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A New Archival Approach to the Study of Values and Value–Behavior Relations: Validation of the Value Lexicon

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The present effort employs a new archival approach to study values and value–behavior relations, which is likely to be particularly useful in applied settings. A value lexicon was developed on the basis of the Schwartz (1992) value theory to extract lexical indicators of values from texts. The convergent, discriminant, and predictive validity of this measure was established using American newspaper content from 1900 to 2000 vis-à-vis existing self-report measures of values and objective indicators of value-expressive behaviors. Results provide empirical support for the use of the value lexicon to study values and value–behavior relations. First, the value lexicon demonstrated convergence with self-report responses of values. Second, values in American newspapers were associated with objective indicators of their corresponding value-expressive behaviors compared with noncorresponding value–expressive behaviors. Third, patterns of values over this 101-year period exhibited meaningful fluctuations with major historical and political events. The discussion describes new possibilities for future research on values in many applied settings with the value lexicon. The discussion also suggests that the principles of the value lexicon could be adopted to measure other psychological constructs of interest to applied psychology.

Keywords: values, behavior, archival research

Rokeach (1973) proposed that values can be used as a unifying concept across all the sciences concerned with social behavior. Values (e.g., achievement, conformity) are defined as relatively stable, broad goals that guide people's perceptions, attitudes, and behaviors across time and contexts (e.g., Allport, 1961; Rokeach, 1973; Schwartz, 1992). One of the most comprehensive and robust theories of values is the Schwartz (1992) value theory. This theory defines 10 broad, cross-culturally recognized values based on the particular motivational goal that underlies each value (see Table 1). The Schwartz value theory has established predictive validity across samples, outcome variables, languages, and cultures (see review in Schwartz & Bardi, 2001). Furthermore, this theory has been shown to significantly predict behavior across a variety of applied settings. For example, values predicted making suggestions for improvement at work (Lipponen, Bardi, & Haapamäki, in press), reactions to procedural justice allocation at work (Fischer & Smith, 2004), buying environmentally friendly products (Grunert & Juhl, 1995), political voting (Caprara, Schwartz, Capanna, Vecchione, & Barbaranelli, 2006), and counselees' behavior during career counseling (Sagiv & Schwartz, 2004). Clearly, on the basis of this prior research, an understanding of values and value–behavior relations in applied settings is important. It therefore

seems important to be able to measure values and behavior in a way that would facilitate examination of these relations across applied settings and across time and place.

Much of the research on values and behaviors has relied on self-report responses. Whereas a self-report paradigm usually can be justified in studying values (e.g., Borkenau & Ostendorf, 1987; Rohan, 2000), it has limitations in certain circumstances (see Podsakoff, MacKenzie, Lee, & Podsakoff, 2003, for review). First, self-report questionnaires are prone to response biases, such as social desirability and consistency biases (see Podsakoff et al., 2003, for an extensive review). Second, they are an obtrusive and labor-intensive method for measuring values across time and place. Finally, it is impossible to administer self-report questionnaires "to measure the subjective states of people long dead" (McGuire, 1976, p. 175), although this type of data could inform knowledge about value–behavior relations historically and across time and real-world settings. Thus, developing a measure of individual values that does not rely on the administration of self-report questionnaires is crucial for contexts in which it is undesirable, impractical, or impossible to administer a questionnaire.

The current article presents a new archival approach that could be particularly useful in such contexts. First, the rationale for developing a value lexicon is described, and the primary aims of this research are summarized. Next, the method used to validate the value lexicon is delineated. Specifically, this section explains the development of the value lexicon using American English and the strategy used to establish convergent, discriminant, and predictive validity of the value lexicon. Next, we establish the lexical co-occurrence among the same and different value words comprising the value lexicon. We establish the convergent and discriminant validity of the value lexicon to measure patterns of individual values by examining its convergence with the structure of individual values measured by traditional self-report methods. In addition,

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Table 1
Definitions of the 10 Values Based on Motivational Types and Items That Measure Them

Value	Definition
Power	Social status and prestige, control or dominance over people and resources (social power, authority, wealth).
Achievement	Personal success through demonstrating competence according to social standards (successful, capable, ambitious, influential).
Hedonism	Pleasure and sensuous gratification for oneself (pleasure, enjoying life, self-indulgent).
Stimulation	Excitement, novelty, and challenge in life (daring, a varied life, an exciting life).
Self-direction	Independent thought and action-choosing, creating, exploring (creativity, freedom, independent, curious, choosing own goals).
Universalism	Understanding, appreciation, tolerance and protection of the welfare of all people and of nature (broadminded, wisdom, social justice, equality, a world at peace, a world of beauty, unity with nature, protecting the environment)
Benevolence	Preservation and enhancement of the welfare of people with whom one is in frequent personal contact (helpful, honest, forgiving, loyal, responsible).
Tradition	Respect, commitment and acceptance of the customs and ideas that traditional culture or religion provide the self. (humble, accepting my portion in life, devout, respect for tradition, moderate)
Conformity	Restraint of actions, inclinations, and impulses likely to upset or harm others and violate social expectations or norms (politeness, obedient, self-discipline, honoring parents and elders).
Security	Safety, harmony and stability of society, of relationships, and of self (family security, national security, social order, clean, reciprocation of favors).

we examine the predictive validity of the value lexicon by correlating patterns of individual values, as portrayed in American (U.S.) newspapers, with objective indicators of behavior throughout the 20th century. We note that the reliance on newspapers in the United States alone is necessary given that the value lexicon was developed using American English. The utility of the value lexicon is illustrated by demonstrating the correspondence between patterns of individual values as portrayed in American newspapers and major national events. Finally, we discuss the potential applications and limitations of this new archival approach for the study of patterns of individual values and value–behavior relations in social, organizational, and cultural contexts.

We rely on Schwartz's (1992) individual-level value theory to develop the value lexicon. Although the individual-level value theory is usually used to examine individual differences in values, prior research has also used aggregated responses of individual values to represent national patterns of individual-level values (Schwartz & Bardi, 2001; Schwartz & Sagie, 2000). These aggregates of individual indicators can inform knowledge about what is important to individuals at the studied time and place and how this corresponds with behavior en masse. Establishing the validity of the value lexicon in this way would advocate its use both for measuring values of individuals in organizations (including leaders) and for measuring individual-level values that organizations advocate (e.g., achievement, conformity, self-direction), as was done by Bardi and Schwartz (1996) in identifying individual-level values in communist ideological writings.

Note, however, that when the research question is focused on the structure of society, a group, or an organization, it would be more appropriate to employ the Schwartz (2004) cultural value theory. This is because according to Smith and Schwartz (1997), a culture-level theory is useful for studying the effect of culture on the structure of society or other group characteristics (e.g., demographics, political characteristics). The cultural value theory (Schwartz, 2004) is the appropriate theory for such purposes because it views cultural values as different solutions to problems and challenges that face all societies (e.g., how to ensure responsible behavior of members of society, determining the boundaries between the individual and the collective, etc.). Hence, a cultural value theory is theoretically focused on values that have developed in societies in response to such societal challenges. The contents of

the values and their structure are slightly different from the ones used in the individual-level value theory. Hence, using the cultural-level values would require developing a value lexicon that reflects the contents of the cultural value dimensions.

Rationale for Developing a Value Lexicon

The use of archival data sources in empirical research has been described as detecting a "cognitive footprint" (e.g., Waller & Zimbelman, 2003) or obtaining a "cardiogram of an age" (e.g., Ricci, 2003). One of the defining attributes of an archival approach is its capacity to examine psychological constructs in times and in places where self-report questionnaire data are not available. Indeed, numerous examples exist documenting the utility of archival data sources to study psychological processes and outcomes. For example, archival research studies have established significant associations between the personality of leaders and organizational performance (Peterson, Smith, Martorana, & Owens, 2003), archival indicators of societal threat and authoritarian attitudes and behaviors (e.g., Doty, Peterson, & Winter, 1991; Peterson & Gerstein, 2005; Sales, 1973), and prediction of various forms of outgroup hostility (Mullen, 2001, 2004; Mullen, Calogero, & Leader, 2007).

