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Ambivalence and certainty can interact to predict attitude stability over time

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HIGHLIGHTS

- We assessed attitudes twice with an interval of up to a year between measurements.
- Initial ambivalence and certainty interacted to predict degree of change over time.
- Objective ambivalence, and not subjective ambivalence, interacted with certainty.

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ABSTRACT

The ability of attitudinal ambivalence and certainty to individually predict an attitude's stability over time has received mixed support. We proposed that ambivalence and certainty moderate one another's relationship with temporal attitude stability. That is, we hypothesized an interaction between these two attitude strength variables to predict stability over time. In three studies, we used two-stage designs in which attitudes were assessed twice with an interval ranging from one to twelve months between measurements. Across these longitudinal studies examining different attitude objects, greater certainty was associated with greater stability across different time points as ambivalence decreased, and greater ambivalence was associated with greater instability as attitude certainty increased. Notably, the results held across health-related, social, and real-world political topics.

1. Introduction

Although attitudes are conceptualized as relatively enduring evaluations (Eagly & Chaiken, 1993; Petty, Briñol, & DeMarree, 2007a), they only sometimes remain stable over time (Achen, 1975; Nelson, 1954). On occasion, they are quite malleable and ephemeral (Converse, 1964; Schwarz, 2007). Importantly, unstable attitudes do not predict future behavior as well as those that remain unchanged between initial measurement and the time of the behavior (Doll & Ajzen, 1992; Glasman & Albarracín, 2006; Schwartz, 1978). Despite this topic's importance, it has received surprisingly little empirical attention in the social psychological literature, likely due to the relative difficulty of measuring attitudes at different time points in longitudinal studies.

Stability is often considered a key quality of "strong" attitudes. Strong attitudes are those that endure over time, resist change in the face of explicit persuasion, and predict relevant behavior (see Krosnick & Petty, 1995). Many attitude features that have been proposed to reflect an attitude's overall strength have been shown to predict stability. For example, attitudes remain more stable over time the more accessible (Bargh, Chaiken, Govender, & Pratto, 1992; Fazio, Chen, McDonel, & Sherman, 1982) and important (Krosnick, 1988) they are.

Interestingly, research to date has focused exclusively on the main effects of various attitude strength attributes on stability with some attributes said to increase and others to decrease stability. So dominant are the main effect approaches that we could not locate a single study that found an interaction between strength variables in predicting attitude stability. Thus, as a first effort in looking at moderation of stability effects, the present research focuses on two separate indicators of attitude strength and how they might interact to predict stability. The two indicators examined here are ambivalence and certainty. As explained further below, we have chosen to focus on these two variables for three reasons: (1) these are two variables that for conceptual reasons might be expected to interact in determining stability; (2) for these two variables, prior research has provided mixed support for main effect relationships, suggesting the presence of moderators; and (3) these two variables have been shown to interact in producing a

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separate attitude strength outcome–resistance to persuasion. Before explicating our interaction hypothesis, we review prior research on the links between certainty, ambivalence, and attitude stability.

2. Attitude ambivalence, certainty, and stability

Ambivalent attitudes are those characterized by both some positivity *and* negativity (Thompson, Zanna, & Griffin, 1995). Previous research has distinguished "objective" from "subjective" ambivalence. Whereas objective ambivalence is the extent to which people's separate ratings of positive and negative reactions to a topic reflect a mixed evaluation vs. one-sidedness (Kaplan, 1972), subjective ambivalence is the uncomfortable feeling of conflict often associated with holding a mixed evaluation (Priester & Petty, 1996). Because the existing research on ambivalence as it pertains to attitude stability has predominantly used the objective ambivalence measures, we will use the term "ambivalence" to refer specifically to objective ambivalence, unless otherwise specified.

The relationship between ambivalence and stability has thus far received mixed support. If ambivalence indicates weak (vs. strong) attitudes, as is often assumed (Conner & Armitage, 2008), greater ambivalence should correspond to reduced temporal stability. Indeed, some data support this negative correlation (Bargh et al., 1992; Craig, Martinez, & Kane, 2005). Other data, however, fail to support an ambivalence–stability relationship. In fact, in their review of data on fluctuating policy attitudes, Steenbergen and Brewer (2004) conclude "that an ambivalent mass public…is not necessarily an unpredictable mass public" (pp. 112). Other research has failed to find relationships between ambivalence and instability for attitudes including low-fat diets, (Armitage & Conner, 2000), alcohol (Karpen, Jia, & Rydell, 2012), and hiring quotas (Bassili, 1996). The fact that some research has produced a positive relationship and others a null effect suggests either that the relationship between ambivalence and stability is spurious or that there are undocumented moderators of the effect.

Attitude certainty, another attitude strength indicator, is generally defined as a subjective sense of conviction in one's attitude or the sense that one's attitude is valid (Gross, Holtz, & Miller, 1995; Rucker, Tormala, Petty, & Briñol, 2014). Like ambivalence, the existing literature linking certainty to attitude stability offers mixed evidence. A traditional attitude strength model, treating higher certainty as an indication of a stronger attitude, would predict a positive relationship between certainty and stability. Indeed, some data support such a positive correlation (Abelson, 1988; Bassili, 1996). There is also some evidence in other literatures that certainty in non-evaluative judgments can predict the temporal stability of those judgments. For example, this has been shown for self-reported behavioral intentions (Sheeran & Abraham, 2003) and for people's beliefs about themselves (Pelham, 1991).

Other data, however, fail to support a certainty–stability relationship. In a study of abortion attitudes, for example, certainty predicted stability in the expected direction for one kind of abortion but not for the other (Craig et al., 2005). Similarly, in a set of studies where many attitude strength variables were reduced to a three-factor solution, the factor on which attitude certainty loaded ("Generalized Attitude Strength") predicted attitude stability only for some of the topics under examination (Prislin, 1996). Once again, either a spurious relationship or a moderated effect is suggested.

3. An interaction approach

In summary, although some evidence supports a traditional attitude strength role for ambivalence and certainty in predicting an attitude's longevity, the absence of effects in other studies suggests either that the stability effects observed might be due to Type 1 error (i.e., they are not replicable), or that there may be one or more unrecognized moderators of each effect. The core hypothesis tested across the present studies is that these two variables moderate one another's relationship with attitude stability. That is, ambivalence would be associated with greater attitude instability but especially for attitudes held with certainty. Or, framed differently, certainty would be associated with greater stability but especially for attitudes that are unambivalent.

Certainty and ambivalence can interact because despite some conceptual similarity between these constructs, we argue that they reflect distinct attitude-relevant qualities (for further discussion on this distinction, see DeMarree, Briñol, & Petty, 2015; van Harreveld, Rutjens, Schneider, Nohlen, & Keskinis, 2014). Whereas ambivalence represents the degree of conflict between positive and negative reactions to the same target, certainty is an overall judgment of the validity of one's evaluative reactions. Therefore, relatively unambivalent attitudes can vary in certainty (e.g., having uniformly positive attitudes toward two people but only having spent a great deal of time with one, producing differences in certainty) and relatively ambivalent attitudes can also vary in certainty (e.g., having equally mixed attitudes toward two people but having greater familiarity with one person's particular positive and negative traits, producing differences in certainty). The difference between ambivalence and certainty is also evident from the studies showing that experimental manipulations of attitude certainty fail to affect ambivalence (e.g., Barden & Petty, 2008, Clarkson, Tormala, & Rucker, 2008, Dubois, Rucker, & Tormala, 2011, Petrocelli, Tormala, & Rucker, 2007), and studies showing effects of certainty on various attitude-relevant outcomes, either controlling for or in the absence of ambivalence effects (e.g., Alvarez & Brehm, 1997, Bassili, 1996, Craig et al., 2005, McGraw, Hasecke, & Conger, 2003, Petrocelli et al., 2007). Finally, some recent research shows that certainty and ambivalence activate different areas of the brain (Luttrell, Stillman, Hasinski, & Cunningham, in press).

