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Affective asynchrony and the measurement of the affective attitude component

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How should the affective component of attitudes be conceptualised and measured? Three studies compared measures based on different conceptualisations. Affective attitudes can be: (1) *holistic* reactions to objects or responses derived from spontaneous *images* of the objects; (2) *bipolar* or *unipolar* in structure; and finally (3) *discrete emotional* evaluations (e.g., angry, happy) or more general *valenced* evaluations (e.g., good, bad). It is recommended that further research with self-reports of the affective component include the holistic, unipolar, discrete emotion (HUE) evaluative measures developed in this paper in combination with a holistic bipolar valenced evaluation measure. Our results also supported a hypothesised affective asynchrony effect. Specifically, an affective measure that required more deliberative thought reduced the correspondence between the affective component and intended behaviours/attitudes. Implications for how the affective component may be represented in memory and the impact of that representation on constructed attitudes are discussed briefly.

INTRODUCTION

Human judgement depends heavily on evaluation. Assessments of objects, people, and events appear to be made primarily along an evaluative or attitudinal continuum ranging from good to bad, desirable to undesirable (Osgood, Suci, & Tannenbaum, 1957). The attitudes themselves are thought to consist of three separable components—affective, cognitive, and conative (e.g., Breckler, 1984; Crites, Fabrigar, & Petty, 1994; Ostrom, 1969) with much research focusing on issues related to the first two components (e.g.,

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Giner-Sorolla, 2001; Greenwald, 1968; Millar & Millar, 1998; Millar & Tesser, 1986, 1989). The affective component of attitudes is the focus of the present paper. We outline reasons why this component may be particularly important to behaviour, examine some of its measurement and conceptual issues, and report three studies that empirically examine these issues.

One reason for the behavioural importance of the affective component of attitudes is that it may be accessed more quickly than the cognitive component—"feelings are first" (E. E. Cummings, cited in Zajonc, 1980). For example, Verplanken, Hofstee, and Janssen (1998) demonstrated that participants responded more rapidly to their feelings than their thoughts about attitude objects. This accessibility is important because information accessed earlier may have greater influence on later processing and behaviours (LeDoux, 1996). Ortony, Clore, and Collins (1988) characterise the affective component (they call it "object-based emotion") as "more immediate, more spontaneous, and less affected by accessible cognitive processes than almost all of the other emotions" (p. 156).

Fazio (1995) suggests a second reason why the affective component may be important to behaviours. He speculated that emotional evaluations are seen as more diagnostic of true attitude than nonemotional ones. In support of this notion, Edwards (1990) found that affectively based attitudes were held with more confidence than cognitively based ones. The relative dominance of affect versus cognition, however, might depend on limiting conditions such as which type of information is acquired first (Edwards & von Hippel, 1995), attitude extremity (Giner-Sorolla, 2001), and the extent of conflict between affect and cognitions (Lavine, Thomsen, Zanna, & Borgida, 1998).

Finally, the affective component of attitudes may be particularly important as a direct motivator of behaviour (Peters, 2006). Not only do we appear to automatically classify incoming stimuli as good or bad but these positive and negative evaluations have been linked directly to behavioural predispositions (Bargh & Chartrand, 1999; Chen & Bargh, 1999). Affective persuasion appears to influence both affectively based and cognitively based attitudes whereas cognitive appeals seem to influence cognitively based attitudes but not affectively based ones (e.g., Edwards, 1990; Lewin, 1943; but see also Millar & Millar, 1990).

A substantial amount of research has focused on the affective component of attitudes (and the related concepts of object-based emotions, affect in decision making, and affect in attitudes; Giner-Sorolla, 1999; Lavine et al., 1998; Loewenstein, Weber, Hsee, & Welch, 2001; Mellers, 2000; Ortony et al., 1988; Slovic, Finucane, Peters, & MacGregor, 2002). Little attention, however, has been paid to the link between its conceptualisation and measurement (see Crites et al., 1994, for an exception).

In past research, the affective component has been assessed most frequently as bipolar (e.g., from positive to negative) rather than unipolar (e.g., from not at all positive to very positive) presumably because the majority of attitudes tend to be bipolar (e.g., positive and not negative). However, investigators have increasingly recognised that attitudes can be ambivalent and that we can feel good and bad about the same attitude object (e.g., desire and guilt about eating chocolate cake). Second, the affective component is assessed sometimes with general evaluative scale endpoints such as good and bad[1] and at other times with discrete, qualitatively different emotions such as fear and anger that are then averaged into a single bipolar index or two unipolar indices (Abelson, Kinder, Peters, & Fiske, 1982; Crites et al., 1994; Norman, 1975). Finally, the affective component of attitude is most frequently assessed in a direct fashion (e.g., "Capital punishment makes me feel . . . "), but sometimes is assessed indirectly through a thought-listing exercise followed by affective ratings of those thoughts (Crites et al., 1994; Ickes, Robertson, Tooke, & Teng, 1986; Peters & Slovic, 1996). Each of these existing measures suggest alternative conceptualisations of the affective properties of attitudes.

Despite different conceptualisations of the affective component and growing interest in affective influences across a variety of fields, few studies have systematically examined measurement issues in self-reported affect. Crites et al. (1994), however, examined the reliability of a subset of the affective measures used in the present paper as well as the ability of each measure to predict an overall good–bad attitude. They did not, however, consider how well each measure predicted behavioural intentions. Since some scales may tap less well into the affective feeling component that sparks behavioural predispositions, relations with behavioural intentions are important. In the present paper we compare the reliability and predictability of different measures of the affective component (Studies 1 and 2) and examine the impact of affective measures that differ in the degree of deliberative thought they require (Studies 2 and 3). Our goal is to choose measures that best meet the criteria of ease of use, reliability, and prediction of self-reported behaviours and attitudes across a variety of stimuli.

