ABSTRACT

Extreme response style (ERS) refers to the tendency to overuse the endpoints of Likert-type scales. This study examined the extent to which ERS is accounted for by measures of personality, specifically, intolerance of ambiguity, simplistic thinking, and decisiveness. One hundred and sixteen pairs of undergraduate students and one of their respective peers completed a battery of questionnaires assessing these personality measures, alongside three measures of extreme responding. Results indicate that peer ratings of intolerance of ambiguity and simplistic thinking interact with the primary participant’s time spent on the survey to predict the primary participant’s extreme responding. Thus, those who quickly complete surveys and are intolerant of ambiguity or are simplistic thinkers are most likely to exhibit ERS. These results have implications not only for surveys using rating scales, but also illustrate how epistemic personality factors more generally influence the processing of new information.

Extreme response style (ERS) refers to the tendency to disproportionately favor the endpoints or extreme categories of ordinal response or Likert-type scales, irrespective of particular item content. ERS can be described as the opposite of central tendency and differs from other response styles such as acquiescence (yea-saying) and social desirability in that most research has found this style remains relatively consistent across differing construct measures over time (Greenleaf, 1992b; Hamilton, 1968; Jain & Agrawal, 1977; Merrens, 1970). Extreme responders represent between 25% and 30% of all respondents in most surveys (Austin, Deary, & Egan, 2006; Eid &
Rauber, 2000). Failing to account for differences in ERS results in confounded or spurious correlations, highlighting the practical importance of studying extreme responding in personality and survey research (Greenleaf, 1992a; Johnson, 2003).

As most research has shown that ERS occurs consistently over time, it seems likely that there are certain stable personality traits that are characteristic of extreme responders. In short, ERS might be considered a behavioral manifestation of stable personality traits that differ among individuals. As such, it is beneficial to determine the dispositional and contextual antecedents of ERS in order to better predict who is most likely to employ this confounding pattern and when it is most likely to be used. Given that most of the research indicates that ERS is stable, researchers have attempted to identify dispositional antecedents of ERS by exploring the relations between ERS and various individual difference variables (e.g., Austin et al., 2006; Lewis & Taylor, 1955).

Individual Differences and Extreme Response Style

ERS has been related to various demographic, cultural, and personality variables, but very few studies have offered any sort of theoretical explanation for why ERS might occur. Some studies have shown that ERS can differ by sex (Berg & Collier, 1953; Borgatta & Glass, 1961; Crandall, 1973; Eid & Rauber, 2000) with women engaging in ERS more than men, although several studies have failed to find any sex differences (Brengelmann, 1960b; Greenleaf, 1992b; Light, Zax, & Gardiner, 1965). Additional studies, but not all (e.g., Greenleaf, 1992b), have found differences in ethnicity (Bachman & O’Malley, 1984; Gerardo, Gamba, & Marin, 1992).

Some individual differences research also suggests a potential cognitive ability component to ERS (i.e., lower cognitive ability individuals engage in more ERS); however, studies investigating relationships between ERS and cognitive ability have produced mixed conclusions, with some research finding negative relations (Brengelmann, 1960a; Das & Dutta, 1969; Light et al., 1965; Wilkinson, 1970), and others finding none (Kerrick, 1954; Zuckerman & Norton, 1961). In terms of personality, ERS has been found to be related to anxiety (Lewis & Taylor, 1955), extraversion, and agreeableness (Austin et al., 2006), although no theoretical reasons were provided for these relations.
To summarize, most research relating ERS to individual difference variables seems to be mixed and inconclusive, a result that may be attributed to Greenleaf's (1992b) contention that past research is plagued by inconsistencies in the measurement of ERS. In addition, previous studies examining personality predictors may have been equivocal due to the lack of a theoretical basis for their predictions. Indeed, in a review of the past literature, Hamilton (1968) found that ERS did not exhibit any consistent patterns to standard global personality inventories (e.g., 16-PF). We suggest that such broad-stroke approaches to understanding the personality basis of ERS may not meet with success. Instead, understanding the nature of extreme responses and motivations people have for making them should narrow the field of potential predictors. Specifically, we believe that the most promising dispositional predictors of ERS belong to a cluster of so-called epistemic variables (Kruglanski, 1989). These personality constructs detail the manner in which people process and respond to information. Of the several traits discussed in lay epistemic theory, perhaps the most notable in its implications for ERS is the construct of intolerance of ambiguity.

Intolerance of Ambiguity and Extreme Response Style

Intolerance of ambiguity was formally defined by Budner (1962) as “the tendency to perceive ambiguous situations as sources of threat” (p. 29). Budner (1962) also defined an ambiguous situation as “one which cannot be adequately structured or categorized by the individual because of the lack of sufficient cues” (p. 30). Intolerance of ambiguity represents a compelling potential predictor of extreme responding, because individuals with a high intolerance of ambiguity should avoid making equivocal responses and instead gravitate toward definite unambiguous choices. As such, high intolerance for ambiguity could explain why a respondent would avoid using potentially ambiguous middle categories on a rating scale and instead make disproportionate use of the definite unambiguous endpoints of a rating scale. Given the research indicating that ERS seems to be a stable trait, varying between individuals, it seems likely that a stable personality construct such as intolerance of ambiguity may act as an explanatory individual difference variable for extreme responding.