To understand why these variables would interact to predict stability, first consider why greater ambivalence on its own would be associated with greater instability. For unambivalent attitudes, the relevant features or assessments of the topic that could come to mind at any given point in time are relatively uniform in valence, so people are likely to report the same overall evaluation at every opportunity. For ambivalent attitudes, however, either positive or negative features or assessments of the attitude object could be more salient or accessible at any given time, so people are less likely to report the same overall evaluation at every opportunity (cf. Zaller & Feldman, 1992). The variation in which particular reactions come to mind could be due to any number of factors, including situational influences such as mood, environment, or recently primed considerations. Now consider what role certainty would play. Greater attitude certainty should increase the consistency between whichever reactions come to mind in a given instance (which as we mentioned, could happen for many reasons, independent of a person's degree of attitude certainty) and the overall evaluation of the target at that moment because those reactions seem especially valid (Briñol & Petty, 2009; Petty et al., 2007a). Indeed, prior research has similarly shown that guiding people to focus on the benefits or the drawbacks of a particular issue changes their overall reported attitudes about the issue, but especially among people who also feel relatively confident in their thoughts (e.g., Petty, Briñol, & Tormala, 2002). Thus, high certainty should reinforce the stability inherent in unambivalent attitudes.

More interestingly, perhaps, certainty should also reinforce the *instability* inherent in ambivalent attitudes. For these attitudes, a variety of valenced reactions could come to mind in a given moment, and we suggest that certainty might cue a reliance on *whichever* reaction comes to mind, producing exaggerated instability across measurement times. For example, a person might have a confidently-held ambivalent attitude toward cheesecake. When asked for his attitude, perhaps he is very hungry, which highlights the positive aspects of his cheesecake attitude. With the addition of his high degree of certainty, he would be all the more likely to report quite a positive evaluation of cheesecake. Alternatively, if he had just watched a 30 min infomercial for health and fitness DVDs, the negative aspects of his cheesecake attitude are more

accessible and this time, his overall attitude certainty makes him all the more likely to report quite a negative evaluation of cheesecake. This analysis thus suggests that high attitude certainty primarily reflects a crystallized, stable attitude when the summary evaluation is clear (i.e., unambivalent).

These predicted patterns are consistent with prior research on the resistance of attitudes to an explicit attack and the *amplification hypothesis* (Clarkson et al., 2008). This hypothesis holds that certainty magnifies the typical effect of other attitudinal attributes whereas uncertainty undermines them (see Petty, Briñol, Tormala, & Wegener, 2007b). As it relates to certainty's potential for magnifying the effects of *ambivalence*, the amplification hypothesis has only been demonstrated in one set of studies examining resistance to persuasion. Specifically, Clarkson et al. (2008) showed a novel effect whereby ambivalence had its expected effect of reducing resistance to persuasion for attitudes held with certainty (cf., Armitage & Conner, 2000), but this tended to reverse under conditions of uncertainty. That is, ambivalence promoted openness to persuasion when certainty was high but was associated with resistance to persuasion when certainty was low. Clarkson et al. explained this effect by arguing and showing that ambivalent individuals processed the attacking persuasive message more carefully than unambivalent individuals (see also, Maio, Bell, & Esses, 1996), but this was especially so when the attitude was held with certainty. Greater processing of the message among the most confident ambivalent individuals led them to be more persuaded (or less resistant) when the attacking message had strong arguments but not when the message had weak arguments. Importantly, however, this explanation for the interaction of ambivalence and certainty is not relevant to an attitude stability situation where no persuasive message is presented.

To date, the Clarkson et al. (2008) research remains the only evidence of an interaction between certainty and ambivalence in producing any attitude strength result and their explanation of the effect does not apply to the temporal persistence situation. It is also important to note, however, that the interaction between ambivalence and certainty they obtained was produced by manipulating these variables with respect to a novel or unfamiliar attitude object (i.e., an unfamiliar person or department store). Thus, there is no evidence that the same interaction would hold with the more common measured variables and with topics of evaluation that are more familiar. Most importantly, the key goal of the current research was to examine whether the interaction of ambivalence and certainty would occur when a different attitude strength consequence was tested — attitude stability. Even if the ambivalence × certainty interaction proves to be a reliable predictor of resistance to persuasion, it is unclear whether the same interaction would hold for stability. Prior research and theory in the attitudes and persuasion literature have, in fact, noted that a variable that influences short-term persuasion outcomes does not necessarily influence long-term attitude stability (e.g., Haugtvedt, Schumann, Schneier, & Warren, 1994, Petty & Cacioppo, 1986). For instance, although attitudes on cultural truisms are highly persistent in a vacuum, they are relatively easy to change when challenged (i.e., low resistance; see McGuire, 1964). Yet, in introducing our hypothesis, we have outlined a reason why this interaction might nonetheless occur for attitude stability. Although a considerable amount of research has examined the processes underlying short-term persuasion outcomes, it is also important to consider the longevity of people's attitudes to better understand the natural ebb and flow of opinion over time (cf. Cook & Flay, 1978).

In addition to our primary goal of looking for an ambivalence × certainty interaction in predicting attitude stability, the present research also aimed to clarify a secondary question: what is the role of subjective ambivalence in these relationships? As noted previously, a distinction has been made between "objective" and "subjective" ambivalence in the literature, and the existing cases of ambivalence–stability research focus on objective ambivalence (Armitage & Conner, 2000; Bargh et al., 1992; Bassili, 1996; Craig et al., 2005; Karpen et al., 2012). Although our hypothesis was about structural or objective ambivalence, it is possible that a certainty × ambivalence effect on stability would operate through effects on felt conflict, which can motivate people to resolve the conflict through attitude change. For example, the more certain people are in their conflicted feelings, the more they may be motivated to change their attitude, which could produce instability. On the other hand, subjective ambivalence may not play a role in the predicted interactions. Given the lack of prior evidence on objective vs. subjective ambivalence in the domain of attitude stability and the empirical interest in the relationship between these two measures of ambivalence (e.g., Priester & Petty, 1996, van Harreveld, Nohlen, & Schneider, 2015), we measure both objective and subjective ambivalence to explore whether the effects are restricted to one measure or the other.

In sum, the present research aims to address the inconsistent main effect findings of attitude certainty and ambivalence on attitude stability by proposing that these variables interact. We also focus on naturally occurring attitudes and their associated degrees of ambivalence and certainty, across a range of real-world topics. In three studies, we used two-stage test–retest designs, assessing attitudes twice with at least a month-long interval separating measurements. We also examined the instability or unreliability of attitude measures within a single session to see if the interaction hypothesis would also account for intra-test as well as between-test reliability. Across studies, we expected that the traditional relationship between certainty and stability (i.e., greater certainty corresponding to greater stability) would be especially the case as ambivalence decreased. The more ambivalent the attitude, however, the more increases in certainty would instead predict reduced temporal stability. We also expected this interaction pattern to show that the traditional relationship between ambivalence and stability (i.e., greater ambivalence corresponding to reduced stability) would be especially the case for attitudes held with increasingly high certainty.

4. Study 1

As a first test of our ambivalence × certainty interaction hypothesis, we measured people's attitudes toward organic food and corresponding indications of certainty and ambivalence at time 1 and re-assessed attitudes one month later. We chose organic food as a topic due to its rising prominence in the current U.S. food market and its perceived connection to healthy diets. We also measured both objective and subjective ambivalence. Although these measures tend to be correlated (e.g., Priester & Petty, 1996) and have sometimes been used interchangeably, they remain distinct, if related, constructs.

4.1. Method

4.1.1. Participants

In the first wave of data collection, 492 Ohio State University undergraduates (237 males, 225 females, 30 no response; $M_{age} = 19.40$, $SD = 2.62$) who were enrolled in introductory psychology participated in an online survey during the first three weeks of the academic term in exchange for course credit. We sent a follow-up survey via email one month later; 174 participants completed this survey in exchange for entry into a lottery for a $25 Amazon.com gift card. Results are reported only for participants who responded at both time points. Results of a logistic regression analysis show that retention is not predicted by initial attitudes, global attitude certainty, subjective ambivalence, objective ambivalence, nor the certainty × objective ambivalence interaction, $ps > .30$.

4.1.2. Procedure

Students accessed the first survey through the online Introductory Psychology Research Experience Program website, and all participants had three weeks at the beginning of the academic term to complete the time 1 questionnaire. In this survey, participants responded to questions assessing their attitudes toward organic food and corresponding degrees of certainty and ambivalence. The survey system also recorded participants' email addresses. One month following the initial survey, we emailed all participants a link to a follow-up questionnaire that assessed attitudes using the same attitude questions from the initial survey.[1] This survey was open for two weeks following the invitation after which the survey was closed and data were downloaded regardless of how many people responded. We thus had little control over the final sample size, but by administering the initial survey to such a large sample, we anticipated that there would be a large enough final sample on which to conduct the stability analyses. We further discuss average effect size, statistical power and sample size later in this paper.