Bipolar or unipolar. A bipolar representation of the affective component (i.e., a single continuum of affect from positive to negative) has dominated attitude research (e.g., Osgood et al., 1957; see reviews by Cacioppo,

[1] Breckler and Wiggins (1989, 1991) have drawn a theoretical and empirical distinction between the use of the evaluative terms such as good and bad for evaluation (e.g., "Legalised abortion is . . . good/bad") versus the use of these same terms to assess the affective component only (e.g., "Legalised abortion makes me feel . . . good/bad").

Gardner, & Berntson, 1997; Wilson, Lindsey, & Schooler, 2000). Although researchers generally agree that the effects of positive and negative evaluative processes are antagonistic, Cacioppo and his colleagues have proposed that two separate motivational substrates underlie positive and negative processes (Cacioppo et al., 1997). In one study, they found functional independence of positive and negative affect such that the level of positive affect, but not negative affect, toward a roommate predicted friendship and the amount of time spent with the roommate (see also Abelson et al., 1982, in the area of political person perception). In the present paper we consider whether a separation of positive and negative affect leads to better prediction or understanding of attitudes and behaviours.

Valence or discrete emotions that vary in evaluation. In the attitude literature, the affective component has been conceptualised either as valenced evaluation (e.g., Granberg & Brown, 1989; Norman, 1975; Rosenburg & Hovland, 1960) or as discrete emotional responses that vary on an evaluative dimension (e.g., Crites et al., 1994). To the best of our knowledge, the contribution of specific discrete emotions to the prediction of attitudes and intended behaviours has not been examined. This is important because affective attitudes could influence behaviours in an emotion-specific way in addition to a more general evaluation sense. We briefly explored this idea in Study 2.

A bipolar conceptualisation of discrete emotions is problematic because such discrete emotion terms do not always have an exact opposite (e.g., Abelson et al., 1982; Breckler, 1984; Crites et al., 1994; Millar & Tesser, 1986). Nonetheless, due to its common use (e.g., Crites et al., 1994), in Study 1 we included a bipolar discrete emotion measure.

Holistic evaluation vs. evaluation organised by thoughts and images. The affective component is usually conceptualised as a holistic evaluation (e.g., "Overall, how does X make you feel?"). Some researchers, however, have described imagery as a critical element of evaluative processes (cf. Lyman, 1984). Responses to an attitude item have been said to depend "on the symbols it evokes and the affect attached to these symbols" (Tourangeau & Rasinski, 1988).

A thought-listing technique has been used sometimes in attitude research to capture subtle associations and meanings in a survey context (e.g., Crites et al., 1994). Szalay and Deese (1978), for example, proposed a free-association method to measure affective reactions and subjective themes associated with objects. According to Szalay and Deese, the free associations minimise experimenter intervention and biases. They are not filtered; they are immediate, relatively context-free, and spontaneous. Freud (1924), cited in Szalay & Deese, 1978) characterised the free-association process as

"truncated ways of saying something that never gets fully articulated and that, when articulated, must reveal only partially what was meant" (p .13). The association technique is relatively unfocused, but, according to Szalay and Deese, this same lack of focus frees the person from the processes of rationalisation that otherwise might result.

Slovic and his colleagues (Benthin, Slovic, Moran, Severson, Mertz, & Gerrard, 1995; Peters & Slovic, 1996; Slovic, Layman, & Flynn, 1991b; Slovic, Layman, Kraus, Flynn, Chalmers, & Gesell, 1991c) used the technique to examine the affective and semantic content of images produced by free association. In this technique (used in the present paper and hereafter referred to as the bipolar imagery measure) participants are asked to write down or state out loud the first images or thoughts that come to mind when thinking about a stimulus. After producing several images, subjects are asked to return to each image and report their feelings about each image on a 5-point scale ranging from -2 (*very negative*) to $+2$ (*very positive*). These ratings are then averaged; the resulting index has consistently predicted intended behaviours and attitudes. In one paper, Slovic, Flynn, and Layman (1991a) found that affective ratings of images associated with states (e.g., Nevada) were predictive of actual vacation behaviour 18 months later.

A major advantage of the bipolar imagery measure is the opportunity to examine specific image content. For example, Slovic et al. (1991c) used the images produced in their study to demonstrate the public's strong aversion to nuclear waste. Jenkins-Smith (1993) subsequently showed systematic differences in the content of images produced by individuals holding different worldviews. Individuals with an egalitarian worldview in his study were more likely to produce "nuclear" images in response to the stimulus "Nevada" than were individuals with a hierarchical worldview.

The imagery measure also has disadvantages. It lacks any requirement that the images be representative or even relevant to participants' feelings about an object. In addition, the expression of images may interfere with affective feelings and create an asynchrony between affect and intended behaviours. We will return to this issue in Study 2.

The purposes of Study 1 were: (1) to compare the reliability and predictability of different measures of the affective attitude component across a variety of stimuli; and (2) to develop a small set of discrete emotion terms that could be used to measure this component.

STUDY ONE

Method

For Study 1, six affective measures were chosen to represent different ways of conceptualising the affective component. These measures are described

below and are: (a) image-based or holistic; (b) unipolar or bipolar; and (c) discrete or valenced emotions.[2] Each participant responded to each measure for four stimuli.

Stimuli. Two sets of four stimuli were used. All participants ($N = 160$) responded to "nuclear energy" while half the participants ($N = 79$) also responded to "chemical pesticides", "church", and "natural pesticides" and the other half of the participants ($N = 81$) also responded to three cities (i.e., "Las Vegas, Nevada", "Seattle, Washington", and "San Francisco, California"). Stimuli were chosen so that they were about equally positive and negative, so that some stimuli were relatively familiar (e.g., "Seattle, Washington" is familiar to our participants), and others were relatively unfamiliar (i.e., natural and chemical pesticides).

Procedure

Participants always produced imagery for each of the four stimuli first and then continued with the rest of the study. This order was chosen because exposure to the other measures may contaminate the hypothesised spontaneity of the imagery task more than the imagery task might contaminate the other measures according to Szalay and Deese (1978). The effect of order was tested in Studies 2 and 3.