Although intolerance of ambiguity has been suggested as a correlate of ERS (Soueif, 1958), there are no studies that have directly
related ERS and intolerance of ambiguity using measures uncontaminated by other related constructs. For example, Brengelmann (1960a) used only positive extreme responses as a measure of ERS, and Brim and Hoff (1957) used a measure of need for certainty as a proxy of intolerance of ambiguity. As such, the measure of intolerance of ambiguity used in this study will be designed to tap only intolerance of ambiguity and not similar constructs such as social dominance, rigidity, or need for certainty.

**Simplistic Thinking and Extreme Response Style**

Another epistemic construct that could potentially be related to ERS is the tendency to think simplistically or in dichotomized terms. Although intolerance of ambiguity reflects a preference for simplicity and discomfort with complexity, the construct of simplistic thinking refers to a tendency to view the world in simplified or dichotomized terms. Prior research has demonstrated that separating out the tendency and preference components of epistemic variables is a useful distinction and may carry some independent predictive validity (e.g., Roets & Van Hiel, 2007). The described tendency for simplistic thinking is reflected in such items as “I tend to see most issues in black and white terms” and “Most questions can be answered with a simple yes or no.” Responses to items such as these theoretically should be related to ERS, given that ERS can essentially be defined as the dichotimization of a Likert scale into a simple yes/no response. In this sense, a tendency to think in simple or reductive terms would drive a respondent to employ primarily the endpoints of a scale as a way of simplifying potential responses. As such, a dispositional tendency for simplistic thinking is also expected to predict extreme responding.

**Decisiveness and Extreme Response Style**

A third personality predictor that may provide a theoretical mechanism underlying ERS is the construct of decisiveness. Decisiveness has been globally defined as encompassing the ease, speed, and confidence of making firm decisions (Kruglanski, 1989; Thompson, Naccarato, & Parker, 1989). A dispositional tendency to quickly seize on a solid answer that provides the strongest possible decision might lead respondents to commit to a definite extreme response,
whereas indecisiveness may lead to respondents avoiding extreme categories that represent strong decisive opinions. This hypothesized relation has some precedence in cross-cultural research relating masculinity and ERS. Johnson et al. (2005) posited that features of masculine cultures that emphasize assertiveness and decisiveness might lead respondents to choose the strongest available categories to express their opinions, and the researchers subsequently found a significant relation between masculinity and extreme responding. Therefore, we also expected decisiveness to predict individual differences in ERS.

Each of these three personality constructs, intolerance of ambiguity, simplistic thinking, and decisiveness therefore should be positively related to extreme responding. Although these three measures belong to the overarching category of epistemic constructs, they do so for varying theoretical reasons. As such, we expected all three to account for unique variance in ERS.

**Contextual Effects on Extreme Response Style**

Although we assert that ERS is a behavior linked primarily to stable personality traits, it is unlikely that people are completely uniform in their tendency to engage in ERS. Much like any trait, people will undoubtedly vary in their expression of the trait from situation to situation (Mischel & Shoda, 1995). Therefore, we examined two potential contextual effects on ERS. Hui and Triandis (1985) proposed that ERS was more likely to occur at the end of a questionnaire due to fatigue or boredom with the measure, highlighting one potential contextual effect. We accounted for this possibility by varying the location of certain measures of ERS throughout the questionnaire battery. Examining extreme responses as a function of the order in which the scales are presented provides a check for the fatigue hypothesis: If extreme responses to the same content are more likely at the end of a questionnaire, then fatigue is a likely explanation. If there are no differences, however, then some evidence is provided for the stability of ERS.

Another potential contextual influence on ERS involves the conservation of cognitive resources when completing surveys. Specifically, people who spend less time on a survey might be more likely to

1. Interestingly this finding runs counter to past research suggesting women are more likely to make extreme responses than men.
make extreme responses, simply because extreme responses are the simplest and least time-consuming choice to make when differentiating among Likert scale categories, given that an extreme response is essentially the equivalent of Yes or No, or Agree or Disagree. In this sense, time taken to complete a survey, which has also been found to be related to trait impulsivity (Molto, Segarra, & Avila, 1993), may be related to extreme responding.

It is also possible, however, that people could rush through a survey because they are actually confident in their answers and find the survey easy to complete, or the content of the survey may represent important or highly accessible information (e.g., Fazio, 1990). As such, time spent on the survey may not predict ERS in and of itself, but respondents who speed through the survey and are high in intolerance of ambiguity, simplistic thinking, or decisiveness might be particularly likely to use an ERS. That is, quickly speeding through the survey may amplify the expected positive relations between intolerance of ambiguity, simplistic thinking, and decisiveness with ERS. By demonstrating this pattern for each of the three personality measures, we will obtain more precise validation of the underlying dispositional nature of ERS.