4.1.3. Variables at time 1

Attitudes. Attitudes toward organic food were provided on three 7-point semantic differential scales anchored at *bad*, *negative*, and *against* at the low end and at *good*, *positive*, and *in favor* at the high end. These items demonstrated high internal reliability, $\alpha = .90$, so they were averaged to form an index of attitudes. Attitude extremity was also computed by taking the absolute value of time 1 attitude scores minus 4, which produced an index of how far attitudes were from the scale midpoint.

Attitude certainty. Certainty was measured using the 7-item scale developed by Petrocelli et al. (2007). This full scale was originally designed to capture two dimensions of attitude certainty: attitude clarity (4 items such as, "How certain are you that the attitude you just expressed toward organic food is really the attitude you have?") and attitude correctness (3 items such as, "How certain are you that your attitude toward organic food is the correct attitude to have?"). All responses were provided on 7-point scales. Items showed good internal reliability for clarity ($\alpha = .94$), correctness ($\alpha = .82$), and overall certainty ($\alpha = .82$). The following analyses, however, will focus only on the composite certainty measure because the results do not differ significantly when using either of the specific certainty dimensions represented in this scale and because we made no specific predictions about individual certainty dimensions.[2] Thus, responses to all seven items were averaged to form the overall certainty variable.

Objective ambivalencce. Following past practice (Kaplan, 1972; Priester & Petty, 1996), participants indicated the extent to which they had negative thoughts or feelings about organic food, ignoring their positive reactions as well as the extent to which they had positive thoughts or feelings about organic food, ignoring their negative reactions. These responses were provided on 7-point scales anchored at "no negative [positive] thoughts or feelings" and "maximum negative [positive] thoughts or feelings." These responses were then combined into an ambivalence index using the most commonly used ambivalence formula, the *similarity intensity model* (Thompson et al., 1995), resulting in scores that can range from −2 to 7 and in which higher values represent higher degrees of objective evaluative ambivalence.[3]

Table 1
Correlations between measures and descriptive statistics ("Organic Food," Study 1).

Measure	1	2	3	*M*	*SD*
1. Certainty				4.19	1.52
2. Objective ambivalence	−.40**			.89	1.86
3. Subjective ambivalence	−.36**	.50**		2.78	1.32
4. Attitude change	−.03	.05	.01	.61	.59

Note. These correlations are only for participants who completed both sets of measures ($N = 174$).
** $p < .001$.

Subjective ambivalence. Participants responded to three items commonly used to assess perceived conflict, taken from Priester and Petty (1996). They responded on 7-point scales with the extent to which they felt "conflicted," "mixed," and "indecision" with regard to organic food. These three items demonstrated acceptable internal reliability, $\alpha = .71$, and were thus averaged and combined to form an index of subjective ambivalence such that higher values represent greater perceived evaluative conflict.

4.1.4. Variable at time 2

Attitudes. Participants reported their time 2 attitudes on the same scales used in the time 1 survey ($\alpha = .92$). An index of temporal attitude stability was created by taking the absolute value of the difference between mean attitude ratings at time 1 and time 2, a common method of computing attitude stability (e.g., Erber, Hodges, & Wilson, 1995, Karpen et al., 2012, Keele & Wolak, 2006). Higher values represent greater instability (change in any direction) over the interval.

4.2. Results

Table 1 presents the correlations among the key variables. Consistent with previous research, objective ambivalence and overall attitude certainty were significantly, although modestly, negatively correlated in both the full sample, $r(490) = -.36$, $p < .001$, and among those who completed the attitude measure at both times, $r(172) = -.40$, $p < .001$.

To test the hypothesis that certainty and objective ambivalence would interact to predict how stable participants' attitudes were over time, the data were first submitted to a multiple regression analysis in which objective ambivalence and overall certainty were entered in the first step of the model and the two-way interaction term was entered in the second step. Results for these variables are interpreted in the first steps of the model in which they appear. Following from previous research on attitude certainty (e.g., Petrocelli et al., 2007), attitude extremity was entered in the analysis as a covariate. Controlling for extremity was important to clarify the unique roles that ambivalence and certainty play in predicting temporal stability because extremity often correlates with both certainty and ambivalence, and extremity has been related to attitude stability (e.g., Prislin, 1996).

There were no main effects of either ambivalence or certainty in predicting attitude stability, $ps > .30$. Extremity, however, did show a main effect whereby more extreme attitudes changed less over the interval, $B = -.17$, $t(170) = -2.97$, $p = .003$. Most importantly, there

[1] The dates on which participants completed both the initial and follow-up surveys were recorded, and scores were computed for each person reflecting the delay (in days) between attitude measurements. Including this score as a covariate in the analyses that follow did not change the significance of any result. We therefore dropped this measure, and it is not included in any of the reported statistical tests in this or the following studies.

[2] Nonetheless, we examined each measure separately. The objective ambivalence × certainty interaction reported in the text was also significant when only the clarity items were used in place of overall certainty for both Study 1, $B = .03$, $t(169) = 2.17$, $p = .03$, 95% CI: [.003, .06] and Study 2, $B = .06$, $t(130) = 3.31$, $p = .001$, 95% CI: [.03, .10]. The same objective ambivalence × certainty interaction was marginally significant when only correctness items were used in place of overall certainty in Study 1, $B = .03$, $t(169) = 1.71$, $p = .09$, 95% CI: [−.004, .06] and significant in Study 2, $B = .06$, $t(130) = 2.79$, $p = .01$, 95% CI: [.02, .10].

[3] When stated in terms of D (dominant reactions: whichever is greater of positive or negative) and C (conflicting reactions: whichever is smaller of positive or negative), the SIM formula for computing ambivalence is: [(C + D) / 2] − (D − C) (Priester & Petty, 1996).