In the imagery task, each participant was asked to provide up to six images for each stimulus. The question was presented as follows for the stimulus, "church":

> Please think about the word "church" for a moment.
>
> When you hear the word "church", what is the first word or image that comes to mind? Still thinking about "church", what is the next word or image that comes to mind? What is the third word or image . . .?

Once images were generated for all four stimuli, participants reported how they felt about each stimulus using six different affective measures. Half of the participants responded to all four stimuli one measure at a time. The other half of the participants completed all of the measures one at a time. No significant order effect emerged, and data from the two orders were combined. Finally, all participants responded to intended behaviour and attitude items for each stimulus and answered demographic questions.

[2] A complete assortment of measures would total eight; we tested only six measures because time constraints would not allow us to include unipolar or bipolar discrete emotion versions of the imagery measure.

Affective measures

Each of the six affective measures consists of a simple average of its individual items. For the image-based measures, the average was calculated from ratings of the images induced by the stimuli (e.g., "church", etc.). In other cases (the holistic measures), an average was calculated from direct ratings of the stimulus.

Measure 1. The bipolar imagery measure—image-based, bipolar, and valenced. On the same line next to each of the images produced by a participant was a series of five numbers from −2 (*very negative*) to +2 (*very positive*). Participants were asked to describe their feelings toward that image by circling one of the numbers.

Measure 2. Unipolar imagery measures—image-based, unipolar, and valenced. Participants were asked to describe their feelings toward each of the images by circling one number on each of two 3-point scales. The first scale ranged from 0 (*not at all negative*) to −2 (*very negative*). The second scale ranged from 0 (*not at all positive*) to +2 (*very positive*). This allowed participants to indicate if they had both positive and negative feelings towards the images they provided.

Measure 3. Holistic, bipolar, and valenced evaluation. Two bipolar, valenced pairs were presented (*dislike/like* and *bad/good*). Participants were asked to describe their feelings holistically (i.e., not through imagery) toward the stimulus by circling a number between −3 and +3 on a 7-point scale.

Measure 4. Holistic, unipolar, valenced evaluations. Four unipolar, valenced terms were presented (like, good, dislike, and bad). Participants were asked to indicate the position that best described their feelings toward the stimulus given by responding on a 4-point scale from 1 (*does not apply/describe*) to 4 (*completely describes*).

Measure 5. Holistic, bipolar, discrete emotion evaluative measure. A list of bipolar discrete emotions was drawn from previous emotion research (Crites et al., 1994; Russell, 1980; Watson & Tellegen, 1985) and was modified based on focus-group discussions. The final instrument included eight bipolar discrete emotion pairs (i.e., love/hate, miserable/delighted, sad/happy, pleased/annoyed, afraid/calm, relaxed/tense, interested/bored, and angry/content). Participants indicated their feelings toward the stimulus by circling a number on a 7-point scale between +3 and −3. A positive emotion term was always next to +3 while the corresponding negative emotion term was next to the −3. The left/right orientation of the positive/

negative pairs was rotated, and the eight bipolar emotion pairs were presented to all participants in a single fixed order. Despite a focused attempt to find discrete-emotion polar opposites, some participants in Study 1 commented that our emotion term pairs were nonetheless not opposites.

Measure 6. Holistic, unipolar, discrete emotion (HUE) evaluative measures. The stimuli were rated on a list of 39 unipolar discrete emotion terms such as angry, upset, and happy for this task. The list included the terms selected for the bipolar discrete-emotion evaluative scale described above as well as 11 terms that are considered basic emotions (Ortony & Turner, 1990). These basic emotion terms (i.e., angry, disgust, afraid, delighted, sad, surprised, contemptuous, upset, guilty, interested, and ashamed) were always presented first to participants. An additional fifteen emotion terms used to describe mood (Ortony & Turner, 1990; Russell, 1980; Watson & Tellegen, 1985; Zevon & Tellegen, 1982) were adapted for this measure. Two terms (regret and hopeful) were included because they have been found important in previous studies (e.g., Mellers, 2000). Five terms included from more than one source were shown only once in the final list of 39 terms. Responses to items could range on a 4-point scale from 1 (*does not apply/describe*) to 4 (*completely describes*). Five positive and five negative terms were selected for the positive and negative HUE measures using a factor analytic procedure.[3] The final terms selected for the positive HUE measure were happy, friendly, enthusiastic, love, and excited and for the negative HUE measure were upset, angry, annoyed, disgust, and afraid. As suggested by Ortony et al. (1988), these terms tend to be cognitively simple and clearly differentiate the valence of the affective reaction to the object.

Dependent variables—behavioural and attitudinal indices. In the last segment of this study, participants responded to items regarding intended behaviours, past behaviours, or attitudes toward each stimulus (see the Appendix for a complete list of behavioural/attitudinal items for each stimulus). For example, pertaining to the stimulus "Las Vegas, Nevada", one of the items was "You have some vacation time coming. How likely are you to vacation in Las Vegas, Nevada?" Participants responded on a scale of 0 (*not at all likely*) to 3 (*very likely*). Participants ($N = 160$) were native English-speaking volunteers from introductory psychology classes at the

[3] Factor analyses were conducted with the 39 discrete emotions terms for each of the five stimuli and then in a general analysis combining all data across the five stimuli. Two similar factors emerged in each analysis and were named positive and negative affect. Convergent and discriminant validity were acceptable. Details are available from the first author.

University of Oregon. Groups of 4 to 10 participants completed the study in about 45 minutes.

Results

Behavioural intent/attitudinal indices. For each stimulus, an index was constructed by averaging its behavioural/attitudinal items. Higher scores reflected greater likelihood or intention of acting in a positive manner toward the stimulus. Each index then was used as the dependent variable in later regression analyses of that stimulus. Reliability of the behavioural intent index was low for two stimuli (chemical pesticides and natural pesticides), and they were dropped from further analyses. Table 1 indicates the means and standard deviations for each remaining index. Participants' mean attitude toward "nuclear energy" in this student sample was similar to attitudes in a nationally representative sample using the identical index (means = 2.36 in this survey and 2.25 reported by Peters & Slovic, 1996). Reliability measures (see Table 2) for all remaining indices of behavioural intentions were acceptable. The alpha coefficients ranged from .69 to .88 (average alpha = .80), and the number of items comprising each index ranged from 2 to 5.