Methodological Issues in Assessing Extreme Response Style

Given the proposed relations between personality measures and extreme responding, it is important to ensure that the method of personality assessment used is both appropriate and valid. Because the previously specified measures intolerance of ambiguity, decisiveness, and simplistic thinking all are traditionally assessed with self-report Likert scales, these measures may be confounded by the extreme responses of those completing the items. Using self-reports to predict ERS that are contaminated by the respondent’s own ERS will lead only to equivocal findings.

A possible method for addressing this problem is to use peer ratings of personality variables in lieu of self-report predictors. By asking close friends of the respondents to assess the respondent’s level of intolerance of ambiguity, simplistic thinking, and decisiveness, the potential confounds of the respondent’s own extreme responses can be avoided. Research has indicated that peer ratings of personality constructs are both highly accurate and reliable alternatives for self-reports, with peer ratings even occasionally serving as better behav-
ioral predictors than self-report measures (Barbaranelli & Caprara, 2000; Barrick, Patton, & Haugland, 2000; Biesanz & West, 2000). Using peer reports of personality will produce responses to personality predictors of ERS that are unconfounded by the original ERS of the respondent. Using peer reports also will eliminate the common method bias associated with solely using self-report measures (Podsakoff, MacKenzie, Lee, & Podsakoff, 2003).

A second issue involves developing an accurate measure of ERS. In this sense, the proposed study advances the past literature, which has measured ERS in strikingly different ways. Researchers have measured extreme responses by counting only positive extreme responses (Brengelmann, 1960a), by collapsing categories in longer Likert scales (Borgatta & Glass, 1961), by subtracting midpoint use from endpoint use (see Hamilton, 1968), or even using standard deviation as a measure of extreme responding (see Hamilton, 1968). Given our proposition that ERS is a reflection of stable individual differences, it makes sense that a measure of extreme responding should reflect this quality. This study will assess ERS in several different ways, each of which should contribute to assessing the underlying core of response extremity.

In sum, it is proposed that ERS is a primarily stable dispositional variable that is reflective of certain personality traits that differ among individuals, namely intolerance of ambiguity, decisiveness, and simplistic thinking. It is also proposed that these personality variables will interact with time spent on survey to predict ERS, such that those who complete the survey quickly and are high in these traits will be the most likely to use ERS. This study will also attempt to determine the best way of measuring ERS in light of its relationship with these personality predictors. The current study thus marks an improvement over past studies through the development of better measures of the ERS construct and through its use of peer reports to remove the confounding bias of the respondents’ own extreme responding on the personality questionnaire predictors.

**METHOD**

**Participants**

The study sample consisted of 132 undergraduates at a large southern university (primary participants), matched with 132 close friends (peer
participants). The undergraduates were taken from a larger sample of 522 individuals (i.e., paired data including both self-reports and peer reports existed only for 132 of the original 522). The sample was 61% female, with ages ranging from 17 to 22 ($M = 19.1, SD = 1.0$). Regarding ethnicity, the sample contained 109 White participants, 2 African American participants, 13 Hispanic participants, 3 Asian participants, 2 participants who marked “other,” and 3 participants who did not indicate any ethnicity. The characteristics of this smaller sample were largely reflective of the characteristics of the full sample.

For the purposes of hypothesis testing, 16 participants who failed to follow directions or respond to a majority of items were also removed from further analyses, leaving a final sample of 116 participants.\(^2\) Further analyses involving time data also resulted in the removal of outliers (approximately 7% of time data).

**Procedure**

Primary participants completed a battery of self-report questionnaire measures in an online survey over approximately a 1-hour period, in exchange for course credit. Participants were also encouraged to recruit peer respondents who knew them well enough to rate them on all of the same questionnaire measures (see below for more details). To provide an incentive for the peer respondents, two $50 prizes were offered to two randomly selected peer respondents. Although the validity of the peers’ school e-mail addresses was verified, no further eligibility criteria were established to determine the closeness of peer acquaintance.

**Materials for Primary Survey Participants**

For the primary survey participants, the questionnaire battery consisted of three sections containing a series of separate measures presented in three different orders for the purposes of varying the content location. Respondents in the sample were randomly assigned to one of these three versions, with relatively equal proportions of respondents for each version of the questionnaire.

**Demographics**

Participants self-reported sex, ethnicity (converted to minority status), and SAT score (which served as a proxy for cognitive ability). These de-

\(^2\) These individuals were identified by examining responses to positively and negatively keyed items to determine whether participants were responding randomly.
mographic data were collected in order to control for any demographic effects suggested by the past ERS literature.

**Extreme Response Style**

Three measures of ERS were collected toward the goal of converging on the ERS construct. The first measure of ERS was a simple score consisting of the proportion of extreme response category (i.e., end points: 1 and 6) use across 200 items in the questionnaire battery (excluding items used in other measures of ERS and personality, as described below). Using such a summative measure across all items in a battery is the most common method of measuring ERS in the literature (Hamilton, 1968). Because each item in the battery represents an opportunity for an extreme responder to make an extreme response, using all the items in the scale, coded for response extremity, can provide a very large and reliable scale to measure ERS behavior.