Previous research has also utilized archival indicators to study values, corroborating them with self-reports of values. For example, Eckhardt and Alcock (1970) identified the values that were central to communism by content analyzing communist texts. Years later, Bardi and Schwartz (1996) found evidence that these values were understood as communist values using self-reports in teacher samples in Eastern Europe. Moreover, the personal importance of these values predicted voting for communist parties. In another study, Schwartz and Ros (1995) identified differences in the values embedded in the American Declaration of Independence compared with values embedded in the motto of the French revolution. They found the same differences in values comparing American and West European teacher samples using self-reports of values. Notably, these studies suggest that individual values embedded in texts can serve as good indicators of values in the relevant population. The present effort extends previous archival work on values by developing a new approach to measure patterns

of individual values systematically on the basis of natural language use.

Natural language use provides a reliable and valid indicator of basic personality, cognitive processes, and social processes (Pennebaker & King, 1999; Pennebaker, Mehl, & Niederhoffer, 2003). Consequently, there have been previous efforts to develop systematic methods to analyze the content of natural texts (e.g., Kulesa & Bishop, 2006; Pennebaker, Francis, & Booth, 2001; Winter, 1994). Recent innovations in the study of associative meaning among words in natural language use have utilized the billions of natural language documents available on the Internet (Gulli & Signorini, 2005; Heylighen, 2001; Turney, 2001). Specifically, the associative linkage between any array of words can be empirically defined in terms of their lexical co-occurrence.[1] The core idea of using lexical co-occurrence to gauge associative strength is that "a word is characterized by the company that it keeps" (Firth, 1957, p. 11). For any given construct, a lexicon of words indicative of the construct can be developed. The relative co-occurrence of these words is used to indicate the degree to which these words converge on the activation of the construct.

This Internet-based approach for measuring lexical co-occurrence is an improvement over extant sets of word association norms, which are limited in their representation of target words for every construct of interest and rely on restricted samples of participants to generate the target words (e.g., Moss & Older, 1996; Palermo & Jenkins, 1964). Instead, this new approach relies on the massive lexical corpus on the Internet to determine which words actually co-occur in use. Spence and Owens (1990) have shown that indicators of lexical co-occurrence in natural language use render results that are highly consonant with the patterns obtained from word association norms. Similar applications of this basic approach have been reported by others (e.g., Fellbaum, 1998; Heylighen, 2001). In the original validation of this lexical co-occurrence approach to measuring psychological constructs, Calogero (2007) used this approach to develop a lexicon of words to measure individual differences in the motivation to attain or avoid cognitive closure. Good to excellent convergent, discriminant, and predictive validity were demonstrated for this new lexical measure of need for cognitive closure across eight studies. The present effort drew on this lexical co-occurrence approach to develop and validate a new measure of individual values to study patterns of values and value–behavior relations over time.

Summary of the Aims of the Current Research

In this research, the Internet-based approach described above was utilized to develop a lexicon of value words to represent the 10 distinct values comprising Schwartz's (1992) individual-level value theory. This value lexicon was subjected to tests of convergent, discriminant, and predictive validity. First, if the value lexicon represents Schwartz's 10 values, then the value words comprising the lexicon would be expected to differentially represent each of Schwartz's 10 values. Specifically, the set of value words representing each of the 10 values should discriminate among the 10 values in their relative lexical co-occurrence in natural language use on the Internet. Second, if the value lexicon represents Schwartz's 10 values, then the structure of relations among the values as represented by value words would be expected to be significantly positively correlated with the structure of values measured by self-report. Third, if the value lexicon predicts actual

behaviors, then we would expect the set of value words representing each value to be positively associated with the behavioral indicator expressing that value in comparison with behavioral indicators that do not express that value.

Method

The Value Lexicon

The process of constructing the value lexicon began with an initial pool of all possible words that reflected each of the 10 values. These words were drawn from the items on the Schwartz (1992) value questionnaire and from the 6th edition of *Roget's International Thesaurus* (Kipfer, 2002) to represent each of the 10 individual values. The aim was to identify three words that, when appearing together, would represent the relevant value. Consistent with the use of multiple items to measure one value (Schwartz, 1992; Schwartz & Bardi, 2001), we reasoned that the occurrence of three words on a single Web page to represent a given value would serve as a more reliable indicator of the prevalence of that value than the occurrence of just one word to represent a given value. We chose to use three words (rather than any other number) as this is the smallest number of items that measure a value in the most recent version of the Schwartz Value Survey (Schwartz, Sagiv & Boehnke, 2000). The set of three words for each value were selected in order to maximize the co-occurrence of pairs of words for the same value while simultaneously minimizing the co-occurrence of pairs of words for different values, as detailed below.

To narrow down the initial pool of words, we applied several criteria. First, a preference was given to use the value label itself (e.g., *power*, *security*) as one of the words to represent each value; however, this was not always possible because some of these value labels yielded prohibitively low word frequencies (e.g., *universalism*, *hedonism*). Second, in order to hold part of speech constant across different values, we considered only nouns. For example, for the value Hedonism, the noun *pleasure* was used rather than the adjective *pleasing*. Third, in order to minimize lexical ambiguity, obvious polysems (words having multiple meanings depending on context) were avoided. For example, the noun *practice* might be appropriate for the value Tradition in denoting the relevant meaning of a custom or a habit, but *practice* could also denote the irrelevant meaning of a professional office. Finally, the words selected to represent each of the 10 values had to convey the

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[1] Although beyond the scope of this article, there is an obvious resonance between the present approach and latent semantic analysis (LSA; e.g., Deerwester, Dumais, Furnas, Landauer, & Harshman, 1990; Landauer & Dumais, 1997; Salton & McGill, 1983). The primary difference between the present approach and LSA is the direction of construction of a semantic space: Whereas LSA attempts to discover a lower dimensional representation of a semantic space from higher dimensional vectors of counts of co-occurrence, the present approach attempts to validate a higher dimensional representation of a semantic space from lower dimensional vectors of counts of co-occurrence. In other words, LSA might have attempted to distill the constellation of 10 values from an *n*-dimensional tabulation of the co-occurrences of all value-relevant terms, whereas the present approach attempts to construct a tabulation of the co-occurrences of value-relevant terms that maps onto the constellation of 10 values already established from self-report questionnaire studies. See Turney (2001) for review of differences between these approaches.

meaning of the relevant value when they appeared together. For example, the word *respect* does not necessarily reflect Tradition when it appears alone, but it does reflect Tradition when it is paired with the words *tradition* and *custom*. The resultant lexicon of 30 value words is presented in Table 2.