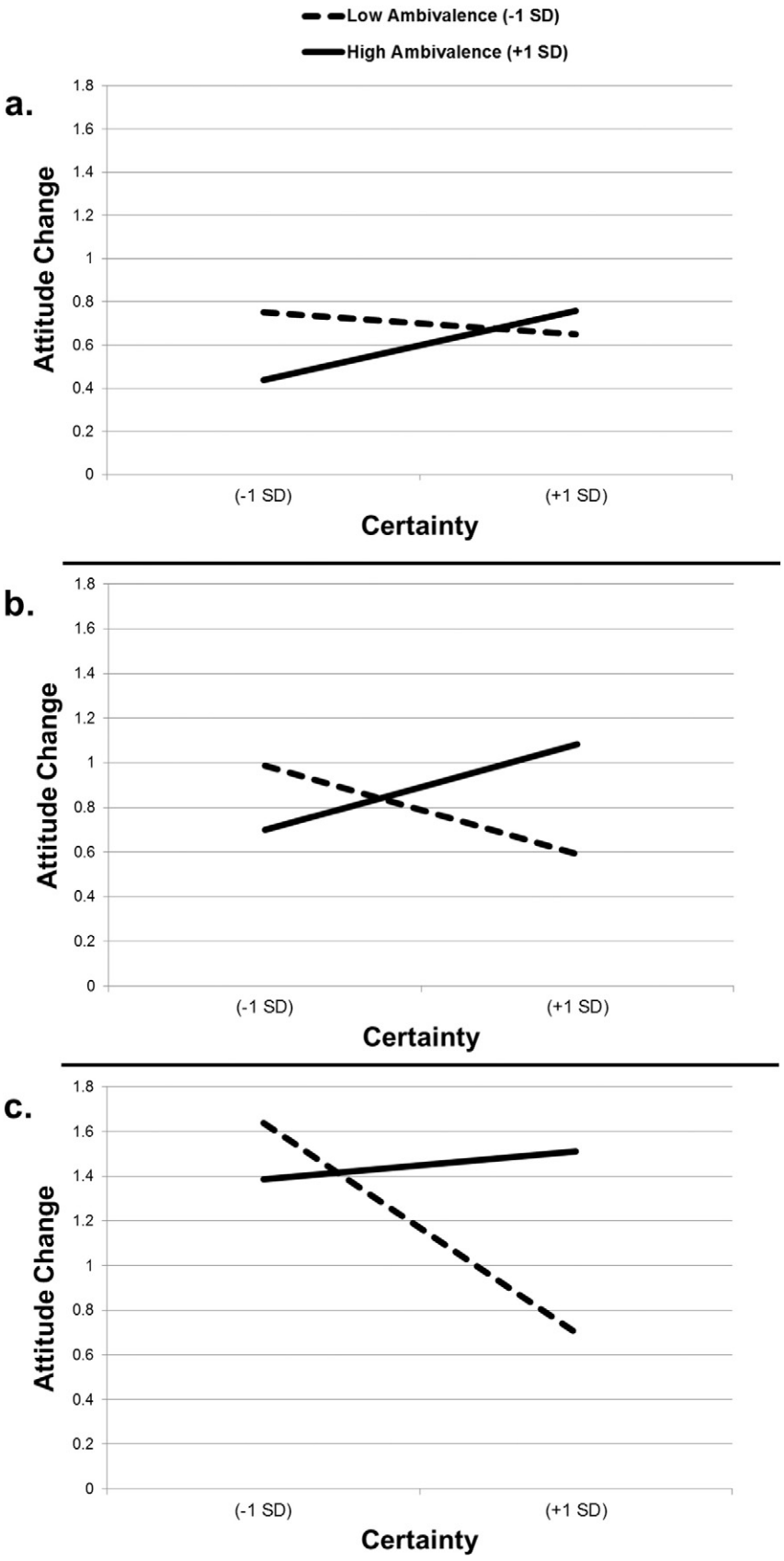

Fig. 1. Attitude certainty and attitudinal ambivalence interact to predict how much (a) attitudes toward organic food change over a one-month interval, (b) attitudes toward alcohol change over a one-year interval, and (c) attitudes toward the presidential candidate Mitt Romney changed over the last 30–60 days of the 2012 presidential election. Initial attitude extremity was entered as a covariate in all three analyses.

was a significant certainty × objective ambivalence interaction, $B = .04$, $t(169) = 2.28$, $p = .02$, 95% CI: [.01, .07].[4]

Further probing the interaction, depicted in Fig. 1a, the traditional attitude strength effect of certainty on stability (i.e., less attitude change as certainty increases) is observed to a greater extent as ambivalence decreases, but it decreases, and even reverses, as ambivalence increases. That is, at a relatively low level of ambivalence (1 *SD* below the mean), certainty does not reliably predict temporal instability, $B = -.03$, $t(169) = -.74$, $p = .46$, 95% CI: [−.12, .06]. At a relatively high level of ambivalence (1 *SD* above the mean), however, greater certainty is associated with significantly greater instability across measurements, $B = .11$, $t(169) = 2.30$, $p = .02$, 95% CI: [.01, .20].

Examined differently, the traditional attitude strength effect of ambivalence on stability decreases, and even reverses, as certainty decreases. Although the overall relationship between ambivalence and instability is not significant at a relatively high degree of certainty (1 *SD* above the mean), $B = .03$, $t(169) = .75$, $p = .45$, 95% CI: [−.05, .11], when the attitude is held with low certainty (1 *SD* below the mean), increased ambivalence corresponds to more stability in attitude ratings across measurements, $B = -.08$, $t(169) = -2.21$, $p = .03$, 95% CI: [−.16, −.01].

Finally, this interaction pattern is specific to *objective* ambivalence. The above interaction remains significant even when entering subjective ambivalence as a covariate (i.e., all significant effects remain significant and all non-significant effects remain non-significant). Also, replacing objective ambivalence with subjective ambivalence (covarying only extremity) in the regression model fails to produce significant certainty or ambivalence main effects or the subjective ambivalence × certainty interaction, $ps > .12$. Thus, the experience of conflict does not appear to be what interacts with certainty to predict stability; rather, the interaction pattern is a function of endorsing both positive and negative reactions to an object, regardless of whether this produces an accompanying feeling of conflict.

4.3. Discussion

The results of Study 1 support the expected interaction between certainty and ambivalence in predicting attitude stability over time. Although promising, we ran a second study using a new topic and introducing an even longer delay between attitude measurements.

5. Study 2

This study aimed to replicate the previous one with a new health-relevant topic and an even longer delay between measurements. In this study, one year passed between attitude measurements, allowing participants to both forget their explicit responses from time 1 and divorce themselves from the conditions of initial measurements. Prior research considering the role of certainty and ambivalence in predicting stability considers a range of delays from relatively short intervals of a couple of days (e.g., Bargh et al., 1992) to relatively longer delays like several months (e.g., Craig et al., 2005). This study thus aimed to push the limit on the interaction pattern of the first study by introducing a full year delay. The method employed was nearly identical to that of Study 1.

5.1. Method

5.1.1. Participants

In the first wave of data collection, 545 Ohio State University undergraduates (224 males, 295 females, 26 no response; $M_{age} = 18.85$, $SD = 2.33$) who were enrolled in introductory psychology participated in an online survey under the same conditions as Study 1. Of this initial sample, 135 people responded to an email follow-up survey one year later in exchange for entry into a lottery for a $25 Amazon.com gift card. Results are reported only for participants who responded at both time points. As before, results of logistic regression analyses provide no evidence that initial attitudes, global attitude certainty, objective ambivalence, or the certainty × ambivalence interaction predicted retention, $ps > .18$. Subjective ambivalence marginally predicted retention, $B = -.15$, $p = .09$; however, as we report later, controlling for this measure does not alter the results.

5.1.2. Procedure

The procedure was identical to that in Study 1 except that all attitude questions reflected attitudes toward alcohol. Furthermore, participants were contacted one year later to complete the follow-up measure rather than one month later.

5.1.3. Measured variables

All variables were measured using the same items as in Study 1, and all computed variables followed the same computational formulas as in Study 1. Internal reliabilities were again high for items assessing time 1 attitudes ($\alpha = .90$), time 2 attitudes ($\alpha = .90$), global attitude certainty ($\alpha = .87$), attitude clarity ($\alpha = .92$), attitude correctness ($\alpha = .78$) and subjective ambivalence ($\alpha = .85$). Like Study 1, these data also failed to show a meaningful difference between clarity and correctness as measures of certainty. We therefore focus on the global measure of certainty.

5.2. Results

Table 2 presents the correlations among the key measures. Objective ambivalence and overall attitude certainty were again significantly, although modestly, negatively correlated in both the full sample, $r(543) = -.29$, $p < .001$, and among those who completed the attitude measure at both times, $r(133) = -.25$, $p < .001$.

To test the hypothesis that certainty and objective ambivalence would interact to predict how stable participants' attitudes were over time, the data were first submitted to a hierarchical multiple regression analysis in which objective ambivalence and overall certainty were entered in the first step of the model and the two-way interaction term was entered in the second step. Attitude extremity was again entered as a covariate. Results are interpreted in the first steps of the model in which they appear.

There was no main effect of certainty in predicting stability, $p = .99$, but there was a (non-significant) trend for the traditional strength effect of ambivalence on stability; greater ambivalence at time 1 was associated with more change over the one-year delay, $B = .06$, $t(131) = 1.56$, $p = .12$, 95% CI: [−.02, .13]. Extremity again showed a main effect, but this time, attitudes were more unstable as initial attitudes increased in extremity, $B = .31$, $t(131) = 4.21$, $p < .001$. More importantly, there was a significant certainty × objective ambivalence interaction, $B = .07$, $t(130) = 3.42$, $p < .001$, 95% CI: [.03, .12].[5]

The interaction is such that the traditional strength effect of certainty on stability is observed to a greater extent as ambivalence decreases, but this effect decreases, and even reverses, as ambivalence increases (see Fig. 1b). At a relatively low level of ambivalence (1 *SD* below the mean), attitudes show more stability over time as certainty increases, $B = -.14$, $t(130) = -2.35$, $p = .02$, 95% CI: [−.26, −.02]. However, at a relatively high level of ambivalence (1 *SD* above the mean), the attitude certainty effect reverses: greater certainty is associated with greater instability across measurements, $B = .14$, $t(130) = 2.32$, $p = .02$, 95% CI: [.02, .26].

Similarly, the traditional strength effect of ambivalence on stability is observed to a greater extent as certainty increases but decreases as

[4] The interaction is also significant when extremity is not entered as a covariate, $B = .04$, $t(170) = 2.66$, $p = .01$, 95% CI: [.01, .08].