Affective measures—reliability. Because we were interested in different conceptualisations of the affective component, reliability analyses were averaged across the different conceptions and are presented in Table 2.

The holistic methods were more consistently reliable than the imagery methods (average alphas = .89 for all holistic measures and .61 for all imagery measures). Mean alpha coefficients of the holistic methods included simple averages of the bipolar and unipolar valenced-evaluation measures as well as bipolar and unipolar discrete-emotion evaluative methods (Measures

TABLE 1
Study 1: Means and standard deviations for each of the average indices of behavioural intent (see Appendix for the actual items comprising each index)

	N	*Means*	*Standard deviation*
San Francisco, California	80	1.68	0.79
Nuclear energy	159	2.36	0.62
Seattle, Washington	80	1.82	0.74
Church	78	3.52	5.56
Las Vegas, Nevada	80	0.84	0.64

Note: For all stimulus words, a higher score indicates greater acceptance of positive behaviours toward the object. As an example, a higher score for Las Vegas suggests greater likelihood of visiting or relocating to Las Vegas.

TABLE 2
Study 1: Mean alpha coefficients for the three conceptualisations of the affective component (for standardised variables)

	Mean alpha	*Nm/ Nipm*	*San Francisco*	*Nuclear energy*	*Seattle*	*Church*	*Las Vegas*
Dependent variable: intended behaviour/attitude index	0.80		0.83	0.88	0.78	0.82	0.69
(Number of variables)	(2–5)		(4)	(5)	(4)	(2)	(4)
Image-based vs. holistic measures							
Image-based (Measures 1 and 2)	0.61	2/6	0.58	0.51	0.58	0.83	0.58
Holistic (Measures 3, 4, 5 and 6)	0.89	4/2–8	0.86	0.89	0.88	0.93	0.88
Unipolar vs. bipolar measures—holistic measures only							
Unipolar (Measures 4 and 6)	0.87	2/4–5	0.83	0.88	0.84	0.91	0.88
Bipolar (Measures 3 and 5)	0.91	2/2–8	0.90	0.91	0.92	0.95	0.87
Discrete emotion vs. valenced measures—holistic measures only							
Discrete-emotion evaluation (Measures 5 and 6)	0.89	2/5–8	0.89	0.87	0.87	0.93	0.87
Valenced evaluation (Measures 3 and 4)	0.89	2/2–4	0.84	0.92	0.89	0.93	0.89

Note: Measures 1 through 6 correspond to the numbered measures in the methods of Study 1. Nm/Nipm = Number of measures/Number of items per measure.

3, 4, 5, and 6, respectively); the imagery rating average included the bipolar and unipolar imagery methods (Measures 1 and 2, respectively). Because the alpha coefficients were so different for holistic versus imagery measures, the alpha coefficients for the other two dimensions—bipolar versus unipolar and valenced evaluation versus discrete-emotion evaluation—were examined for the holistic measures only.

Few differences existed between these other two dimensions of affective evaluation (alphas = .91 and .87, for the bipolar and unipolar measures, respectively, and alphas = .89 and .89, for the discrete emotion and valenced evaluation measures, respectively). The bipolar average in Table 2 included the bipolar valenced-evaluation measure and the bipolar discrete-emotion evaluative measure (Measures 3 and 5); the unipolar average included the unipolar valenced-evaluation and unipolar discrete-emotion evaluative methods (Measures 4 and 6). The mean alpha coefficient for discrete-emotion evaluation was calculated by averaging the bipolar and unipolar discrete-emotion measures (Measures 5 and 6); the average of the alpha

coefficients for the bipolar and unipolar valenced-evaluation measures comprises the valenced-evaluation dimension (Measures 3 and 4).

Predictive results. Within each of the five stimuli, the affective measures were used to predict the behavioural/attitudinal index in regression analyses. The results (see Table 3 for average results across the three dimensions of affect) are presented as multiple correlations (R) because correlations are thought to be better indicators of effect size than the standard R^2 (D'Andrade & Dart, 1990). The average correlations for the dimensions were calculated in the same manner as the alpha coefficients in the previous paragraph.

Holistic measures did better than image-based measures for all stimuli in their ability to predict intended behaviours and attitudes (average Rs = .56 and .46, respectively), probably due to their higher reliability. The other dimensions of affect did not differ meaningfully in predictive ability. The mean correlations of the behavioural/attitudinal indices with the unipolar and bipolar measures were .55 and .57, respectively. The mean correlations of the discrete-emotion and valenced evaluation measures were .57 and .55, respectively.

Although the unipolar and bipolar measures explained similar proportions of variance, the unipolar measures (the holistic discrete-emotion evaluative measure—HUE—as well as the valence measures) could demonstrate an important advantage. The positive and negative scales

TABLE 3
Study 1: Predicting intended behaviour/attitude index: Mean correlations (adjusted R) for the three conceptualisations of the affective component

Mean correlations	*Mean R*	*San Francisco*	*Nuclear energy*	*Seattle*	*Church*	*Las Vegas*
Image-based vs. holistic measures						
Image-based (Measures 1 and 2)	.46	.56	.46	.48	.46	.34
Holistic (Measures 3, 4, 5, and 6)	.56	.65	.58	.57	.51	.48
Unipolar vs. bipolar measures—holistic measures only						
Unipolar (Measures 4 and 6)	.55	.62	.58	.52	.54	.48
Bipolar (Measures 3 and 5)	.57	.68	.57	.62	.46	.49
Discrete emotion vs. valenced measures—holistic measures only						
Discrete-emotion evaluation (Measures 5 and 6)	.57	.64	.57	.60	.53	.50
Valenced evaluation (Measures 3 and 4)	.55	.67	.58	.55	.47	.47

Note: Measures 1 through 6 correspond to the numbered measures in the methods of Study 1.

showed statistical independence[4] and may allow for the functional independence of positive and negative feelings. Results of Study 1, however, were not conclusive due to variance restriction. For example, negative affective evaluations of "nuclear energy" correlated more highly than positive affective evaluations with attitudes towards "nuclear energy" (Rs = .58 and .24, respectively, using the HUE measures). Positive rather than negative affective evaluations had stronger correlations with intended behaviours and attitudes towards "church", "Seattle", and "San Francisco" (average positive $R = .58$ and average negative $R = .25$ for these three stimuli). However, restricted variance of the less predictive valence likely contributed to the functional independence results. For example, on the scale from 1 to 4, the average score on the negative HUE scale for nuclear energy was 1.9; it was rated only 1.1 on the positive scale. We will examine functional independence again in Study 2.