Google represents the largest and most popular search engine available on the Internet, and the searches of terms reflect popular usage of those terms (Blair, Urland, & Ma, 2002). Google searches all documents, blogs, messages, and Websites to which it has access (e.g., HTML, PDF, Word, Macromedia Flash [SWF], spreadsheets, plain text) and computes the number of sites that contain the entered search term(s). Therefore, searches were conducted for these 30 words with the Google search engine, restricted to Websites in English originating from the United States. Each 1 of the 30 words was searched singly to obtain a frequency estimate, referred to as a Google hit. Replicating previous results (see Blair et al., 2002), the number of single Google hits for each word exhibited significant correlations with the word frequency estimates from Thorndike and Lorge's (1944) 60–year-old norms, $r(28) = .41$, $p = .01$, and Kucera and Francis's (1967) 40–year-old norms, $r(28) = .57$, $p = .0005$, indicating that the number of Google hits for each word is an adequate indicator of word frequency. Second, for each of the 10 values, the lexical co-occurrence of word pairs for same and different values was calculated in terms of their joint probability. For example, *kindness* and *mercy* are words that represent the same value (Benevolence), whereas *kindness* and *strength* are words that represent different values (Benevolence and Power). Searches were done singly (e.g., "*kindness*") and for every possible pair (e.g., "*kindness mercy*," "*kindness strength*"). Joint probability (JP) is defined as the ratio of the number of paired hits (PH) to the average of the number of single hits (SH; Google hits expressed in 1,000s). To illustrate, the calculation of the JP for the co-occurrence of *kindness* and *mercy* is represented as:

JP(kindness − mercy)

$$= (kindness − mercy_{PH}) / [(kindness_{SH} + mercy_{SH})/2]$$

The JP for the co-occurrence of kindness and mercy (benevolence) is:

JP(kindness − mercy)

$$= (1,560) / [(12,200 + 21,800)/2] = .09.$$

The JP for the co-occurrence of kindness and strength (Benevolence and Power) is:

JP(kindness − strength)

$$= (2,360) / [(12,200 + 130,000)/2] = .03.$$

If the value lexicon represents Schwartz's 10 values, then we expected the value words in the lexicon to differentially represent each of Schwartz's 10 values. Specifically, the mean JP for the co-occurrence of pairs of words for the same value should be higher than the mean JP for the co-occurrence of pairs of words for different values, thus discriminating between the 10 values in their relative lexical co-occurrence in natural language use. Convergence among the value words representing the same value and divergence among the value words representing different values would provide a measure of validity for the 10 distinct values represented in the lexicon.

It is important to note that the set of three words selected to measure each value are not necessarily synonyms but rather were selected to give the best coverage of the value concept. For example, the words *independence* and *freedom* that measure the value Self-Direction are not synonyms. They represent two different aspects of the Self-Direction value in the Schwartz Value Survey (Schwartz, 1992; see Table 1 above). Thus, their lexical co-occurrence reflects the broad value construct rather than merely expressing the same concept with multiple but equivalent terms. The lexical indicators selected for each value represent the broad meaning of the value when they appear together, in the same way that the self-report items for each value represent the broad meaning of the value when averaged together. Because the words that represent the same value are not synonyms, the expectation that their lexical co-occurrence will be higher than their lexical co-occurrence with words that measure other values is not an obvious one. Furthermore, the values represented in the Schwartz (1992) value theory are interrelated with one another, creating a quasi-circumplex (a circle without specified gradients, ordered in the same way as in the tables of this article) such that each value is more positively correlated with adjacent values in the circle and each value is less positively correlated with nonadjacent values in the circle. Therefore, the differences between the lexical co-occurrence of words for the same and different values would have to be quite robust in order to overcome the additional challenge presented by the circumplex structure of the values.

Convergent and Discriminant Validity of the Value Lexicon

In order to test the convergent and discriminant validity of the value lexicon, it was first necessary to identify a source of people's natural language use to which we could apply the value lexicon to measure the 10 values. Newspapers provide a rich, extensive source of lexical output to which we can apply the value lexicon. Although caution is warranted when utilizing media data because of imperfect representativeness (Ortiz, Myers, Walls, & Diaz, 2005), there is evidence in previous studies, which used methods different from our method, that popular textual media in democratic societies largely represent the salient values, opinions, and concerns of people. Specifically, in a comparison of newspapers that either published all letters to the editor or published only selected letters to the editor, individual letter writers to these newspapers did not differ in their support of the Equal Rights Amendment (ERA; Hill, 1981). Furthermore, the percentage of

Table 2
Words Selected to Represent Each Value: The Value Lexicon

Value	Lexical indicators for each value
Power	power, strength, control
Achievement	achievement, ambition, success
Hedonism	luxury, pleasure, delight
Stimulation	excitement, novelty, thrill
Self-direction	independence, freedom, liberty
Universalism	unity, justice, equality
Benevolence	kindness, charity, mercy
Tradition	tradition, custom, respect
Conformity	restraint, regard, consideration
Security	security, safety, protection

support for the ERA indicated in published letters to the editor did not significantly differ from the support indicated in public opinion polls that represent the general population. In addition, Inglis (1938) found that changes in the portrayals of agentic heroines in *The Saturday Evening Post* from 1901 to 1935 covaried with, but did not precede, changes in gainful employment of women in the United States. More recently, Adelman and Verbrugge (2000) observed that the coverage of six prominent diseases in 34 American newspapers reflected societal trends in disease prevalence and mortality. These findings indicated that increases in newspaper coverage of cancer or AIDS reflect, rather than cause, increases in the prevalence of these diseases.[2]

Therefore, we examined the occurrence of individual-level values in popular American newspapers. To begin, we measured the prevalence of the value words on newspaper pages. A series of searches was conducted in U.S. newspapers for the years 1900 to 2000 on NewspaperArchive.com, an Internet-based search engine with access to millions of newspaper pages, from eight countries, for the years 1759 to present. First, for each year, the number of U.S. newspaper pages containing all three of the words for each of the 10 values was tabulated. It was reasoned that the occurrence on a single newspaper page of all three words (e.g., *luxury*, *pleasure*, and *delight*) for a given value (e.g., Hedonism) would serve as a more reliable indicator of the prevalence of that value than the occurrence of just one of those words. Second, for each year, the number of American newspaper pages containing the word *the* was tabulated in order to provide a baseline of the total number of newspaper pages printed during that year. This was based on the assumption that every page of a newspaper in English would contain the word *the,* as we indeed found. Third, for each year, the relative prevalence of each of the 10 values was defined as the number of American newspaper pages containing all three of the words for a given value divided by the number of newspaper pages in that year. On the basis of these prevalence figures, it was possible to compute the intercorrelations among the 10 values in American newspapers pages across 101 years.

To test the convergent and discriminant validity of the value lexicon, we compared the lexical occurrence of the 10 values in popular American newspapers with self-reported responses of the 10 values. Specifically, we examined the convergence between the intercorrelations among the 10 values in newspapers and the intercorrelations among the 10 values based on self-report responses to the Schwartz Value Survey (Schwartz, 1992). Bardi and John (2007) computed intercorrelations among the 10 different values on the basis of the self-report responses of 545 American students. The 10×10 matrix produced by computing the intercorrelations among the 10 different values yields a total of 55 correlations. If the value lexicon serves as an indicator of Schwartz's (1992) 10 values, then the pattern of intercorrelations among the 10 values reflected in American newspaper pages should converge with the pattern of intercorrelations among the 10 values in participants' self-reports. That is, the general patterns of relations among the values observed in the 55 correlations obtained from the lexical co-occurrence of the 10 values in U.S. newspaper pages should exhibit the same general patterns as observed in the 55 correlations obtained from U.S. students' self-reports of the 10 values (Bardi & John, 2007). We did not expect to find exactly the same structure of relations among the values when comparing the two patterns of relations, as they represented markedly different operationalizations of the Schwartz values.

Specifically, in contrast to the value questionnaire (Schwartz, 1992), the value lexicon represents an indirect indicator of values, because values are reflected from the co-occurrence of value words in texts, whereas in value questionnaires values are measured directly. However, we did expect a positive correlation between the two patterns of relations.

Predictive Validity of the Value Lexicon

The term *value-expressive behavior* refers to behaviors that express or promote the attainment of primarily one value as compared with other values (Bardi & Schwartz, 2003). For example, dominating behaviors primarily express Power values, and pleasure-seeking behaviors primarily express Hedonism values. Only one previous study examined relations between Schwartz's 10 values and an array of behaviors that express the 10 values (Bardi & Schwartz, 2003), demonstrating moderate relations between values and behaviors when behavior was measured by self- and peer-reports. For the purposes of this research, archival indicators that were not derived from responses to self-report questionnaires were specifically utilized because they circumvent the known limitations of traditional self-report measures, span historical periods and contexts, and provide greater ecological validity for the constructs under investigation. Whereas the indicators utilized here are potentially fallible, these indicators are no better or worse than more traditional data extraction methodologies, as documented in the extant archival research literature, (e.g., Simonton, 2003; Webb, Campbell, Schwartz, Sechrest, & Grove, 1981). The purpose was to correlate these behavioral indicators with value occurrences in newspapers across 101 years (1900–2000).