[5] The interaction is also significant when extremity is not entered as a covariate, $B = .06$, $t(131) = 2.67$, $p = .01$, 95% CI: [.02, .11].

Table 2
Correlations between measures and descriptive statistics ("Alcohol," Study 2).

Measure	1	2	3	*M*	*SD*
1. Certainty				4.68	1.38
2. Objective ambivalence	−.25**			1.66	1.89
3. Subjective ambivalence	−.53**	.38**		2.94	1.49
4. Attitude change	.11	−.08	−.19*	.79	.73

Note. These correlations are only for participants who completed both sets of measures ($N = 135$).
* $p < .05$.
** $p < .001$.

certainty decreases. When the attitude is held with relatively high certainty (1 *SD* above the mean), the traditional positive relationship between ambivalence and instability is observed, $B = .13$, $t(130) = 3.12$, $p = .002$, 95% CI: [.05, .21]. However, when the attitude is held with low certainty (1 *SD* below the mean), there is not a reliable relationship between ambivalence and stability, $B = -.08$, $t(130) = -1.42$, $p = .16$, 95% CI: [−.18, .03].

Once again, these effects were specific to the objective ambivalence measurement. The objective ambivalence × overall certainty interaction remains significant even when entering subjective ambivalence as a covariate. Also, replacing objective ambivalence with subjective ambivalence fails to produce a significant ambivalence × certainty interaction on stability, $p = .25$.

5.3. Discussion

The results of Study 1 and Study 2 support the expected certainty × ambivalence interaction on attitude stability over time for both organic food and alcohol attitudes. Specifically, the traditional strength effect of certainty on stability was increasingly evident as attitudes were decreasingly ambivalent. In other words, greater certainty was associated with less change across time points for relatively unambivalent attitudes, although this simple effect was only significant in Study 2. As attitudes were increasingly ambivalent, however, the results revealed a reversal of the standard certainty–stability relationship—greater certainty was associated with increased change across time points. These data also show that the relationship between ambivalence and stability was moderated by certainty. As attitudes increased in certainty, greater ambivalence was associated with increasing attitude instability (the traditional attitude strength result for ambivalence), but as attitudes decreased in certainty, greater ambivalence was associated with more stability across measurements.

These patterns were also specific to objective attitude ambivalence rather than the subjective feeling of conflict that can accompany such attitudes. It seems, then, that having more conflicting evaluative associations with an object is what differently predicts stability under high or low certainty, regardless of the perception of that conflict.

Although these results support our predictions using two different attitude objects, we wanted to replicate the interaction in yet another domain to test the generalizability of both the interaction and pattern of simple effects. In particular, we wanted to consider attitude stability in a context where fluctuations in attitudes are particularly likely and consequential. Also, both of the previous topics of organic food (Study 1) and alcohol (Study 2) are related to the domain of health and consumption behavior, so it was important to extend our analysis to a more socially charged domain, such as person perception and political attitudes. Study 3 thus considers the temporal stability of attitudes toward a presidential candidate during an ongoing national election.

6. Study 3

The third study aimed to replicate the previous studies and extend the results to another topic in a context where attitude stability is highly consequential—the 2012 presidential election. We measured attitudes up to two months prior to and shortly after Election Day, 2012 to assess how stable candidate attitudes were in the face of much pre-election information and events. We also assessed ambivalence differently than in the previous studies, using a method that has been used in prior research to examine ambivalence toward political candidates (Abelson, Kinder, Peters, & Fiske, 1982; see also Meffert, Guge, & Lodge, 2004). Rather than assessing conflict between global positive and negative evaluative reactions, this method instead considers the conflict between the positive and negative traits that people ascribe to a political figure. Obtaining the same results with this alternative measure would enhance the generalizability of our findings.

We again expected an interaction between ambivalence and certainty in predicting stability, such that increasing certainty would correspond to greater stability as ambivalence decreased. This interaction was also expected to show that increasing ambivalence would correspond to reduced temporal stability as attitude certainty increased.

6.1. Method

6.1.1. Participants

Two-hundred twenty-nine Ohio State University undergraduates (76 males, 151 females, 2 no response; $M_{age} = 18.78$, $SD = 1.83$) enrolled in introductory psychology who received credit toward fulfilling a course requirement participated in the study. Notably, data for phase 1 were collected 4–8 weeks prior to the 2012 United States presidential election. Pre-election sessions were conducted in computer labs in groups of one to ten participants at a time. One-hundred four participants responded to the follow-up survey after the election. Results of logistic regression analyses again show that initial attitudes, global attitude certainty, and objective ambivalence do not significantly predict retention, $ps > .49$. Although non-significant, the ambivalence × certainty interaction pattern ($p = .10$) was such that at relatively low levels of certainty (1 *SD* below the mean), participation in the follow-up is marginally more likely as ambivalence toward Romney increased, $B = .50$, $p = .09$, 95% CI: [−.08, 1.08] whereas ambivalence did not predict participation in the follow-up at relatively high levels of certainty (1 *SD* above the mean), $B = -.08$, $p = .71$, 95% CI: [−.51, .35]. No particular incentive was offered for completion of the post-election survey.

6.1.2. Procedure

Participants first rated their attitudes and attitude certainty regarding Mitt Romney, one of the candidates in the 2012 presidential election. They then responded to a series of questions assessing how well various positive and negative personality traits applied to him. These traits were used to indicate how much people thought Romney possessed both positive and negative traits (ambivalence) vs. mostly positive or mostly negative traits (univalence).[6]

The day after the election concluded and the winner of the popular vote was announced, participants received an email inviting them to complete a final, brief survey regarding the election. Participants who voluntarily chose to complete this follow-up survey (45% of the original sample) rated their attitudes toward Mitt Romney once again using the same scale items used in the original survey. Because we wanted follow-up responses to be registered soon after election day, the follow-up survey was open for one week following the election after which the survey was closed and data were downloaded.

[6] We also measured attitudes and ambivalence toward Barack Obama, but there was far less variance in the stability of Obama attitudes than in the stability of Romney attitudes in our sample (Obama attitude stability variance = .61; Romney attitude stability variance = 1.30). This may be because attitudes toward a sitting president were less susceptible to fluctuation than attitudes toward the less familiar candidate. Thus, we focus on the analyses of Romney attitudes over time. Nonetheless, the interaction between ambivalence and certainty on stability for Obama attitudes demonstrated a pattern consistent with predictions but did not reach significance, $t(100) = 1.03$, $p = .31$.

6.1.3. Variables at time 1

6.1.3.1. Candidate attitudes. Participants' attitudes toward Mitt Romney were assessed with three 9-point semantic differential items to measure evaluative interpersonal reactions: *bad–good*, *negative–positive*, and *dislikeable–likeable*. The scales were such that higher numbers represented more positive attitudes toward the candidate. The three items assessing attitudes toward Romney were found to be reliable ($\alpha = .96$), so they were averaged to form an index of attitudes toward Romney. Extremity was computed by subtracting 5 from the attitude scores and taking the absolute value, which produced an index of the attitude rating's distance from the middle response.

6.1.3.2. Candidate attitude certainty. Immediately upon providing the attitude ratings, participants indicated their certainty. Because the distinction between attitude "clarity" and attitude "correctness" was not consequential in Study 1 and Study 2, we instead opted for the standard measurement approach to global attitude certainty. That is, certainty was rated on three 7-point semantic differential items of how confident, sure, and certain participants were in their attitudes toward Romney (e.g., Barden & Petty, 2008). The three items had high internal reliability ($\alpha = .86$), so they were averaged together to form a single index of attitude certainty.

6.1.3.3. Candidate attitude ambivalence. After participants provided attitude and certainty assessments, they rated how well they thought a series of traits applied to Mitt Romney. These measures were the same ones that have been used to measure positive and negative traits of political candidates in prior research (Abelson et al., 1982, Study 2). Participants were asked to rate how well they thought three negative traits (*dishonest*, *power hungry*, and *weak*) and three positive traits (*moral*, *knowledgeable*, and *inspiring*) applied to Mitt Romney. Both negative ($\alpha = .70$) and positive ($\alpha = .72$) traits demonstrated acceptable internal reliability and were thus averaged to form two new variables representing perceived positive and negative traits. We then computed an index of conflict between these trait perceptions using the same ambivalence formula used in the previous studies. Higher scores on this index reflect more ambivalent evaluations.