Discussion

The results of Study 1 indicated that image-based measures were less reliable and predictive than the holistic measures of the affective component. The

[4] *HUE measure correlations and systematic response error*. The oblique (promax) rotation of the general factor analysis from which the HUE scales emerged indicated that the two factors were mostly independent ($r = -.29$). However, Russell and Carroll (1999) suggested that systematic and random error in participants' ratings may cause measures such as this one to appear falsely unipolar, rather than bipolar.

Systematic and random error can be controlled statistically. As did Russell (1979), we focused on statistical control of acquiescent response style (systematic error) and random error. First, acquiescent response bias (i.e., an individual difference in the tendency to agree or disagree consistently with items regardless of content) was calculated by summing responses to all affective evaluation items except the 39 unipolar discrete emotion terms. This summation thus included items for which agreement indicated positive affect as well as items for which agreement indicated negative affect. For the general analysis, this summed response included all stimuli; otherwise, only responses for the relevant stimulus were included. Partial correlations of the positive and negative HUE measures, controlling for acquiescence, were calculated and then were disattenuated for the unreliability of the affect measures.

The final results shifted the correlation between the positive and negative HUE measures in the expected negative direction, but the shift was minor for most stimuli. Prior to correcting for error, the correlation of the positive and negative HUE measures was $-.37$ for the general solution and ranged from $-.06$ to $-.43$ (average $r = -.24$) for each stimulus solution. After partialling out acquiescence and disattenuating the results, the same correlation was $-.44$ for the general solution and ranged from $-.09$ to $-.56$ (average $r = -.27$).

Russell and Carroll (1999) provided a convincing argument that participants' varying interpretations of the response scales would influence the expected correlation for a bipolar relation between positive and negative affect. They estimated that the expected correlation for bipolarity would lie in the range between $r = -.467$ and -1.00. Correlations for four of the five stimuli and the general solution lie outside this range, ruling out strict bipolarity. The correlation for church ($r = -.56$) indicated the possibility of a strict bipolar structure.

results did not, however, unambiguously support a unipolar versus bipolar structure for the affective component. In addition, the distinction between valenced evaluation and discrete-emotion evaluation was not obvious. It could be that the nature of the affective component does not allow individuals to distinguish between valence and discrete emotions (Ortony et al., 1988). Alternatively, Kahneman (1999) suggested that valenced evaluation may adequately represent the affective component in memory even though in real time emotions are experienced with the greater nuance of discrete emotions. Since the affective component is quite similar to the concept of "as-if" emotions, described by Damasio (1994) as learned from past experience and used to guide future choices, it is an interesting question whether we experience this component as smaller versions of full-blown discrete emotions or if a summary good–bad feeling suffices. In Study 2 we examined whether individual discrete emotions were significant predictors of intended behaviours, over and above their evaluative average.

Study 2 was designed: (1) to replicate the main measurement results of Study 1; and (2) to examine whether the strength of association between the affective component and intended behaviours depends on the amount of deliberative processing required.

STUDY TWO

Affective asynchrony

In Study 1, participants produced images to all stimuli prior to responding to any affective measure. Whereas Szalay and Deese (1978) assumed that the imagery method freed participants from rationalisation, Study 2 examined the possibility that producing images first may disrupt affective processes and reduce the correspondence between the affective component and intended behaviours. This reduction is defined as affective asynchrony in the present paper. Several findings support this suspicion. Wilson and his colleagues (Hodges & Wilson, 1993; Schooler, Ohlsson, & Brooks, 1993; Wilson & Schooler, 1991) have demonstrated that verbalisation of reasons can result in the disruption of nonreportable processes in insight problem solving and attitude reports. The verbalisation of images may be similar enough to the verbalisation of reasons that it interferes with nonreportable affective processes. Second, although imagery is frequently considered an important part of the affective component, images are not necessarily conscious and may not be verbalisable even though they contribute to our affective feelings. Instead, "associations among stimuli, responses, and their meanings can exist in the absence of conscious knowledge about them" (Foa & Kozak, 1986, p. 21). Finally, researchers (Hodges & Wilson, 1993; Waenke, Bless, & Biller, 1996) have suggested that the most available

information (even if less important and available only temporarily) will strongly influence current judgement. Producing images may make the information content of these images more available and influential on judgements. We hypothesised that an asynchrony between affect and intended behaviours would emerge from the production of images and that this asynchrony would be seen in suppressed correlations between measures of the affective component and intended behaviours.

Study 2 also attempted to replicate the general results of the first study, with participants responding only to the 10 selected discrete emotion terms of the HUE measure, rather than the 39 terms used in Study 1. In addition, we examined initial evidence with respect to discrete emotions influencing attitudes in an emotion-specific manner above and beyond the HUE scale. Finally, although affective attitudes are frequently assessed as bipolar, the bipolar discrete-emotion evaluative measure was not considered further in Study 2 due to the problematic lack of discrete-emotion opposites and the existence of other measures that performed equally well on the present paper's criteria for use.