Each of the behavioral indicators was selected on the basis of several criteria: First, the behavioral indicator needed to be consistent with the conceptual definition of the value based on the Schwartz (1992) value theory. Second, the behavioral indicator had to be considered an expression of primarily one value, and not an expression of the other values. Third, the behavioral indicator had to be considered an expression of a value that can vary in its frequency of expression over time while retaining functionally equivalent meanings across time and social change (Doty, Peterson, & Winter, 1991). Fourth, the behavioral indicator needed to be quantifiable in a meaningful way without distorting the nature of the behavior expressed. Finally, the behavioral indicator had to provide data for most or all of the years from 1900 to 2000. The objective indicators selected to represent the 10 value-expressive behaviors are described below.

Power. The value of Power stems from the motivation to exert dominance over people and resources (Schwartz, 1992). When people value Power, they are likely to engage in activities that will enable them to have dominance over others. Taking part in military action is a behavior that enables people to pursue their Power values because the aim of military action is to establish dominance over people and/or resources. Indeed, military cadets valued power much more highly

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[2] Of course, value-laden messages can also affect values, as was shown regarding the influence of school textbooks on children (McClelland, 1961). However, children are more amenable for value change (see, e.g., Bardi & Schwartz, 1996). Although the media is likely to have some influence on its audience, in a democratic society it is more plausible that the media reflects what is important to its audience.

than a comparable sample of adults (Lönnqvist, Verkasalo, Bezmenova, & Helkama, 2007). We therefore reasoned that the percentage of the population on active military duty would be one objective indicator of behavior that expresses the value of Power. That is, the greater the extent to which Power values are salient and important, the more people in the population will enlist in the army. Data for this objective indicator of behavior were available for the years 1900 to 2000 (Kurian, 2004). We expected that increases in the prevalence of Power values in American newspapers during this period would be associated with increases in the percentage of the population involved in active military duty during the same period.

Achievement. The Achievement value emphasizes demonstrating competence according to social standards of success, and the pursuit of these values entails investing time and energy in tasks that serve group interests (Schwartz, 1992; Schwartz & Bardi, 2001). When people value Achievement, they are likely to engage in activities that enable them to demonstrate competence and success. Indeed, Bardi and Schwartz (2003) demonstrated that valuing achievement was associated with investing time and effort in achieving high grades at universities among student samples. Patenting an invention is another behavior that enables people to pursue Achievement values because it is an obvious demonstration of competence and success. Indeed, prior research has demonstrated that higher need for achievement scores, as measured in U.S.-published reading textbooks, were associated with increased patents granted per capita in the United States from 1800 to 1950 (deCharms & Moeller, 1962). We therefore reasoned that the number of patented inventions per capita would be one objective indicator of behavior that expresses the value of Achievement. Data for this objective indicator of behavior were available for the years 1900 to 2000 (United States Patent and Trademark Office, 2005.) We expected that increases in the prevalence of Achievement values in American newspapers during this period would be associated with increases in the number of patented inventions per capita during the same period.

Hedonism. The value of Hedonism emphasizes gratification of self-oriented needs and desires, and the pursuit of these values entails seeking pleasure and gratification of desires (Schwartz, 1992; Schwartz & Bardi, 2001). When people value Hedonism, they are likely to engage in activities that enable them to experience pleasure and gratify nonessential needs. Indeed, valuing hedonism was associated with consuming food or drinks that the person likes, even when he or she is not hungry or thirsty (Bardi & Schwartz, 2003). Alcohol consumption is a behavior that enables people to pursue their Hedonism values because alcohol is most often consumed for pleasure and not to relieve thirst. We therefore reasoned that alcohol consumption per capita would be one objective indicator of behavior that expresses the value of Hedonism. Data for this indicator were available for the years 1900 to 2000 (National Institute on Alcohol Abuse and Alcoholism, 2006). We expected that increases in the prevalence of Hedonism values in American newspapers during this period would be associated with increases in the amount of alcohol consumed per capita during the same period.

Stimulation. The value of Stimulation emphasizes the pursuit of opportunities that bring excitement, arousal, and novel experiences (Schwartz, 1992). When people value Stimulation, they are likely to engage in activities that enable them to have exciting and arousing experiences in daily life. Indeed, valuing stimulation was associated with the frequency of watching thrillers (Bardi & Schwartz, 2003). Watching entertainment films is one behavior that enables people to pursue their Stim-

ulation values because movies provide opportunities for excitement and arousal. When there is an increased demand to watch movies, it is likely that the film industry will respond by releasing more films. We therefore reasoned that the number of entertainment films released per capita would be one objective indicator of behavior that expresses the value of Stimulation. Data for this indicator were available for the years 1900 to 2000 (Schmidt, 2006). We expected that increases in the prevalence of stimulation values in U.S. newspapers during this period would be associated with increases in the number of entertainment films released per capita during this period.

Self-Direction. This value emphasizes independence of thought and action, and includes the specific values *freedom* and *choosing own goals* (Schwartz, 1992). When people value Self-Direction, they are likely to engage in activities that enable them to demonstrate independence of thought and action. Voting in national elections is one behavior that enables people to pursue their Self-Direction values because voting provides an opportunity to demonstrate the freedom to make independent choices. We therefore reasoned that the percentage of voter turnout for Presidential and Congressional elections would be one objective indicator of behavior that expresses the value of Self-Direction. Data for this indicator were available for the years 1900 to 2000 (Woolley & Peters, 2005). We expected that increases in the prevalence of Self-Direction values in American newspapers during this period would be associated with increases in the percentage of voter turnout for Presidential and Congressional elections during this period.

Universalism. Universalism is a prosocial value that includes the specific values of *social justice* and *broadminded* (broadminded being defined as tolerance). This value emphasizes a focus on the protection of all others outside the immediate in-group (Schwartz, 1992). When people value Universalism, they are likely to engage in activities that enable them to promote social justice and the protection of others. Indeed, in student samples, universalism values were correlated with donations made to disadvantaged populations in foreign countries (Bardi & Schwartz, 2003). Donations to charities is one behavior that enables people to pursue their Universalism values because these donations protect the welfare of disadvantaged populations and attempt to rectify social injustice. We therefore reasoned that the proportion of total personal income donated to the United Way would be one objective indicator of behavior that expresses the value of Universalism.[3] Note that this behavior is a better reflection of Universalism values than of Benevolence values because of the emphasis on helping people whom one does not know personally and who are outside one's immediate group. Data for this indicator were available for the years 1920 to 1997 (Putnam, 2000). We expected that increases in the prevalence of Universalism values in American newspapers during this period would be associated with increases in the proportion of total personal income donated to the United Way during the period.

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[3] United Way is one of the largest charities in the United States, working with, for example, businesses, community development corporations, voluntary associations, and various faith communities (reflecting the specific universalism value of *broadminded*) to redress various themes of social injustice. These themes include promoting self-sufficiency and facilitating women's leadership (reflecting the specific universalism value of *social justice*). Thus, this large charity is a particularly suitable charity for the expression of universalism values.