6.1.4. Variable at time 2

Candidate attitudes. Attitudes toward Mitt Romney were provided on the same scales as in the initial survey ($\alpha = .98$), and attitude stability was computed as it was in the prior two studies.

6.2. Results

Table 3 presents the correlations among the key measures. Ambivalence and certainty were again significantly, although moderately, negatively correlated in both the full sample, $r(227) = -.22$, $p = .001$, and among those who completed the attitude measure at both times, $r(102) = -.36$, $p < .001$.

Table 3
Correlations between measures and descriptive statistics ("Mitt Romney," Study 3).

Measure	1	2	*M*	*SD*
1. Certainty			4.92	1.45
2. Objective ambivalence	−.36**		1.08	.72
3. Attitude change	−.20*	.20*	1.21	1.14

Note. These correlations are only for participants who completed both sets of measures ($N = 104$).
* $p < .05$.
** $p < .001$.

To test the target interaction effect on stability, the data were submitted to a multiple regression analysis, entering attitude certainty and ambivalence in the first step of the model and entering their interaction term in the second step. As in the first two studies, attitude extremity was entered as a covariate. Results for these variables are interpreted in the first step of the model in which they appear. No main effects emerged for extremity ($B = -.01$, $t(99) = -.13$, $p = .89$, 95% CI: [−.21, .18]), certainty ($B = -.11$, $t(99) = 1.42$, $p = .25$, 95% CI: [−.30, .08]), or ambivalence ($B = .24$, $t(99) = 1.42$, $p = .16$, 95% CI: [−.10, .57]).

Most important was a significant certainty × ambivalence interaction, $B = .26$, $t(99) = 2.38$, $p = .02$, 95% CI: [.04, .47] (see Fig. 1c).[7] Specifically, among participants with less ambivalent reactions to Mitt Romney (1 *SD* below the mean), the traditional certainty effect emerges: greater attitude certainty is associated with more stability across measurements, $B = -.36$, $t(99) = -2.51$, $p = .01$, 95% CI: [−.58, −.07]. For attitudes associated with more ambivalent reactions (1 *SD* above the mean), however, there was not a significant relationship between certainty and instability, $B = .04$, $t(99) = .38$, $p = .70$, 95% CI: [−.18, .26]. From a different perspective, when the attitude is held with greater certainty (1 *SD* above the mean), greater ambivalence is related to greater instability, $B = .57$, $t(99) = 2.65$, $p = .01$, 95% CI: [.14, .99]. Ambivalence is not significantly related to stability, however, for attitudes held with less certainty (1 *SD* below the mean), $B = -.18$, $t(99) = -.46$, $p = .46$, 95% CI: [−.65, .30].

6.3. Discussion

Ambivalence and certainty again interacted to predict attitude stability in an important, consequential domain: the 2012 U.S. presidential election. Ambivalence moderated the positive relationship between certainty and stability such that it held more strongly as ambivalence decreased. Similarly, certainty moderated the ambivalence–stability relationship such that the traditional attitude strength effect (higher ambivalence, lower stability) was increasingly the case at higher levels of certainty. This study also extended the results of our earlier studies by offering both a new, highly relevant attitude object and a new measurement of objective ambivalence.

7. Studies 1–3 combined analysis

Although the interaction between certainty and ambivalence is reliable in all three studies, the pattern of significant simple effects varies somewhat from study to study. Across studies, the average effect size of the target interaction was Cohen's $f^2 = .05$.[8] For comparison, Cohen (1988) proposed that $f^2 = .02$ reflects a "small effect" and $f^2 = .15$ reflects a "moderate" one. Assuming that this average effect size approximates a population effect size, power analyses were conducted using *G*Power* (Faul, Erdfelder, Buchner, & Lang, 2009) to compute the power that each of the preceding studies had to detect this average effect size. By this standard, Study 1 achieved a power of .84, Study 2 achieved a power of .74, and Study 3 achieved a power of .63, when $\alpha = .05$. Therefore, we combined the studies to increase statistical

[7] The interaction is also significant when extremity is not entered as a covariate, $B = .25$, $t(100) = 2.37$, $p = .02$, 95% CI: [.04, .46]. Also, as part of the demographic items, we asked participants to report their political affiliation on a 7-point scale anchored at *strong Republican* and *strong Democrat*. Because the candidate in question was a Republican candidate, we tested whether the stability effect further depended on participants' political affiliation. In a multiple regression analysis testing a three-way interaction between political affiliation, certainty, and ambivalence, the three-way interaction does not emerge as significant, $B = .001$, $p = .99$, suggesting the key ambivalence × certainty interaction did not depend on political affiliation.

[8] We computed this average by taking the partial R^2 associated with the interaction in each study, submitting those values to a Fisher's *z* transformation, computing an average *z* across studies, transforming the averaged *z* back to an *R* and subsequently computing Cohen's f^2 from the R-value.

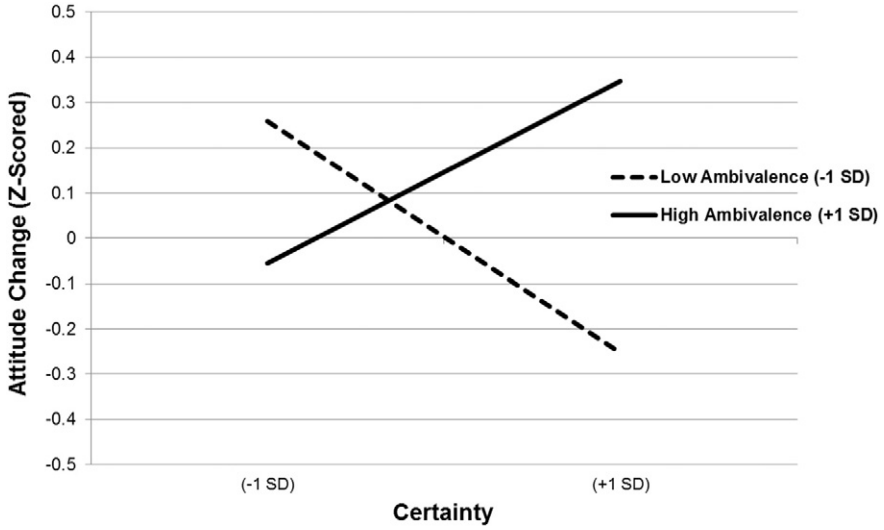

Fig. 2. Attitude certainty and ambivalence interact to predict the stability of attitudes across all three studies. All variables are Z-scored within study. Extremity is entered as a covariate, and study is included as a factor.

power, allowing us to test which simple effects are reliable across the datasets. To do this, certainty, ambivalence, extremity, and attitude stability scores were standardized within study. The datasets were then combined, resulting in a dataset with $N = 1266$ participants ($N = 413$ completed both initial and follow-up surveys). Two dummy variables were created to reflect the three studies, arbitrarily setting Study 1 as the "control" condition.

These data were submitted to a hierarchical multiple regression analysis similar to those used in the individual studies, but also accounting for study as a factor. Overall certainty, objective ambivalence, extremity, and the two dummy study variables were entered in the first step of the model. The ambivalence × certainty interaction term was entered in the second step, along with four other interaction terms reflecting certainty and ambivalence interactions with each of the two dummy variables. Finally, two three-way interaction terms were entered in the third step: dummy 1 × certainty × ambivalence, and dummy 2 × certainty × ambivalence. Results are interpreted from the first step of the model in which they appear.

No main effects emerged as significant for certainty, ambivalence, or extremity, $ps > .33$. More importantly, the interaction between ambivalence and certainty is significant, $B = .23$, $t(402) = 4.60$, $p < .001$, 95% CI: [.13, .32] (see Fig. 2).[9] Decomposing this interaction from one perspective, the traditional attitude strength effect of certainty on stability emerges for relatively unambivalent attitudes but decreases, and even reverses, as ambivalence increases. That is, at a relatively low level of ambivalence (1 *SD* below the mean), the positive certainty–stability relationship emerges whereby more certainty is associated with greater stability, $B = -.25$, $t(402) = -2.56$, $p = .01$, 95% CI: [−.44, −.06]. At a relatively high degree of ambivalence (1 *SD* above the mean), however, the certainty effect reverses, and greater certainty is associated with greater instability, $B = .20$, $t(402) = 2.02$, $p = .04$, 95% CI: [.01, .39].

