVT	**Russia's Physical and Social Infrastructure: Implications for Future Development**
145-00-GLO	**Central Asia and South Caucasus: Reorientations, Internal Transitions and Strategic Dynamics**