The second measure of ERS used was the so-called contentless measure designed by Greenleaf (1992b) for the explicit purpose of measuring ERS. Greenleaf’s measure accounts for a potential flaw of the first ERS measure by removing content as an influence on extreme responding, given that the first ERS measure might be tainted by multiple “pockets” of items that are highly correlated. The Greenleaf scale incorporates 16 items from an extensive survey administered to a large U.S. sample in 1975 and 1987. Items were selected from these surveys based on their low inter-item correlations and equivalent response category proportions, meaning that these items are essentially free of content influences and can be considered representative of a respondent’s scale use on any six-category Likert scale. The proportion of extreme response scores on these 16 items was also previously shown to be stable over a 12-year period, supporting that ERS is reflective of stable traits (Greenleaf, 1992b).

The third measure of ERS accounts for a potential flaw in Greenleaf’s (1992b) measure based on the fact that the items comprising this measure were individually selected post hoc from various sections of a lengthy questionnaire. Because presenting the 16 items of the Greenleaf scale in only one location might result in differing inter-item correlations when compared to Greenleaf’s original survey data, a third measure of extreme responding was constructed using Greenleaf’s technique on the remaining 273 items of this data set. By selecting 16 items from the current questionnaire battery that are shown to have low inter-item correlations and similar response proportions, any potential problems with presenting the Greenleaf items in one particular location of the questionnaire battery can be avoided.
Each of these methods of measuring ERS presumably captures response extremity in conceptually distinct ways. Whether these differing conceptual approaches to measuring ERS result in significantly different measures of ERS is an empirical question, but it is expected that these three measures of ERS will converge on some general tendency for extreme responding.

**Time**

The online survey service provided a measure of time taken to complete the survey. This measure of time was calculated from data indicating the exact time each primary respondent both started and finished the online survey. As is the case with most time data, a set of outliers completed the survey over a much longer period of time, and consistent with other time-based studies (e.g., Ratcliff, 1993) times greater than three standard deviations from the mean were dropped for the purposes of this analysis, resulting in the elimination of times for 7% of responders. It is likely that this small group of participants reflects respondents who interrupted their survey-taking session and returned at a later time.

**Personality Measures**

Although the primary participants did complete self-ratings on Intolerance of Ambiguity, Simplistic Thinking, and Decisiveness, these scales were collected primarily to provide some assessment of the convergent validity of peer ratings on these traits. Because we analyzed the personality data using peer reports and not self-reports, we report details of these measures below in the Material for Peer Respondents section.

**Materials for Peer Respondents**

Each primary participant was asked to recruit a close friend to complete a similar questionnaire. The questionnaire content for these peer ratings consisted of the same measures of personality (i.e., Intolerance of Ambiguity, Simplistic Thinking, and Decisiveness) described above. Peer participants, however, were instructed to complete the questionnaire as if they were the primary participant. Thus, peer ratings of each personality characteristic were obtained for each primary participant. In the analyses reported below, we use the peer’s ratings of the primary participant’s

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3. As discussed earlier, other measures of ERS exist. We decided against using most of these as they contained obvious flaws. For example, measures of ERS that count only positive responses confound trait level with response extremity.
personality to predict the participant's manifestation of ERS (i.e., derived from the primary participant questionnaire).

**Intolerance of Ambiguity**

A 25-item self-report questionnaire of intolerance of ambiguity was developed that incorporated items from previous scales purporting to measure intolerance of ambiguity (Budner, 1962; Norton, 1975; Rydell & Rosen, 1966; Webster & Kruglanski, 1994) as well as newly written items. All items were written such that higher scores indicate greater intolerance of ambiguity (see Appendix). In addition, a previously used measure of intolerance of ambiguity, the eight-item discomfort with ambiguity facet of the Need for Closure Scale (Webster & Kruglanski, 1994), was used for validation purposes. This measure was not used to test any hypotheses, however, because some item content overlapped with need for certainty. In addition to this issue, previous researchers have noted other construct contamination issues with this measure (see Neuberg, Judice, & West, 1997).

**Simplistic Thinking**

A new eight-item measure was developed for the purposes of capturing the tendency to think in simple or dichotomized terms as opposed to the preference for unambiguous or simple information (as assessed by the previously described Intolerance of Ambiguity measure) and items were written such that higher scores indicated greater tendency for simplicity (see Appendix). The scale employed new items as well as items from previous measures of intolerance of ambiguity (Budner, 1962; Rydell & Rosen, 1966) and dogmatism (Rokeach, 1960).

**Decisiveness**

A new eight-item measure of decisiveness was developed with the intention of focusing solely on the tendency to quickly “seize” on an answer, as opposed to including confidence or fear of making errors, given that there is no theoretical reason to believe that these particular qualities might be related to ERS. The newly developed eight-item measure incorporates some items from the Personal Fear of Invalidity scale (Thompson et al., 1989) and the Need For Closure Scale (NFCS) decisiveness facet (Webster & Kruglanski, 1994), which were both also used for validation purposes but not hypothesis testing (given that these scales also measure confidence and fear of making errors). The Decisiveness scale was written
such that higher scores indicate a greater tendency to seize on an answer (see Appendix).