Benevolence. The Benevolence value emphasizes a prosocial motivation to enhance and protect the well-being of people with whom one is in frequent contact (Schwartz, 1992). It includes the specific values *helpful* and *forgiving*. When people value Benevolence, they are likely to engage in activities that will enable them to protect the well-being of people in their immediate environment. Indeed, in student samples, Benevolence values were correlated with helping neighbors (Bardi & Schwartz, 2003). Deciding not to deport individuals from the country is one behavior that enables the pursuit of Benevolence values because it provides an opportunity to protect and/or help individuals who are portrayed concretely (with a name, picture, and personal story). We therefore reasoned that the proportion of the population deported would be one objective indicator of behavior that expresses the value of Benevolence (reverse scored). Data for this indicator were available for the years 1900 to 2000 (Kurian, 2004). We expected that increases in the prevalence of Benevolence values in American newspapers during this period would be associated with decreases in the percentage of the population deported during this period.[4]

Tradition. The value of Tradition emphasizes commitment and acceptance of the customs and ideas of traditional cultures or religions and includes the specific values *devout* and *respect for tradition* (Schwartz, 1992). When people value Tradition, they are likely to engage in activities that will enable them to demonstrate their commitment to and respect for traditional customs and practices. Indeed, valuing tradition was associated with observing traditional customs during religious festivities (Bardi & Schwartz, 2003). Moreover, across religions, valuing tradition was highly correlated with religiosity ($r = .54$) and frequency of church attendance ($r = .37$; Schwartz & Huismans, 1995). The prevalence of churches is one indicator that enables people to pursue their Tradition values because the building and prevalence of churches demonstrates commitment to traditional customs and religious practices. The greater the number of people who attend church, the greater the number of churches needed. We therefore reasoned that the number of churches per capita would be one objective indicator of the expression of the value Tradition. Data for this indicator were available for the years 1900 to 1977 (Melton, 1977). We expected that increases in the prevalence of Tradition values in American newspapers during this period would be associated with increases in the number of churches per capita during the period.

Conformity. The value of Conformity emphasizes maintaining the status quo, and the pursuit of this value entails restraint of impulses in order to avoid violations of social norms (Schwartz, 1992; Schwartz & Bardi, 2001). When people value Conformity, they are likely to engage in activities that will enable them to adhere to social norms and contribute to the status quo. Indeed, in student samples, Conformity values were correlated with obedience to parents and with avoiding confrontations (Bardi & Schwartz, 2003). Giving birth after getting married enables people to pursue their Conformity values because marriage before children represents a pervasive social norm in the American culture. We therefore reasoned that the number of unwed births per capita would be one objective (reversed) indicator of behavior that expresses the value of Conformity. Data for this indicator were available for the years 1940 to 2000 (Kurian, 2004). We expected that increases in the prevalence of Conformity values in American newspapers during this period would be associated with decreases in the number of unwed births per capita during the same period.

Security. The value of Security emphasizes safety and stability of society, including maintaining the social order (Schwartz, 1992). When people value Security, they are likely to engage in activities that will enable them to have and/or provide safety and security in situations. Employment in security-based occupations is one behavior that enables people to pursue their Security values because it involves people directly in maintaining the social order. Indeed, among workers across 32 occupations, people who work in security occupations tended to value security highly as compared with people in other occupations (Knafo & Sagiv, 2004). We therefore reasoned that the percentage of the working population employed as police officers, guards, or public safety officials would be one objective indicator of behavior that expresses the value of security. Data for this indicator were available for the years 1900 to 1997 (Putnam, 2000). We expected that increases in the prevalence of Security values in American newspapers during this period would be associated with increases in the percentage of the working population employed as police, guards, or public safety officials during the same period.

Considerations in the Selection of Behavioral Indicators

Because of the obvious challenges in selecting and finding available behavioral indicators for each of the 10 values, it was necessary to utilize one behavioral indicator for each value to maintain consistency and make valid comparisons among the 10 value–behavior relations.

Indeed, the behavioral indicators selected may not be the ideal representations of each value-expressive behavior. Other indicators may serve as reasonable approximations of the value-expressive behaviors as well. For example, it could be argued that alcohol consumption is not the best indicator of Hedonism values. During this time period, there were many external factors that could have influenced alcohol consumption (e.g., Prohibition, wars), and therefore people may not have been able to primarily express the value of Hedonism by consuming alcohol. An alternative reasonable indicator could be the amount of money or time people spent on their vacations. However, spending time on a vacation would also be expected to be influenced by similar and different external factors. More importantly, similar to other plausible alternative indicators, data for the amount of time spent on vacation were not available for the time period under investigation here.

In addition, some of the indicators selected may seem to be reasonable expressions of other values. For example, it could be argued that the indicator of Power values (the percentage of the population on active military duty) could also be an expression of Security values. However, the United States was not under continuous threat between 1900 and 2000, and therefore the population in active military duty would be more likely to vary as a function of the importance of dominance (Power) compared with the importance of safety (Security). We maintain that any indicator of objective behavior will have a particular set of strengths and weaknesses that may or may not overlap with the strengths and weaknesses of alternative indicators. Notably, a primary purpose of this research was to examine whether the behavioral indicators

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[4] It was impossible to find a behavior that could be measured on a national level that would clearly reflect helping behavior toward people with whom one is in frequent contact. Hence, we used the percentage of population deported as the best approximation.

we selected do relate to their respective values more than they relate to the other values when both variables could plausibly be affected by other societal factors (e.g., wars, economic cycles).

Results

Lexical Co-occurrence of Value Words in the Value Lexicon

We expected that if the value lexicon represents Schwartz's 10 values, then the value words would differentially represent each of these 10 values in their relative lexical co-occurrence in natural language use on the Internet. Table 3 presents the mean JPs of pairs of words representing the same value and the mean JPs of pairs of words representing different values (i.e., one word representing the target value and one word representing a different value) for each of the 10 values.[5] As expected, the mean JP for the co-occurrence of pairs of words for the same value, $M = .09$, is significantly higher than the mean JP for the co-occurrence of pairs of words for different values, $M = .05$, $F(1, 53) = 12.91$, $p < .0004$, corresponding to a medium effect size, $r = .44$. This provides stronger support than expected given the nature of the words and the value structure, as noted in the Method section above. However, there were two exceptions to the general pattern of results. The JPs for Achievement and Tradition suggest that the words representing Achievement and Tradition co-occurred similarly with the words representing the other values. We return to these exceptions in the Discussion. Overall, the value lexicon represents words that can significantly discriminate between Schwartz's values in natural language use on the Internet.

Convergent and Discriminant Validity of the Value Lexicon

If the value lexicon serves as an indicator of individual-level values as delineated by Schwartz (1992), then the general patterns observed in the 55 correlations obtained from the lexical co-occurrence of the 10 values in American newspaper pages should exhibit the same general patterns as observed in the 55 correlations obtained from American students' self-reports of the 10 values (Bardi & John, 2007). Indeed, the convergence between these two very different operationalizations was remarkably high, $r(53) =$

.93, $p < .0001$,[6] demonstrating convergent and discriminant validity for the value lexicon.

As we expected, the structure of relations among the values elicited from the lexical co-occurrence of values on newspaper pages was not identical to the structure of self-reported values. Similar to self-reported values, the intercorrelations among the lexical co-occurrences of values decline as they become more distant from each other in the circle. However, in contrast to self-reported values, there is also a slight increase in correlations with opposite values. This probably reflects the concurrent use of antonyms, such as "get out of your *safety* zone, have some *excitement* in life!" (Security vs. Stimulation values) or a debate that presents conflicting values, such as the abortion debate in the United States that confronts Tradition values with Self-Direction values.