Method

In Study 2, each participant ($N = 80$) responded to a series of tasks including measures of imagery and affective attitude for six stimuli (''Seattle, Washington'', ''nuclear energy'', ''church'', ''Las Vegas, Nevada'', ''cigarette smoking'', and ''recycling''). Half of the participants produced images and completed the bipolar imagery measure for each of the six stimuli first, and then responded to holistic unipolar valenced-evaluation items and the holistic unipolar discrete emotion items of the HUE scale. The other half responded to the HUE and holistic unipolar valence items first, and then produced images and completed the bipolar imagery measure. All participants then responded to the holistic bipolar valence measure, the behavioural/attitudinal items, and demographic information.

Results and discussion

The main effects of Study 1 were replicated. The imagery method was less reliable than the holistic measures (average alphas = .63 and .83, respectively) and had lower correlations with intended behaviours/attitudes (average Rs = .37 and .58, respectively). The results also suggest that the reliability of the imagery method cannot be improved because it results from participants producing affectively inconsistent sets of images (e.g., a negative image follows two very positive images). Participants could be asked to produce more images in order to increase reliability, but reliability did not

increase substantially when only the first three images in Study 2 were compared to all six images (average alphas = .63 and .65, respectively). Predictability based on the average of the first three image ratings (vs. six) was somewhat lower (average *r*s = .34 and .38, respectively).

Alternatively, it may be that a combination of holistic and image-based measures will tap into different aspects of the affective component (i.e., more and less deliberative aspects, see Giner-Sorolla, 1999) and provide better prediction of intended behaviours than either type of measure alone. Regression analyses were conducted for each stimulus using its behavioural index as the dependent measure and one holistic measure and the bipolar imagery measure as the independent measures. The imagery measure did not explain significant additional variance in intended behaviours over and above any holistic measure for any stimulus. For example, the nuclear index was regressed onto its holistic bipolar valence measure and its bipolar imagery measure, $R = .67$, $F(2, 78) = 31.2$, $p < .001$. Higher ratings on the holistic bipolar valence measure were associated with greater acceptance of nuclear power ($\beta = .28$, $p < .001$), but the bipolar image ratings were not significantly associated ($p = .50$).

As in Study 1, few differences existed among the other dimensions of affect. The discrete-emotion evaluation and valenced evaluation measures were similar in terms of predictability (average *R*s = .59 and .58, respectively) and reliability (average alphas = .84 and .82, respectively) as were the bipolar and unipolar measures (average *R*s = .57 and .59, respectively, and average alphas = .83 and .82, respectively). Again, the functional independence of positive and negative affect appeared to be largely due to variance restriction. For example, strong negative feelings and few positive feelings existed towards "nuclear energy". Average correlations between the measures were similar to Study 1 and are shown in Table 4.

TABLE 4
Study 2: Mean correlations between measures

			Unipolar valence		*HUE*	
	Bipolar imagery	*Bipolar valence*	*Positive*	*Negative*	*Positive*	*Negative*
Bipolar imagery	—					
Bipolar valence	.62	—				
Unipolar valence						
Positive	.51	.69	—			
Negative	−.36	−.57	−.31	—		
HUE						
Positive	.50	.60	.72	−.25	—	
Negative	−.41	−.52	−.30	.74	−.22	—

In the present analysis we have focused on the evaluative averages of discrete emotion terms. However, might the discrete emotions themselves play a role in the construction of attitudes that is separate from their evaluative average? Hierarchical regression analyses were conducted for each stimulus in order to explore whether specific discrete emotions would explain significant variance in intended behaviours over and above the evaluative HUE scales. Among the six stimuli, only one, "cigarettes", yielded significant results when the group of 10 discrete emotions that comprise the HUE scales were added on top of their evaluative averages; results for the stimulus "Seattle" were marginally significant. For "cigarettes", 6 of the discrete emotions (happy, love, angry, annoyed, disgust, and afraid) added significant prediction. For "Seattle", the discrete emotion excited was the only additional significant predictor. These two stimuli, "cigarettes" and "Seattle", also had the most extreme affective ratings (i.e., the greater of positive or negative HUE ratings was 3.0 for "cigarettes" (negative HUE) and 2.7 for "Seattle" (positive HUE) compared to maximums ranging from 2.1 to 2.5 for the other stimuli). We speculate that as overall affective evaluations become more extreme, specific discrete emotions may be experienced to a certain extent and emerge as important to attitudes. Lerner and Keltner (2000), for example, have demonstrated that individual differences in fear versus anger systematically predict risk responses congruent with the underlying appraisal tendencies. The current HUE measure, because it is intended to be brief, also does not include some potentially important emotion terms such as guilt, shame, and sadness. This brevity may limit the ability of the HUE to show distinctive effects of discrete emotions in some contexts.

Order of image production. In the present study, participants produced images immediately before or after the HUE and unipolar valence measures. Order did not influence the relative predictive value of the four measures tested (e.g., the holistic methods correlated higher with intended behaviours/attitudes than the bipolar imagery measure regardless of order). Also, order of presentation did not significantly alter the average reliability of all affective measures (mean alphas = .76 and .79, for Orders 1 and 2, respectively). The means and standard deviations of behavioural and affective measures also did not differ significantly between the two orders.

The order of image production was hypothesised to influence correlations between measures of the affective component and intended behaviours in two ways. First, the produced images might include unimportant content (i.e., noise). Consistent with this noise hypothesis, the correlations with intended behaviours were always lower for the imagery measure than the holistic measures. Second, image production might disrupt affective

processes. Both hypotheses lead to a prediction of reduced correlations between affective measures that follow image production and intended behaviours. Two measures—the HUE and unipolar valence measures—can be used to examine order effects. When images were produced first, participants completed these two measures after image production. When images were produced third, participants completed these two measures prior to image production.

As hypothesised, the HUE and unipolar valence measures provided less predictability when participants responded to them after rather than before image production (mean Rs = .55 and .56 for the HUE and unipolar valence measure, respectively, prior to image production and mean Rs = .65 and .63, respectively, after image production). Twelve pairs of correlations between the affective component and intended behaviours (six stimuli each for the HUE and unipolar valence measures) were compared on order. In 10 of those 12 pairs, the correlation was lower when the measure was completed after rather than before image production ($p < .05$, based on a sign test using the binomial distribution). See the bottom of Table 5 for a summary of the number of pairs that showed the expected difference in the magnitude of correlations for each stimulus.