RESULTS

See Table 1 for means, standard deviations, and correlations between all predictors and measures of extreme response style. Reliabilities of all relevant measures are also reported on the diagonal of the matrix.

Scale Refinement

For each of the newly developed scales, exploratory factor and reliability analyses were conducted to eliminate poor items and assess convergent validity.

Intolerance of Ambiguity

After removing 7 items, the resulting 25-item measure of ambiguity intolerance achieved a reliability of .93 and exhibited a strong single-factor solution in an exploratory factor analysis. This Intolerance of Ambiguity measure was correlated .62 with the discomfort with ambiguity facet of the Need for Closure Scale (Webster & Kruglanski, 1994), indicating satisfactory construct validation with previous measures. Values on this scale ranged from 2.30 to 6.00 ($M = 4.05$, $SD = 0.67$), and the correlation between self-reports and peer reports of this measure was significant ($r = .52$).

Simplistic Thinking

After removing seven items (most of which belonged to a separate factor that was deemed less relevant), the resulting eight-item scale was confirmed to be unidimensional and achieved a reliability of .87. Values on this scale ranged from 1.25 to 6.00 ($M = 3.52$, $SD = 0.96$), and the correlation between self-reports and peer reports of this measure was also significant ($r = .46$).

Decisiveness

After removing two poor items, the resulting eight-item scale was confirmed to be unidimensional and achieved a reliability of .80.
Table 1
Means, Standard Deviations, and Correlations Between Predictors of Extreme Response Style (N = 116)

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<td>3. SAT Score</td>
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<td>4. Time</td>
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<td>5. PR Ambiguity</td>
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<td>6. PR Simplistic</td>
<td>3.52</td>
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<td>7. PR Decisiveness</td>
<td>3.59</td>
<td>0.73</td>
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<td>8. ERS Overall</td>
<td>0.20</td>
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<td>9. ERS Greenleaf</td>
<td>0.26</td>
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<td>10. ERS Alternate Greenleaf</td>
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<td>11. ERS Unit-weighted</td>
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<td>12. SR Ambiguity</td>
<td>3.90</td>
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<td>13. SR Simplistic</td>
<td>3.22</td>
<td>0.86</td>
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<td>14. SR Decisiveness</td>
<td>3.36</td>
<td>0.78</td>
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Note. Sex: 0 = male, 1 = female; Minority status: 0 = White, 1 = non-White; Ambiguity = Intolerance of Ambiguity; Simplistic = Simplistic Thinking; PR = Peer Report; SR = Self-report; Coefficient alphas on the diagonal.

*p < .05.
Evidence of convergent validity was exhibited by strong correlations with the decisiveness facet of the NFCS ($r = .64$) and the Personal Fear of Invalidity scale (Thompson et al., 1989; $r = -.62$), which measures indecisiveness. Values on this scale ranged from 1.56 to 6.00 ($M = 3.59, SD = 0.73$), and the correlation between self-reports and peer reports of this measure was also significant ($r = .55$).

**Extreme Response Style**

As discussed above, we obtained the first measure of ERS by calculating the proportion of endpoint use across the 200 items in the questionnaire battery. Before recoding the items into endpoint use scores, the average inter-item correlation for the 200 items was .036, indicating a large amount of content variance. After recoding the items for endpoint use (i.e., 1 for any endpoint category use, 0 for anything else), the internal consistency was exceedingly high ($\alpha = .97$), indicating a substantial amount of systematic variance in endpoint use.

The second measure of ERS, the Greenleaf scale, had an average inter-item correlation of .077 prior to recoding into the use of endpoint format, but some inter-item correlations ranged as high as .39, indicating some lack of content variance for a measure specifically designed to have very low inter-item correlations. The reliability of the Greenleaf scale after coding for extreme responses was .71, again indicating a high degree of systematic variance due to endpoint use.

To compute the third measure of ERS, the alternate version of the Greenleaf scale, 16 items were selected from across the entire questionnaire battery (excluding the 16 original Greenleaf items and items from the three personality predictor measures). These items were deliberately chosen based on their low (<.1) correlations with one another and similar response proportions across categories (to avoid highly skewed items). The average inter-item correlation of the Alternate Greenleaf scale was .004 before recoding into extreme responses, with a reliability of .67 after recoding, also indicating a large proportion of systematic variance due to endpoint use.

The ERS measures were all substantially correlated with each other, ranging from .45 to .70. Exploratory factor analyses indicated that the three measures of ERS all loaded highly onto a single factor (loadings > .80). As such, a single unit-weighted ERS score was calculated based on the mean of the ERS scores of the overall ques-
tionnaire battery, the Greenleaf scale, and the Alternate Greenleaf scale. This unit-weighted ERS score was used as the primary measure of ERS for subsequent hypotheses, with a scale reliability of .76. ERS scores ranged from 0 to .78, with a mean of .22, and a standard deviation of .13. This indicates that approximately 22% of responses were extreme.  