Predictive Validity of the Value Lexicon

Bardi and Schwartz (2003) demonstrated moderate, positive value–behavior correlations between self-reported values and self- and peer-reports of actual behaviors. Therefore, we expected the same general patterns in using the value lexicon and objective indicators of value-expressive behaviors, although it is reasonable to expect more random variance with archival indicators of actual behaviors. Table 4 presents the correlations between the prevalence of values in American newspapers and the objective indicators of behaviors. The correlations of values with their corresponding value-expressive behaviors are presented on the diagonal, in boldface. The mean correlations of the values with their noncorresponding value-expressive behaviors are presented on the bottom row. As expected, most of the correlations on the diagonal are more positive than the correlations on the same row and column. The few correlations that divert from this pattern could be attributed to random variance that, as noted above, should be expected with archival indicators of actual behavior. Yet, importantly, the mean correlation for the 10 corresponding value–behavior pairs, $r = .56$, was much higher than the mean correlation for the 90 noncorresponding value–behavior pairs, $r = .07$. The effects for the corresponding and noncorresponding value–behavior pairs were significantly different, $Z = 4.80$, $p < .0001$, demonstrating that the values in American newspapers indicated by the value lexicon are strongly and consistently associated with objective indicators of their value-expressive behaviors. In fact, exceeding expectations, the mean correlation for the 10 corresponding value–behavior pairs based on objective indicators of values and behaviors during this 101-year period is stronger than the mean correlation for the 10 corresponding value–behavior pairs based on students' self-reports of values and behaviors reported by Bardi and Schwartz (2003; across three studies, $r = .49$). It is also important to note that the correlation between Power values and the number of people on active military duty remained significant after excluding the years 1944 and 1945, which were statistical outliers because they were the peak years of the U.S. military's active participation in World War II. Similarly, the correlation between Hedonism values and the amount of alcohol consumption per capita remained significant after excluding the 13 years of Prohibition.

Table 3

Mean Joint Probabilities (JPs) of Co-occurrence Among Words in the Value Lexicon

Value	Mean JP of pairs of words representing the same value	Mean JP of pairs of words representing different values
Power	.17	.07
Achievement	.06	.05
Hedonism	.06	.03
Stimulation	.04	.02
Self-direction	.11	.05
Universalism	.07	.05
Benevolence	.06	.03
Tradition	.05	.06
Conformity	.11	.05
Security	.21	.05

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[5] The complete matrices of 10×10 correlations of all 10 values throughout the article are available from the authors on request.

[6] All calculations on correlations in this article are performed with Fisher's Z transformation and back transformation.

Table 4
Correlations Between Values and Objective Indicators of Behaviors

Behavior (corresponding value, *df*)	Values									
	Power	Achievement	Hedonism	Stimulation	Self-direction	Universalism	Benevolence	Tradition	Conformity	Security
Military participation (Power, 99)	**.33**	−.28	−.26	−.20	.09	.33	−.23	−.26	−.28	.06
Patented inventions (Achievement, 99)	−.36	**.35**	.03	.09	−.05	−.20	.28	.11	.25	−.19
Alcohol consumption (Hedonism, 99)	−.41	−.23	**.50**	−.75	−.24	−.24	.01	−.09	.10	.24
Movies released (Stimulation, 99)	.72	.76	−.48	**.89**	.44	.25	.42	.51	.82	−.17
Voting participation (Self-Direction, 99)	.54	.32	.12	.15	**.57**	.32	.44	.39	.49	−.22
United Way donations (Universalism, 76)	.79	.28	−.26	.48	.35	**.47**	.19	.31	.44	−.17
Deportations (Benevolence, reversed, 99)	.41	.48	.14	−.02	.34	.26	**.48**	.17	.57	−.52
Number of churches (Tradition, 76)	.04	.15	−.17	.11	.13	−.09	.17	**.09**	.14	−.22
Unwed births (Conformity, reversed, 59)	.85	.37	−.07	.58	.36	.45	−.12	−.04	**.70**	−.47
Police and guards employed (Security, 96)	−.67	−.75	.06	−.41	−.31	−.29	−.57	−.28	−.71	**.76**
Mean correlation with noncorresponding behaviors	*.30*	*.13*	*−.11*	*−.01*	*.13*	*.05*	*.06*	*.10*	*.25*	*−.20*

Note. Degrees of freedom refer to correlations between values and corresponding value-expressive behaviors. Correlations of values with their corresponding value-expressive behaviors are in boldface.

It is important to note two exceptions to this general pattern. The JPs for Power and Tradition suggest that the words representing Power and Tradition values were similarly associated with corresponding and noncorresponding value-expressive behaviors. We return to these exceptions in the discussion. Overall, patterns of individual values were significantly correlated with their value-expressive behavior and more strongly correlated with their value-expressive behavior as compared with all other behaviors.

A plausible conceptual question might be posed: whether some of these associations between values and behavior are actually just a reflection of changes over time.[7] Therefore, the analyses reported above were replicated with regression analyses, wherein behaviors were simultaneously regressed on both year and values in order to determine whether the patterns reported above could be dismissed as an artifact of changes over time. As expected, the mean β for the 10 corresponding value–behavior pairs, $\beta = .33$, is higher than the mean β for the 90 noncorresponding value–behavior pairs, $\beta = .02$, $F(1, 98) = 10.34$, $p < .0009$, indicating that the value–behavior relations remain significant when accounting for changes over time.[8]

An Illustration of the Utility of the Value Lexicon: Value Patterns in the United States

The portrayal of values in American newspapers throughout the 20th century also can be used to examine change in values at the group or societal level. Figure 1 depicts a total of 1,010 data points capturing variations in the prevalence of values in American newspapers. Inspection of this figure reveals several interesting societal patterns. These variations in values exhibit several peaks and troughs, which correspond to major historical events during this 101-year period in America. For example, Stimulation exhibits a dramatic upswing during the "Roaring Twenties," followed by a precipitous downswing at the start of the Great Depression. Security exhibits a dramatic upswing at the beginning of World War II, a dramatic downswing at the conclusion of World War II, then a general increase that lasts until the conclusion of the Cold War. This illustration demonstrates the utility of the value lexicon for identifying unique relations between the values and corresponding societal changes compared with noncorresponding societal

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[7] A plausible analytic suggestion might be that these data should more properly be subjected to ARIMA (autoregressive integrated moving average) analyses (e.g., Box & Jenkins, 1976; McDowell, McCleary, Meidinger, & Hay, 1980). ARIMA analyses would allow the examination of the prediction of behaviors by values while taking into account cyclical fluctuations, periodicity, and autoregressive nonindependence in these data. At a theoretical level, we would be reluctant to treat any variability indicative of cyclical fluctuations or periodicity as "white noise" to be filtered out of the model. For example, to date, there has been no theoretical or empirical determination as to whether the fluctuations in values depicted in Figure 1 represent genuine, meaningful period fluctuations or merely random noise to be filtered out. At a mechanical level, these data do not conform to the requirements of ARIMA modeling. For example, each archival indicator of behavior covers a slightly different portion of the 101-year period being examined in these analyses, and some of the indicators have some missing values for some of the yearly increments across the 101-year period being examined in these analyses.