From a different perspective, certainty moderates the ambivalence–stability relationship. At a relatively high level of certainty (1 *SD* above the mean), greater ambivalence is associated with increased temporal instability, $B = .31$, $t(402) = 2.99$, $p = .003$, 95% CI: [.10, .51]. At a relatively low level of certainty (1 *SD* below the mean), however, the effect reverses in direction but not significantly, $B = -.16$, $t(402) = -1.58$, $p = .12$, 95% CI: [−.36, .04].

[9] The interaction is also significant when extremity is not entered as a covariate, $B = .22$, $t(403) = 4.45$, $p < .001$, 95% CI: [.12, .31].

Notably, neither of the dummy variables further moderated the certainty × ambivalence effect, $ps > .82$, suggesting that the interaction effect is not dependent on individual study. In other words, the key interaction does not depend on a specific attitude object or participant sample.

8. An alternative to the temporal stability account

Having demonstrated that the interaction of ambivalence and certainty in predicting temporal stability is robust across our three studies, we took advantage of the power of the combined dataset to examine a possible novel alternative account for the observed effects. This alternative holds that instead of indexing stability across time, our results may instead reflect instability (i.e., unreliability) in people's responses to individual attitude items, which would be apparent even at time 1. Or put differently, perhaps the interaction is related to instability (unreliability) in expressing attitudes at time 1 and this is responsible for the observed instability over time. Achen (1975), in fact, proposed that attitude instability over time can either reflect actual changes in the attitude over time (test–retest reliability), inconsistent responses to individual questions (internal reliability), or a combination of the two. To our knowledge, this important issue about attitude stability has never been addressed in any prior research on the roles of certainty or ambivalence in predicting attitude stability over time.

If inconsistent responses to individual attitude measures at time 1 fully account for measures of temporal instability, researchers would be able to diagnose such temporal instability and the factors that produce it very efficiently without needing a longitudinal design. On the other hand, if the variance in individual question responses at time 1 does not correspond to how much the average ratings change over time, then the results we have reported in the previous studies are, in fact, reflective of temporal change and not simply measurement variance. Finally, it may be that ambivalence and certainty predict both varieties of response instability but do so independently.

To address this interesting issue, we created a measure of time 1 attitude response variance by computing the standard deviation of (unstandardized) responses to the three semantic differential items that were used to create the composite time 1 attitude variables for each study. We then entered this as the dependent variable in the same hierarchical multiple regression model used to predict the temporal instability effects across studies. The following analysis only considers participants who completed their respective follow-up studies, but results do not differ when considering the full sample.

There is a main effect of extremity in which responses to individual semantic differentials were lower in variability as attitude extremity increased, $B = -.15$, $t(407) = -3.49$, $p = .001$, 95% CI: [.11, .45]. There was also a marginal main effect of certainty such that the more confident a person was in his or her average attitude, the less variable were the individual semantic differential responses, $B = -.07$, $t(407) = -1.72$, $p = .09$, 95% CI: [−.14, .01]. The main effect of ambivalence was not significant but was in the direction of more ambivalence predicting more unreliability, $B = .04$, $t(407) = 1.07$, $p = .29$, 95% CI: [−.04, .12].

Most interestingly, ambivalence and certainty interacted to predict time 1 attitude response variance, $B = .11$, $t(402) = 3.14$, $p = .002$, 95% CI: [.04, .18], similar to the way they interacted to predict temporal stability. At relatively low ambivalence (1 *SD* below the mean), certainty is negatively related to individual response variance, $B = -.15$, $t(402) = -2.21$, $p = .03$, 95% CI: [−.28, −.02], but at relatively high ambivalence (1 *SD* above the mean), certainty is not reliably related to response variance, $B = .06$, $t(402) = .92$, $p = .36$, 95% CI: [−.07, .19]. Similarly, at relatively high certainty (1 *SD* above the mean), ambivalence is positively related to response variance, $B = .15$, $t(402) = 2.16$, $p = .03$, 95% CI: [.01, .29], but there is no effect of ambivalence at relatively low certainty (1 *SD* below the mean), $B = -.07$, $t(402) = -.96$, $p = .34$, 95% CI: [−.21, .07].[10]

The certainty × ambivalence interaction, however, is further moderated by study—specifically, there was a 3-way interaction between the first dummy variable, ambivalence, and certainty, $B = .16$, $t(402) = 2.11$, $p = .04$, 95% CI: [.01, .31]. Decomposing this interaction reveals that the ambivalence × certainty interaction on time 1 attitude response variance is significant in Study 2, $B = .18$, $t(402) = 3.48$, $p < .001$, 95% CI: [.08, .29], but not across the other two studies, $p = .71$.

Importantly, time 1 attitude response variance does not correlate with temporal stability, $r(412) = .04$, $p = .39$, and the previously reported ambivalence × certainty interaction predicting temporal stability as well as the three key simple effects remain significant, $ps < .05$, even after entering time 1 attitude response variance as a covariate. Thus, ambivalence interacts with certainty to predict both temporal instability (in all three studies) and individual response inconsistency (at least in one study), but these effects are independent of each other, and initial attitude inconsistency does not account for the temporal instability effects we reported across the three studies. In addition, although the effect on individual response inconsistency emerged only for Study 2, re-analysis of this study in isolation reveals that the ambivalence × certainty interaction on temporal instability remains significant in that study even when controlling for time 1 attitude response variance.

9. General discussion

Across three studies, attitudinal ambivalence and certainty interacted to predict the stability of a person's attitude over time. As ambivalence decreased, there was a stronger positive relationship between certainty and attitude stability—the traditional attitude strength effect of certainty. As ambivalence increased, however, the certainty effect reversed; the more certainty people expressed in their attitudes, the more those attitudes changed over time. Similarly, as certainty increased, there was a stronger positive relationship between ambivalence and attitude instability—the traditional attitude strength effect of ambivalence. As certainty decreased, however, the tendency was for the ambivalence effect to be eliminated or reversed.

At a practical level, practitioners familiar with prior research might have assumed that increasing certainty in people's attitudes by the various techniques available (see Rucker et al., 2014 for a review) would invariably produce more long-lasting attitudes or that reducing ambivalence would invariably produce more stable attitudes. The current research shows that this conclusion is only valid for relatively unambivalent and confidently held attitudes, respectively.

Thus, our results suggest one possible reason why the existing literature on ambivalence, certainty, and stability offers mixed results. Like the previous studies that found support for an attitude strength effect on stability, we also show conditions under which ambivalence and certainty demonstrate their expected effects. However, we also show conditions under which one would fail to find the predicted attitude strength patterns. In our three studies, if we were to only interpret the raw correlations between each strength indicator and attitude stability, as in previous research, we would have found evidence for the separate certainty and ambivalence effects in just one study (Study 3). Examining the interaction between these two variables, however, offered a more nuanced understanding of their relationships with temporal stability.

Notably, these studies drew on a diverse set of issues, and the results held for topics associated with health-related, social, and political matters alike. The results also converge across different measurement approaches. First, results held for two different methods of assessing objective ambivalence, but a measure of the subjective sense of evaluative conflict did not interact with certainty to predict stability. Second, although objective ambivalence interacted with overall attitude certainty, it did not matter whether that certainty was rooted in clarity or correctness.

Why do ambivalence and certainty interact to predict attitude stability? As initially presented in the Introduction, we suggest one potential theoretical account. Following from prior calls to understand the unique attributes of individual attitude strength predictors (Visser, Bizer, & Krosnick, 2006), we first identify ambivalence as an attitudinal attribute that predicts the range of possible evaluations a person can have in response to some object. Indeed, prior research has shown that ambivalent attitudes are particularly sensitive to situational influences, which can make them more variable over time. For example, when attitudes are ambivalent (vs. unambivalent), the evaluations that people report are especially susceptible to contextual variables such as mood (Bell & Esses, 1997) and priming (DeMarree, Morrison, Wheeler, & Petty, 2011; MacDonald & Zanna, 1998; Tourangeau, Rasinski, Bradburn, & D'Andrade, 1989). Therefore, because predominantly positive *or* negative associations come to mind at different times, depending on various situational cues, ambivalence could foster particularly unstable evaluations (see also Sia, Lord, Blessum, Ratcliff, & Lepper, 1997). To this point, Bell and Esses (1997) commented, "individuals who are ambivalent toward a group will display responses toward the group that are unstable. Thus, one cannot easily predict how they will respond to the group unless one knows which dimension of their attitude, the positive or the negative, is likely to come to mind in that context" (p. 1081).