**Stability of ERS**

The stability of ERS across the survey battery was assessed by examining whether the order in which the questionnaire scales were presented affected the likelihood of extreme responding. Participants completed the survey battery in one of three different section orders, and ERS scales were formulated to appear either at the beginning, middle, or end of the questionnaire battery based on the particular version of the questionnaire battery given to the sample. Results indicated that ERS scores did not depend upon the location of the items within the survey ($\beta = .02, p > .05$).

**Regressions**

Initial support for our hypotheses can be seen in Table 1. Intolerance of ambiguity, simplistic thinking, and decisiveness were all positively and significantly related to ERS.

Given past research demonstrating relations between demographic variables and ERS and potential multicollinearity issues with our predictors, we examined the predictors separately controlling each time for sex, minority status, and self-reported SAT score. None of these demographic control variables were found to predict ERS (see Table 2).

Intolerance of ambiguity, controlling for sex, minority status, and self-reported SAT score, accounted for 15.5% of the variance in ERS. Simplistic thinking, controlling for the same demographic variables, accounted for 7.5% of the variance in ERS. Finally, decisiveness, controlling for demographic variables, accounted for 10.3% of the variance in ERS.

4. We say “approximately,” as this unit-weighted composite does not treat each item equally (i.e., there are only 16 items in each version of the Greenleaf scale, whereas the overall scale has 200). The actual overall proportion of endpoint use was 20%, with a $SD$ of 13%.
Intolerance of ambiguity, simplistic thinking, and decisiveness account for 24.1% of the variance in ERS simultaneously, when controlling for demographic variables ($\beta = .43$, $p < .05$, for ambiguity, $\beta = .32$, $p < .05$, for decisiveness, $\beta = -.10$, $p > .05$, for simplistic thinking). These results show that the effect of simplistic thinking on

![Table 2: Regressions and Interactions (N = 116)](image)

<table>
<thead>
<tr>
<th>Personality variable</th>
<th>$\beta$</th>
<th>$\Delta R^2$</th>
<th>$R^2$</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Intolerance of Ambiguity</strong></td>
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<tr>
<td>Step 1.</td>
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<tr>
<td>Gender</td>
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<tr>
<td>Minority status</td>
<td>-.03</td>
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<tr>
<td>SAT score</td>
<td>.13</td>
<td>.02</td>
<td>.02</td>
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<tr>
<td>Step 2.</td>
<td></td>
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<tr>
<td>Time</td>
<td>.04</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intolerance of Ambiguity</td>
<td>.39</td>
<td>.15*</td>
<td>.17</td>
</tr>
<tr>
<td>Step 3.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Time $\times$ Intolerance of Ambiguity</td>
<td>-.25</td>
<td>.05*</td>
<td>.22</td>
</tr>
<tr>
<td><strong>Simplistic Thinking</strong></td>
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<tr>
<td>Step 1.</td>
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<td>Gender</td>
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<td>Minority status</td>
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<td>SAT score</td>
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<tr>
<td>Step 2.</td>
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<tr>
<td>Time</td>
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<tr>
<td>Simplistic Thinking</td>
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<td>.07*</td>
<td>.09</td>
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<tr>
<td>Step 3.</td>
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<tr>
<td>Time $\times$ Simplistic Thinking</td>
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<td>.13*</td>
<td>.22</td>
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<tr>
<td><strong>Decisiveness</strong></td>
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<td>Step 1.</td>
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<td>Gender</td>
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<td>Minority status</td>
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<td>Step 2.</td>
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<td>Time</td>
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<td>Step 3.</td>
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<tr>
<td>Time $\times$ Decisiveness</td>
<td>-.14</td>
<td>.02</td>
<td>.12</td>
</tr>
</tbody>
</table>

*p < .05.
ERS is eliminated when the other personality variables are also included, a result that is unsurprising given the high correlation between simplistic thinking and intolerance of ambiguity ($r = .65$, $p < .05$).

**Interactions**

Moderated multiple regression was used to test interactions between the personality measures and time spent on the survey. In Step 1, the control variables sex, minority status, and SAT score were entered. In Step 2, main effects for time and personality were entered. Finally, interactions between time and personality were entered in Step 3. All main effects were centered prior to forming interaction terms. These results are displayed in Table 2.

Results showed significant interactions for both intolerance of ambiguity ($\beta = -.25$, $p < .05$; Figure 1) and for simplistic thinking ($\beta = -.54$, $p < .05$; Figure 2). There was no significant interaction for decisiveness ($\beta = -.14$, $p = .21$).

Figures 1 and 2 support two of the three interaction hypotheses by showing that likelihood of extreme responding increases when time spent on survey is low and scores on the intolerance of ambiguity and simplistic thinking measures are high and remains relatively stable when time spent on the survey is high. Both interactions demonstrate that those who are most likely to engage in extreme responding are those who rush through the survey and are also high in the specified personality measure.