[8] Zero-order correlations among values and year are available from the authors on request.
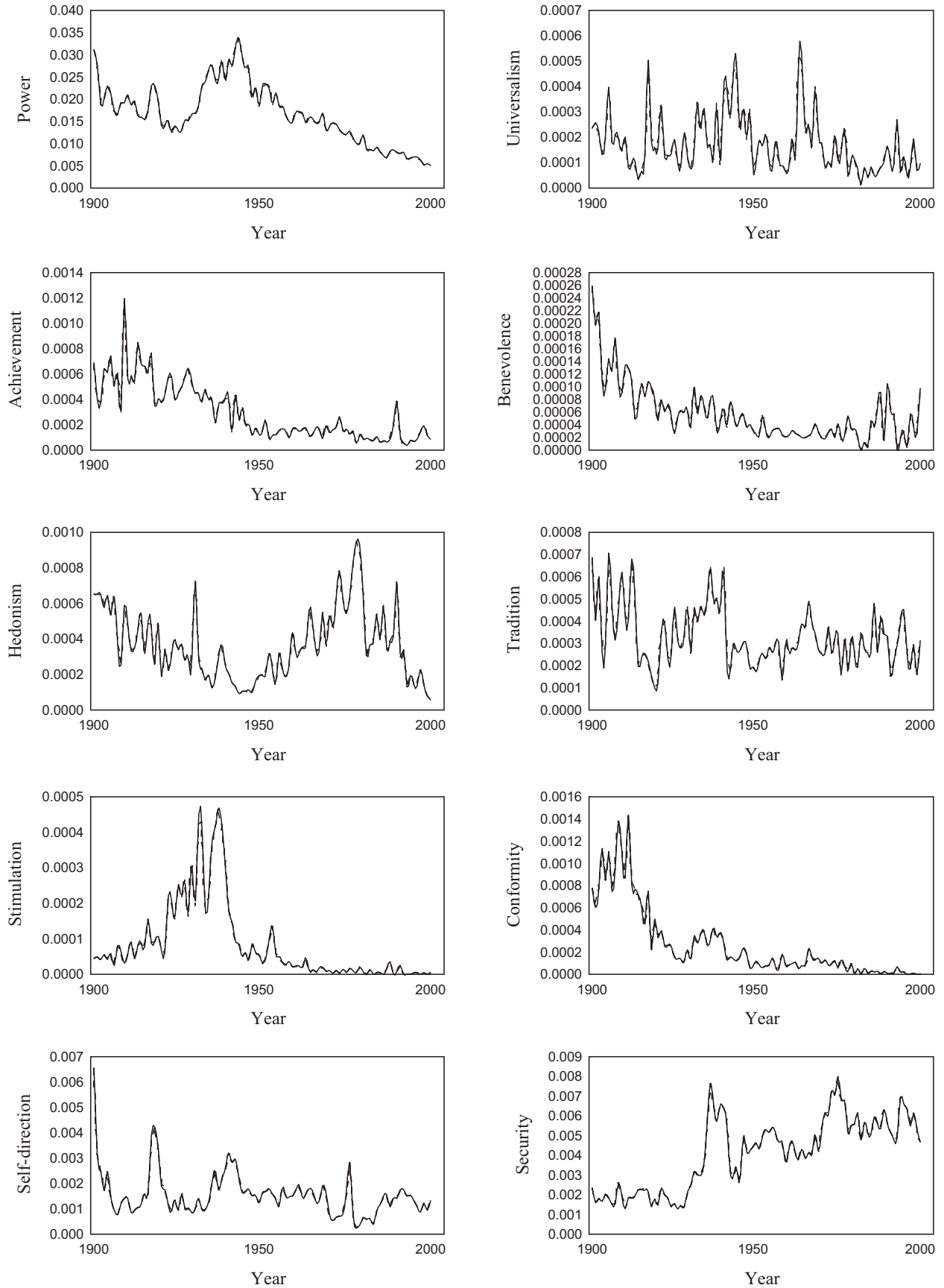
Figure 1. Variations in the prevalence of values in the United States between 1900 and 2000.

changes. Thus, the value lexicon may be used to examine trends and changes in values over time.

Discussion

The present research aimed to develop a tool that would enable measurement of patterns of individual-level values without reliance on self-report questionnaire responses, thereby facilitating the measurement of values over time and in real-world settings. A value lexicon was developed on the basis of Schwartz's (1992) value theory and recent advances in the study of associative meaning in natural language use (e.g., Heylighen, 2001) to measure patterns of individual values without reliance on self-report methods. The validity of this lexicon was established in various ways. First, words that represented the same value had higher lexical co-occurrence in natural language documents on the Internet compared with words that represented different values. Second, the general pattern of correlations among values in American newspapers demonstrated the same general pattern of correlations as values measured by American students' self-reports. Finally, the prevalence of values in American newspapers predicted objective indicators of value-expressive behaviors, thus demonstrating the remarkable generalizability of these results to real-world social phenomena. In addition, values in American newspaper pages showed meaningful fluctuations across time and events during this 101-year period. Overall, the significant convergence of results from two distinctly different methodological approaches offers remarkable support for the validity of the value lexicon and for the indicators utilized to examine these value–behavior relations (Campbell & Fiske, 1959; Sales, 1973; Webb et al., 1981). Together, the findings presented in this article provide validity for using the value lexicon to identify and study values and value–behavior relations across social and historical contexts where self-report questionnaire data are not available or desirable.

The importance of demonstrating these value–behavior relations with this new archival approach should be highlighted. In the current approach, individual values were not reported on directly, but were indicated by their lexical co-occurrence in natural language use. Despite the multitude of external influences that can affect the expression of values in natural language use, the observation of higher co-occurrence of the lexical indicators for the same, as compared with different, values across the billions of documents available on the Internet attests to the remarkable ecological validity of the value lexicon. The value lexicon offers a valid, reliable, and versatile tool to analyze accessible and relevant natural language use documents of individuals in groups and organizations to address questions about the presence and importance of values.

Second, the indicators of value-expressive behaviors represent the actual performance on the part of real people in real time, which is likely to be affected by external influences. It is quite remarkable, then, that we observed significant relations among the values represented by the value lexicon and the objective indicators of actual behavior despite the multitude of external influences affecting the expression of such behaviors.

It is important to note some exceptions to the generally consistent patterns of relations found. The lexical indicators for Achievement and Tradition co-occurred similarly with the lexical indicators of other values. Additionally, the lexical indicators for Power and Tradition exhibited similar associations with corresponding and noncorresponding value-expressive behaviors. These exceptions may be explained by considering the circumplex structure of the relations among the values (Schwartz, 1992), which indicates that each of the 10 values is positively related to at least two other values (the adjacent values in the circle). Thus, it is reasonable to expect some overlap among the lexical co-occurrence of the values and among the value–behavior relations. Yet, despite these inherent relations among the values, most of the values did demonstrate higher mean JPs among words representing the same versus different values and higher correlations with their corresponding value-expressive behaviors. Thus, these two exceptions in each examination seem to be offset by the remarkably consistent and sizable correlations among indicators of the values and value-expressive behaviors.

The value of Tradition warrants more attention, as it was least discriminant from the other values in the value lexicon, and it was not significantly related to its behavioral indicator. It is possible that the lexical indicators of Tradition and/or the objective indicator of its value-expressive behavior were imperfect representations of this value. Its low discriminant validity in the lexicon could stem from high co-occurrence of some of its words with words that reflect other values. For example, in natural language use, the word *respect*, which represents Tradition values when it is paired with *tradition* and *custom,* could be frequently paired with words that reflect other values such as *control* (Power), *consideration* (Conformity), or *kindness* (Benevolence). In addition, Tradition demonstrated the weakest association with its value-expressive behavior, a finding that is inconsistent with the findings reported by Bardi and Schwartz (2003) based on self-reports of values. In their research, Tradition and Stimulation were the values most closely associated with their corresponding value-expressive behaviors. Stimulation demonstrated the strongest association with its value-expressive behavior in the present research, whereas the findings for Tradition seem more problematic. One explanation is that the behavioral indicator (i.e., number of churches per capita) is a weak expression of Tradition values. Number of churches per capita may be heavily influenced by the number of different religions in an area and not the prevalence of Tradition values per se. However, an indicator that specifies regions and the number of religions in each region was not available. Future research should attempt to find alternative lexical indicators of Tradition and alternative behavioral indicators of Tradition.