Certainty, however, reflects a metacognitive appraisal that indexes the validity of the evaluations that come to mind in a given moment. Just as people's thoughts inform their summary evaluations more when they have confidence in those thoughts (Briñol & Petty, 2009), relatively confidently held ambivalent attitudes may fluctuate even more than those held with doubt because whichever valenced associations happen to come to mind in a given instance are deemed especially valid, magnifying the natural effect of ambivalence on temporal instability. For relatively unambivalent attitudes, however, the thoughts that come to mind are typically of one valence, and in this case, increasing certainty would further reinforce their stability. Although this explanation seems plausible and accounts for the obtained results, future research could provide additional support for it by manipulating relevant contextual cues (e.g., positive or negative primes). One might then expect an ambivalence × certainty × context interaction on reported evaluations.

An additional mechanism for temporal stability effects may be how much people are able to resist persuasion to information

[10] The interaction and its simple effects do not change when extremity is not entered as a covariate, but in such a model, both certainty, $B = -.11$, $t(408) = -3.16$, $p = .002$, and ambivalence, $B = .10$, $t(408) = 2.75$, $p = .01$, emerge as significant main effects predicting time 1 attitude response variance.

they encounter between measurements. As we reviewed earlier, the only other research documenting a certainty × ambivalence interaction showed effects on persuasion outcomes (Clarkson et al., 2008). However, although "resistance" and "stability" are both attitude strength outcomes, these consequences are not invariably related (Haugtvedt et al., 1994; Petty, Haugtvedt, & Smith, 1995), and in our view, resistance to persuasion does not adequately explain our effects. For instance, although attitudes toward Mitt Romney (Study 3) were likely subjected to much attitude-relevant information in the weeks leading up the election, it is less likely that participants encountered much if any persuasive information about organic food during the one month interval (Study 1). Yet, the effects were the same. Finally, as noted earlier, the resistance effect observed by Clarkson et al. was attributed to the fact that certainty increased the extent of message processing among ambivalent individuals and so the resistance effect only held when the arguments were strong. Even if participants were exposed to messages about the attitude objects used in our research, it seems unlikely that all of them would have been strong enough to elicit favorable thoughts when processed. For example, as noted in footnote 7, the interaction of certainty and ambivalence on Romney attitudes (Study 3) held among participants identifying as both Republicans and Democrats even though messages about Romney would have elicited different reactions in each group.

Another contribution of the current research is that it explored the distinction between objective and subjective ambivalence in Study 1 and Study 2. Although certainty interacted with objective ambivalence, there was no reliable interaction with subjective ambivalence. This again could speak to why these variables interact in the way that they do. That is, rather than magnifying feelings of conflict related to an attitude (i.e., subjective ambivalence), attitude certainty instead interacts with the structural balance of positive and negative associations. It would be informative to examine the roles of objective and subjective ambivalence in producing the attitude resistance effect observed by Clarkson et al. It may well be that the resistance effect is better predicted by subjective ambivalence because it seems reasonable to propose that it is the felt conflict from ambivalence that is responsible for the increased information processing that it engenders. If so, this would provide another example in which resistance and persistence are influenced differently and in which objective and subjective ambivalence have different effects.

The distinction between objective and subjective ambivalence in these studies is also noteworthy in the context of an emerging literature identifying subjective attitude strength indicators, like perceived accessibility, elaboration, and knowledge, as the stronger predictor of various outcomes, compared with the objective measure of the same strength indicator (e.g., Barden & Petty, 2008; Tormala, Clarkson, & Henderson, 2011; Smith, Fabrigar, MacDougall, & Wiesental, 2008). Nevertheless, other perspectives maintain that the objective measure is a better predictor (Bassili, 1996). It is possible, however, that the relative predictive power of objective vs. subjective attitude attributes depends on both the attitude attribute itself and the outcome of interest (e.g., See, Fabrigar, & Petty, 2013). Stability may thus be one attitude strength outcome that is more dependent on an attitude's structural ambivalence than the extent to which a person reports feeling conflicted about his or her attitude. This account is consistent with our proposal that the stability effects observed in these studies correspond to the validation of whichever valenced reaction comes to mind at the moment of attitude measurement.

Although some may have expected subjective ambivalence to play a stronger role in these effects, we argue that feeling conflicted about one's attitude is less important for longitudinal stability than having an attitude with a mix of associations that may be relatively more or less accessible at different times. As an example, Bell and Esses (1997) noted that some accounts of ambivalence maintained that ambivalent attitudes are more susceptible to contextual influences because of the unpleasant experience (i.e., subjective ambivalence) that can accompany them. They found, however, that even when measuring objective ambivalence one week ahead of time, in order to limit the extent to which unpleasant experience would be aroused during the key task, situational primes still affected responses for people with objectively ambivalent, but not unambivalent, attitudes. Still, it remains possible that subjective ambivalence is a stronger predictor of stability in some cases, such as when both positive and negative reactions are simultaneously accessible at both times (see Newby-Clark, McGregor, & Zanna, 2002; Petty et al., 2007b). Future research, however, is necessary to more completely understand the nuances of these effects.

It is also noteworthy that in the combined analysis of all three of our studies, we tested an alternative explanation for our temporal stability effect, namely that the effects were due to the relationship between certainty, ambivalence, and the reliability of the attitude measurement itself. Although uncovering such an effect is quite interesting, the data do not support this as an alternative route to temporal stability. That is, even though evaluative extremity, certainty, and the interaction between certainty and ambivalence significantly predicted the variance in participants' responses to the individual questions that made up the attitude index at time 1, when reliability was controlled, the stability effects remained. The effect on time 1 response variance, however, was only significant in the study assessing alcohol attitudes (Study 2). Although some have suggested that attitude strength variables could affect how accurately attitude measurements reflect a person's actual attitude (Fabrigar, Wegener, & MacDonald, 2010), to our knowledge, our research is the first to demonstrate this empirically. Therefore, this new variable offers a potential addition to the extant attitude strength literature even though it does not account for the temporal stability effects reported here.

Nevertheless, it also worth noting that there was considerable attrition in these three studies, though this is the reality of such longitudinal designs. Of course, when faced with missing data in such designs, one can question whether this biased a study's findings (see Laird, 1988). To this end, we were careful to test for and report any effects of our key predictor variables on rates of participant retention. Although there was no strong evidence that any attitude-relevant variables predicted participants' completion of the follow-up surveys, it remains possible that an unmeasured variable did covary with retention and thus accounts for some of the reported effects. As such, we must bear this possibility in mind when interpreting the results.

In summary, the present research demonstrated an interaction between two commonly identified predictors of attitude strength—ambivalence and certainty—on the extent to which attitudes remain stable over time. Although some researchers have begun considering interactions between a limited set of attitude strength variables (e.g., certainty and importance; Visser, Krosnick, & Simmons, 2003) on some outcomes, attitude strength research could benefit from increased attention to the ways in which strength indicators interact to uniquely predict effects of interest. In addition, this research highlighted the utility of considering interactions between attitude strength indicators for one important strength outcome (stability). However, applying this interaction perspective to other attitude strength outcomes could be similarly beneficial. As we have reviewed, Clarkson et al. (2008) observed interactions between manipulated ambivalence and certainty for resistance to persuasion and information processing—two other strength outcomes. A remaining attitude strength consequence to consider is attitude–behavior consistency. Both ambivalence and certainty have been shown to moderate the consistency between attitudes and relevant behavior and/or behavioral intentions (for reviews, see Armitage & Conner, 2004; Rucker et al., 2014). However, because attitudes also predict behavior better when they are relatively more stable over time (e.g., Doll & Ajzen, 1992, Schwartz, 1978), it is possible that

ambivalence and certainty similarly interact to predict attitude–consistent behavior.

Most importantly, these findings also contribute to the attitude strength literature by exploring a vital, yet underrepresented, outcome of strong attitudes: temporal stability. Although investing in longitudinal designs might be costly, it is important to examine the extent to which attitudes remain stable over time, and that is particularly true for attitudes toward real-world, relevant topics, such as the ones examined in the current studies.

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