Participants responded to the bipolar valence measure after image production in both orders. Based on the theoretical analysis above, the production of images should have disrupted affective processes in both orders at this point. Therefore, the correlations between the bipolar valence measure and intended behaviours should be lower in both orders, and no difference should exist between the orders. However, the order of presentation still suppressed the affect–behaviour relation (the average correlations with the bipolar valence measure were .52 and .61 for images produced first and third, respectively).

It is not clear why the effect persisted for the bipolar valence measure that was placed after image production in both orders. It may be that whatever came first had a powerful effect on all later responses (e.g., Ariely, Loewenstein, & Prelec, 2003). In any event, it appears as if the early verbalisation of images may result in a disruption in nonreportable affective processes and a subsequent suppression of the relation between the affective component and intended behaviour—what we call affective asynchrony.

STUDY THREE

The question remains whether the mere production of images created the affective-asynchrony effect by adding noise, or whether it was caused by the greater deliberation of image verbalisation disrupting affective processes (either through exclusion of some important affective content or through a

TABLE 5

Study 2: Mean correlations between affective and intended-behaviour measures (adjusted *R*) based on the three conceptualisations of the affective component

		Mean R		*Seattle*		*Nuclear*		*Church*		*Las Vegas*		*Cigarettes*		*Recycling*	
Order	*Mean R*	*1**	*2*	*1*	*2*	*1*	*2*	*1*	*2*	*1*	*2*	*1*	*2*	*1*	*2*
Image-based vs. holistic measures															
Image-based (Measure 1)	.37	.32	.42	.45	.23	.09	.56	.53	.53	.36	.60	.35	.36	.13	.26
Holistic (Measures 3, 4, and 6)	.58	.54	.62	.65	.44	.54	.72	.63	.69	.41	.70	.68	.72	.35	.49
Unipolar vs. bipolar measures—holistic measures only															
Unipolar (Measures 4 and 6)	.59	.55	.62	.67	.44	.56	.70	.66	.73	.43	.72	.67	.70	.34	.52
Bipolar (Measure 3)	.57	.52	.61	.61	.44	.51	.76	.57	.61	.37	.65	.71	.78	.37	.43
Discrete emotion vs. valenced measures—holistic measures only															
Discrete-emotion evaluation (Measure 6—HUE scales)	.59	.55	.63	.70	.46	.47	.73	.69	.73	.42	.76	.59	.63	.40	.47
Valenced evaluation (Measures 3 and 4)	.58	.54	.62	.63	.43	.58	.72	.60	.67	.41	.67	.73	.77	.32	.50
Mean *R*—Overall	.54	.49	.58	.60	.39	.43	.68	.60	.65	.40	.67	.60	.63	.29	.43
Sign Test Results of the HUE and unipolar valence measures: Number of correlations between intended behaviour and the affective measure that were weaker when images were produced before rather than after completion of the affective measures (out of 2 possible).				0		2		2		2		2		2	

Note: Measures 1 through 4 and 6 correspond to the numbered measures in the methods of Study 1. *In Order 1, images were produced first. In Order 2, images were produced after participants completed the HUE and unipolar valence measures (Measures 6 and 4, respectively).

change to the process linking affect and behavioural intention). In Study 3, we attempted to replicate the findings of Study 2 and to examine the impact of two forms of image production (silent and verbalised) on the association between the affective attitude component and intended behaviours. We hypothesised that some imagery (particularly more affective imagery) would be difficult to verbalise on paper so that it either would be less available when verbalisation was required or the requirement would result in more deliberation. In either case, normal affective processes would be disrupted, thus creating the affective-asynchrony effect.

Method

In Study 3, each participant ($N = 186$) responded to a series of tasks including measures of imagery and affective attitude for seven stimuli (''nuclear energy'', ''San Francisco, California'', ''cigarettes'', ''recycling'', ''church'', ''Las Vegas, Nevada'', and ''Seattle, Washington''). One-third of the participants (Verbal-First) verbalised images on paper for each of the seven stimuli first; participants did not rate their images on the bipolar imagery measure, however, because these ratings were not possible in the silent imagery of the next condition. They then responded to bipolar valenced-evaluation items, the HUE scale, and unipolar valenced-evaluation items (similar to Order 1 of Study 2). One-third of participants (Silent) completed those same tasks except that instead of verbalising images, they were asked to think about their images silently without writing anything down (e.g., ''Focus your thoughts on any images or pictures that come to mind in response to 'nuclear energy'. Let your mind freely flow among the images and pictures that come to mind until the experimenter tells you to stop''). The last one-third of participants (Verbal-After) responded to the HUE and unipolar valenced-evaluation items first, then produced images and finished by responding on the bipolar valenced-evaluation measure. All participants rated the behavioural items immediately after the affective items.

Several other differences existed relative to the previous methodologies. First, in pretesting we found that 60 seconds per stimulus was an adequate amount of time to complete verbalised and silent imagery. Participants were guided through the imagery task using this timeline. Second, in previous studies, the ranges of the affective measures varied (e.g., a 4-point scale for the unipolar valence measure but a 7-point scale for the bipolar valence measure). In Study 3 we constrained the range of each affective scale to 5 points. Finally, participants rated the extent to which they censored their imagery, the extent to which the images that came to mind were personally relevant, and the extent to which they experienced any sounds, smells, tastes, or body sensations while doing the imagery task. Each of the three items was

rated on a 7-point scale ranging from 0 (*not at all*) to 6 (*extremely*). Participants also provided demographic information.

Results and discussion

Indices of behavioural intent and the affective component of attitude towards each object were constructed as in the previous studies. Reliability (alpha coefficients) and predictability results for the affective measures were similar to those of Studies 1 and 2. See Table 6 for the average predictability results.