![Interactive effect of time spent on survey on the relation between intolerance of ambiguity and ERS.](image)
The goal of this study was to understand the nature of relations between personality and extreme response style. All three hypothesized personality constructs were found to be positively related to ERS, and these overall effects were stronger for people who completed the survey more quickly. These effects also occurred over and above any demographic predictors of ERS.

In terms of demographic predictors of ERS, past studies had indicated mixed support for the possibility of sex and cognitive ability predicting ERS and some support for ethnicity predicting ERS. We found no differences between sexes on ERS. Cognitive ability was not significantly related to ERS; however, self-reported SAT scores may not have been a valid enough measure of cognitive ability. In addition, our college sample likely yielded some range restriction. The lack of findings for ethnicity as a predictor of ERS may reflect a true lack of ethnic differences in ERS, but considering the limited sample of non-White participants, this conclusion is only tentative.

Past studies also suggested a positive relationship between constructs similar to intolerance of ambiguity and ERS, and this study found that a measure with item content specifically devoted to intolerance of ambiguity (and not the host of other constructs conflated in past measures of intolerance of ambiguity) accounted for a significant amount of variance in extreme responding. This relationship held after accounting for other demographic and personality predictors of ERS. As such, these results indicate that a measure...
whose item content is designed to tap only intolerance of ambiguity is related to extreme responding.

An additional contribution of this study was the uncovering of a significant relationship between decisiveness and ERS. Specifically, a tendency to quickly seize on the strongest possible answer was shown to account for a significant amount of variance in extreme responding, above and beyond control variables, and also when included with other personality variables.

Finally, a novel positive relationship between a tendency for simplistic thinking and ERS was uncovered. Because simplistic thinking held a strong relation to intolerance of ambiguity, this effect was eliminated when all three personality variables were included in the regression model predicting ERS. Taken together, however, these results indicate that at least three personality variables that can be grouped together as stable epistemic constructs all predict variance in ERS, supporting the stable and dispositional nature of ERS.

In terms of contextual moderators of ERS, two significant interactions were discovered with response time. Specifically, participants who finished the survey quickly and were rated as high in ambiguity intolerance (as well as simplistic thinking) were far more likely to exhibit an extreme response style than those who were rated low in these personality variables by peers. This pattern also held for decisiveness: Although the interaction was not significant, the direction of the relationship was such that respondents who rushed through the survey and were rated as highly decisive were the most likely to exhibit ERS.

In short, simply rushing through a questionnaire is not sufficient to lead to ERS; one must also be highly intolerant of ambiguity, decisive, or inclined toward simplistic thinking. These results make sense, as it is possible for those who rush through a survey to choose to respond randomly, or respond with a central tendency. If someone is high in the aforementioned personality traits, however, then they will likely employ an extreme response style when completing the survey quickly.

Based on the success of using a combination of three different measures of ERS, we can offer several suggestions for researchers who wish to assess ERS in their own surveys. First, given that each measure of ERS is likely to contain at least one drawback, if there is sufficient space in a survey, then researchers should use multiple measures to triangulate on participants’ latent ERS. If space
considerations require a more abbreviated approach to ERS assessment, then we would recommend using the method described by Greenleaf (1992b) and used for our alternative Greenleaf scale. Specifically, one could select a set of items from the entire survey that are relatively uncorrelated and have similar response proportions. Then score these items according to the use of endpoints and use the mean as the individual’s ERS score. In Greenleaf’s study and again in our study, a relatively small selection of items created a fairly reliable ERS scale (i.e., 16 items in both cases) that contained minimal overlap in content. In contrast to this approach and despite the high level of internal consistency for our overall ERS scale, we would not recommend using the combined proportion of extreme responses across all items as the sole assessment of ERS. In particular, it seems likely that a good deal of content overlap will exist in any survey, particularly given that researchers often have the goal of including scales that are highly related to one another. In such cases ERS is likely to be confounded with trait level on one or more measured constructs.

A final consideration in assessing ERS is whether material placed at the end of a survey is more likely to exhibit ERS than earlier portions of the survey (Hui & Triandis, 1985). The current study found no support for this notion, as the order in which ERS measures were presented had no significant effect on likelihood of extreme responding.

The accumulated evidence in this study indicates that although ERS may be influenced by situational factors, a substantial amount of the variance in extreme responding is due to stable personality traits. This conclusion is buttressed by support from moderate relations between ERS and three personality variables, evidence that the relationship between these personality variables and ERS grows stronger for people who spend less time completing the survey and the lack of evidence for fatigue or speed as an explanation for ERS.

Despite the consistency of these results, there are, of course, several limitations to be noted. The use of a college sample begs the question of whether the effects are the same for those who are less educated or experienced with completing surveys. Also, our use of electronic survey methodology may not generalize to surveys administered using paper and pencil.