Limitations

Although strong evidence has been provided for the use of the value lexicon to study values, it is important to acknowledge some potential criticisms. First, it could be argued that the Internet does not represent the natural language use in a society. It is reasonable to expect that the population that comprises the lowest levels of socioeconomic status may not use the Internet. This weakness, however, is even greater in questionnaire-based studies that typically rely on educated samples. Whereas we do not know exactly which individuals were represented in the Internet searches for value words, we can be fairly confident that the sheer number of Web pages searched provided a relatively heterogeneous sample of natural language use in men and women across all parts of the United States, occupation, age, education level, ethnicity, and political ideology (Peterson & Seligman, 2003). Importantly, when compared with a recent review of Web-based psychological re-

search (Skitka & Sargis, 2006), the present research clearly extends beyond previous uses of the Internet as a psychological laboratory and "prompts one to think outside of the traditional box" (p. 543) with regard to methodology and measurement.

Second, values are typically measured by asking directly "what is important to you in your life?" The present approach assumes that the prevalence of value words in newspapers reflects high importance of the corresponding values among many individuals. It is plausible that the prevalence of value words does not reflect the importance of these values. However, there is evidence that newspaper texts do reflect people's opinions and concerns (e.g., Adelman & Verbrugge, 2000; Hill, 1981). Furthermore, other research has consistently demonstrated that recurrent or frequent themes in people's speech indicate the importance of these themes to people (see review in Pennebaker et al., 2003). Moreover, in the present research, the associations between the values in newspapers and their corresponding value-expressive behaviors offer some evidence for the importance of these values to many individuals in the relevant society. It would be desirable, however, for future research to test the relations between values and behaviors with an individual difference design in using the value lexicon and objective behavioral indicators.

Whereas the best representations of the 10 values with sufficient frequency in American English over the 20th century were selected, they may not be the ideal representations of the values. It would have been preferable to use the same words that appear in the conceptual definitions of the values, and in the specific values that measure them, as provided by Schwartz (1992). However, Schwartz (1994) noted that "specific items were sampled from among values thought to express the motivational goal that defines that value" (p. 25); thus, the specific values are a sample from a range of possible values and are not necessarily the only words possible to represent each broad value. Indeed, Schwartz (2005) found the same structure of values when he systematically eliminated subsets of specific values from the analysis.

Similarly, the indicators selected for the value-expressive behaviors may not be the ideal representations of the behavioral expressions of the values. Effort was made to find a behavioral indicator that best expresses one value. Still, finding an indicator for each of the values, which would also fulfill our criteria as outlined above, was challenging, and the behavioral indicators remain imperfect. Indeed, any one indicator of behavior for these broad values would not serve as a complete expression of the value and could be subjected to alternative interpretations. Further research is needed to examine and refine the lexical and behavioral indicators used by this new archival approach to study value–behavior relations.

Third, to establish initial validity of the value lexicon, we restricted the lexicon to value words represented in American English, and therefore the lexicon may not be generalizable to other English-speaking countries, where word frequencies and/or lexical co-occurrence may be different. Similarly, at this stage of research, the value–behavior patterns should not be generalized outside the United States. However, the principles of this new approach can be used to develop a lexicon of value words for other languages and cultures. Considering the cross-cultural stability of Schwartz's (1992) value theory, it should be possible to test value–behavior relations by identifying lexical indicators of the 10 values within different cultures.

Applied Implications of the Current Findings

Importantly, the relations between the indicators of values and indicators of value-expressive behaviors were demonstrated over a 101-year period. The value–behavior relations observed here suggest that values that are important to people (as conveyed in popular newspapers) are associated with people's actual behaviors that express those values. When such behaviors are performed en masse, they are likely to have a cumulative effect on society. For example, the prevalence of Achievement values corresponded with increases in the number of inventions patented, with a likely cumulative effect on a society's economic growth. If applied to organizational settings, the prevalence of Achievement values may correspond with increased employee productivity, with a likely cumulative effect on an organization's economic growth.

The prevalence of Hedonism values corresponded with increases in alcohol consumption. The potential cumulative effect of such mass behavior is an increase in health problems in society, which is likely to also affect a society's economy. If applied to organizational settings, more alcohol consumption could reduce the quality and quantity of work. More broadly, a greater emphasis on Hedonism may lead to greater motivation of workers to enjoy life sometimes at the expense of hard work (see also Bardi & Schwartz, 2003), leading to decreased success of companies. However, companies may respond to such increases in the importance of Hedonism by establishing rewards that directly enable the pursuit of Hedonism values, such as vacations or parties organized by the companies.

Decreases in the importance of Conformity values corresponded with increases in the number of births to unwed mothers. Such behavior performed by masses of people is likely to have a cumulative effect on the maintenance of societal norms and the acceptance of unconventional social practices. If applied to organizational settings, the prevalence of Conformity values may correspond with decreased conflict among employees and managers but also decreased originality in thought and action, with a likely cumulative effect on an organization's cohesiveness and creativity.

Potential Applications of the Value Lexicon

There are numerous possibilities for the use of the value lexicon to assess the prevalence and communication of values across a variety of contexts, which would not be feasible with traditional self-report methodology. Using the value lexicon, values could be identified in speeches of political and organizational leaders, formal texts of organizations (e.g., mission statements, letters to investors), e-mail communications of employees, minutes of meetings, or, more broadly, media-based messages directed toward consumers, voters, and clients. For example, if a given sample of lexical output (e.g., an e-mail message, a transcript of speech by a chief executive officer [CEO], a newspaper report) rendered a high prevalence of the co-occurrence of the words *achievement*, *ambition*, and *success*, this would be evidence of some activation of the value construct of Achievement in that text (e.g., the e-mail communication could be describing an employee who has been promoted; the CEO's speech could be describing what employees are urged to strive for; the newspaper report could be describing different political candidates). Thus, the value lexicon could be used to measure values in textual sources for the purpose of examining individual differences in values, aggregates of individ-

uals' values, or values of leaders. This is similar to McClelland's (1961) use of measuring achievement motivation of individuals or aggregated across individuals in societies, as well as the use of levels of the Big Five traits in individuals or aggregated across individuals in nations (e.g., Schmitt, Allik, McCrae, & Benet-Martínez, 2007).

In turn, these values could then be related to the performance of political and organizational leaders, the performance of groups and organizations, or the responses of consumers, voters, and clients to value-laden messages. For example, the value lexicon could be used to test the relationship between the values communicated by organizational leaders and subordinates' responses to these leaders and to the organization overall. Did messages that convey Achievement values increase worker productivity? The value lexicon could be used to test the relationship between the values communicated by political leaders in their election speeches and voters' responses to these speeches. Did messages that convey certain values increase the likelihood of being elected? Are successful leaders sensitive to changes in the values that are currently salient in society, and do they adopt value messages that are likely to reflect currently popular values? Importantly, changes in the values of individuals in groups, organizations, or societies could be examined over time to assess emergent and historical patterns of values across contexts. In addition, the principles of the value lexicon could be used to develop archival measures of other constructs relevant to applied settings, such as cultural tightness–looseness (Gelfand, Nishii, & Raver, 2006) and resistance to change (Oreg, 2003).

Taken together, the indicators of value–behavior relations examined over this extended historical time frame provide remarkable evidence for trends in society that cannot be easily studied with more traditional methodological approaches. The value lexicon developed and validated in the current study has manifold applications for organizations, operating across multiple levels (e.g., employee productivity, leadership effectiveness, organizational success). The ecological validity of these kinds of data clearly preclude controlled laboratory investigations of these phenomena and make archival analyses particularly well suited to studying value–behavior patterns across time and place (e.g., McGuire, 1976).

Conclusions

New approaches to the study of psychological constructs could inform knowledge about variations in these constructs across social contexts that cannot be studied directly (e.g., McGuire, 1976; Peterson & Seligman, 2003). The present research provides a new approach that extends the measurement of values to longer historical time frames, to the general population, and to real-world behaviors, thereby demonstrating some of the opportunities provided by this new archival approach. The potential applications of the value lexicon are broad in scope, particularly in applied settings where measuring patterns of individual values and behavior with self-reports might be relatively prone to biases or simply impossible. We hope that this new approach will stimulate many new avenues of research that were not possible to explore previously.

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