Although our new measures of the three epistemic personality constructs exhibited generally high levels of reliability and construct validity, the lack of prior validation leaves some room for caution in the inter-
pretation of our results. Hopefully, extension of these newly developed personality measures in other contexts will prove useful and will help solidify the results obtained here. A final limitation that we should mention concerns our attempts to rule out the effects of demographic variables. Our conclusions concerning the role of ethnicity and intelligence in particular will remain tenuous until replication can occur with a more diverse sample and a more valid measure of cognitive ability.

Despite these limitations, the results of this study are strengthened by several features of our research design, including the use of peer ratings of personality in lieu of self-reports, multiple measures for both predictor and criteria constructs, and the examination of several control variables. The implications of these results have bearing in any situation that requires the rating of a stimulus or individual, as it appears that personality factors play a key role in whether or not an extreme response is chosen over a nonextreme response, irrespective of the actual content of the stimulus. In situations where cautious judgments are preferable or where the consequences of an inaccurate extreme judgment may be severe (such as in clinical or medical decisions), it may be advisable to determine whether the rater possesses personality characteristics associated with an ERS.

Although our study does not offer direct implications for eliminating potential biases associated with ERS, we again offer some possibilities for future research to examine. Statistical control based on the direct assessment of ERS is one such possibility. For example, if ERS is thought to influence criterion scores, then researchers might first enter ERS in the regression model, relying afterward on the residual criterion scores. Unfortunately, this method only addresses a relatively simplistic linear effect of ERS. A second method would be to derive new norms for extreme and nonextreme responders in popular personality inventories such as tests based on the Five-Factor Model of personality.

Understanding response styles such as ERS is not only important from a psychometric or practical standpoint, but also interesting as a theoretical investigation of a dispositional style that may influence behavior in substantive areas of work (Guion, 1998). Individuals who are likely to make extreme responses when using Likert scales in questionnaires could also possibly be driven to make extreme responses in general social situations (e.g., political attitudes, decision making, group interactions). Casting ERS as a behavioral manifestation of intolerance of ambiguity, decisiveness, and simplistic think-
ing also serves as a form of validation for these epistemic personality constructs, based on the hypothesized links between dispositional traits and behavioral actions. In this sense, the construct of ERS can be considered both as an indicator of certain personality traits as well as a possible measure of bias. Future studies might therefore benefit by examining whether other personality variables, such as the Five-Factor Model of personality, will account for additional unique variance in extreme responding. In this way, studying ERS from a personality perspective should hopefully contribute to this underresearched yet widely applicable topic.

REFERENCES


**APPENDIX**


**Intolerance of Ambiguity**

1 (strongly disagree), 2 (disagree), 3 (slightly disagree), 4 (slightly agree), 5 (agree), 6 (strongly agree)
1. Thinking about complex brainteasers is a waste of time.
2. I dislike questions which could be answered correctly in many different ways.* (NFCS)
3. I find it annoying when someone says something that is overly complex.
4. I have no use for people who have “nuanced” opinions.
5. I don’t like things that have more than one interpretation.
6. I like things that are plain and easy to understand.
7. The simple life is the good life.
8. I prefer simple problems over complex problems.
9. I like it when issues are black and white rather than “shades of grey.”
10. I like it when there are no ifs, ands, or buts about it.
11. Poems with contradictions are annoying.
12. I dislike things that have both positive and negative qualities about them.
13. Groups which have too much difference of opinion among their own members don’t appeal to me.
14. I like stories that have consistent characters.
15. Vague and impressionistic pictures really have little appeal for me.* (RRAS)
16. I don’t like to work on a problem unless there’s a possibility of coming out with a clear cut answer.* (RRAS)
17. It’s annoying to listen to someone who cannot seem to make up his or her mind.* (NFCS)
18. I hate it when you can’t solve a problem right away.
19. I hate it when a TV series ends its season with a cliffhanger.
20. A group meeting functions best with a definite agenda.* (NAIS)
21. The best part of working a jigsaw puzzle is putting in that last piece.* (RRAS)
22. I like movies with clear cut endings.
23. A good job is one where what is to be done is always clear.* (BS)
24. I usually get a strong sense of relief when I finally get the answer.
25. I’d rather find an answer, any answer, compared to uncertainty.

Decisiveness

1. I may struggle with a few decisions, but not very often.* (PFIS)
2. I never put off making important decisions.* (PFIS)
3. The possibility that I might be wrong rarely stops me from making a decision.
4. I tend to make my decisions immediately.
5. When faced with a problem I usually see the one best solution very quickly.* (NFCS)
6. I usually make important decisions quickly.
7. I would describe myself as decisive.
8. He who hesitates is lost.

Simplistic Thinking

1. Of all the different philosophies which exist in this world there is probably only one which is correct.* (RDS)
2. There are two kinds of people in the world: those who are for the truth and those who are against the truth* (RDS)
3. There are only a few types of people in this world.
4. There’s a right way and a wrong way to do almost everything.* (RRAS)
5. Most questions can be answered with a simple yes or no.
6. An expert who doesn’t come up with a definitive answer probably doesn’t know too much.* (BS)
7. Practically every problem has a solution.* (RRAS)
8. I tend to see most issues in black and white terms.