We first tested whether the affective-asynchrony results of Study 3 replicated those of Study 2. To do so, we examined order effects on predictability of the Verbal-First condition with the Verbal-After condition on the two measures rated after production in the one condition and before images in the second condition (i.e., the HUE and unipolar valenced-evaluation measures). As hypothesised, the HUE and unipolar valence measures provided less predictability for Verbal-First than Verbal-After participants (mean Rs = .57 and .59 for HUE and unipolar valence measures, respectively, among Verbal-First participants and mean Rs = .63 and .68 among Verbal-After participants, respectively). Fourteen pairs of correlations between the affective and intended-behaviour measures (seven stimuli each for the HUE and unipolar valence measures) were compared on order. Results of a sign test using the binomial distribution revealed that the differences between 10 of 13 non-identical pairs of correlations were in the expected direction. See the bottom of Table 6 for a summary of the number of pairs that showed the expected difference in the magnitude of correlations for each stimulus.

Finally, we turn to a test of potential causes of the affective-asynchrony effect. We hypothesise that the effect may be due to: (1) noise—any produced images could include unimportant content (i.e., noise) that disrupts the correlations (H_1: $r_{\text{Verbal-First}} = r_{\text{Silent}} < r_{\text{Verbal-After}}$); and (2) the greater deliberation required by image verbalisation could disrupt affective processes (H_2: $r_{\text{Verbal-First}} < r_{\text{Silent}} = r_{\text{Verbal-After}}$).

In order to test these hypotheses, the correlations of three affective measures and intended behaviours were compared between Verbal-First and Silent participants. Consistent with our hypothesis, these measures provided less predictability among Verbal-First than Silent participants (mean Rs = .58 and .62, respectively). Twenty-one pairs of correlations between the affective component and intended behaviours (seven stimuli each for the HUE, unipolar valence, and bipolar valence measures) were compared. In 15 of those 21 pairs, the effect was in the predicted direction ($p < .05$, based on a sign test using the binomial distribution). Correlations for Silent

TABLE 6
Study 3: Mean correlations between affective and intended-behaviour measures (*R*)

		Average			*Nuclear energy*			*San Francisco*			*Cigarettes*		
	Overall	*1**	*2*	*3*	*1*	*2*	*3*	*1*	*2*	*3*	*1*	*2*	*3*
Holistic bipolar valenced evaluation (Measure 3)	0.61	0.58	0.62	0.63	0.49	0.66	0.69	0.41	0.62	0.68	0.63	0.80	0.57
Holistic unipolar valenced evaluation (Measure 4)	0.63	0.59	0.61	0.68	0.59	0.65	0.72	0.49	0.63	0.75	0.66	0.68	0.76
HUE (Measure 6)	0.61	0.57	0.64	0.63	0.54	0.64	0.69	0.63	0.69	0.69	0.51	0.67	0.62
Sign Test Results: Number of correlations that were weaker in the first vs. the second condition mentioned													
HUE and unipolar valence measures for Verbal-First and Verbal-After participants		10/13			2/2			2/2			2/2		
All 3 affective measures for Verbal-First and Silent participants		15/21			3/3			3/3			3/3		
HUE and unipolar valence measures for Silent and Verbal-After participants		7/13			2/2			1/1			1/2		

	Recycling			*Church*			*Las Vegas*			*Seattle*		
	*1**	*2*	*3*	*1*	*2*	*3*	*1*	*2*	*3*	*1*	*2*	*3*
Holistic bipolar valenced evaluation (Measure 3)	0.53	0.37	0.56	0.73	0.70	0.69	0.64	0.66	0.57	0.61	0.55	0.64
Holistic unipolar valenced evaluation (Measure 4)	0.44	0.22	0.53	0.71	0.77	0.71	0.61	0.71	0.64	0.66	0.62	0.62
HUE (Measure 6)	0.32	0.41	0.51	0.77	0.81	0.70	0.62	0.69	0.57	0.61	0.54	0.66
Sign Test Results: Number of correlations that were weaker in the first vs. the second condition mentioned												
HUE and unipolar valence measures for Verbal-First and Verbal-After participants	2/2			0/1			1/2			1/2		
All 3 affective measures for Verbal-First and Silent participants	1/3			2/3			3/3			0/3		
HUE and unipolar valence measures for Silent and Verbal-After participants	2/2			0/2			0/2			1/2		

Note: Measures 3, 4, and 6 correspond to the numbered measures in the methods of Study 1. *1 = Verbal-First ($n = 63$); 2 = Silent ($n = 60$); 3 = Verbal-After ($n = 63$).

participants did not differ from those of Verbal-After participants (in 7 of 13 pairs, the correlation was stronger for Silent participants, *ns*).

As expected, Silent participants produced more personally relevant images than a combined group of Verbal-First and Verbal-After participants, means = 4.5 and 4.1, respectively, $t(178) = 2.2$, $p < .05$. Silent participants did not report censoring their images less nor experiencing bodily sensations more than the verbal participants (censorship means = 1.8 and 1.5, *ns*; bodily sensation means = 2.5 and 2.2, *ns*).

GENERAL DISCUSSION

We examined three conceptualisations of the affective component of attitudes: (1) as constructed through imagery or as a holistic evaluation; (2) as unipolar or bipolar in structure; and (3) as represented by discrete emotion evaluation or valence evaluation. The results of Studies 1 and 2 showed that holistic measures (as opposed to image-based measures) were more reliable and predictive. The image measure in combination with the holistic measures did not add to the predictability of intended behaviours compared to the holistic measures alone.

Separating the affective component into positive and negative unipolar measures (as opposed to a single bipolar measure) demonstrated some advantage of functional independence. Some behaviours correlated more highly with positive affective evaluation while other behaviours correlated more highly with negative affective evaluation. These results parallel other findings of the separate influence of positive and negative affective evaluation on behaviours or attitudes (Abelson et al., 1982; Benthin et al., 1995; Cacioppo et al., 1997), but researchers are cautioned that the appearance of functional independence in correlational analyses may result from variance restrictions in the less predictive valence. Future research should consider the conditions under which positive or negative affective attitude has a greater impact on behaviours and attitudes and should also consider the conditions under which unipolar or bipolar structures for the affective component might emerge.

The distinction between discrete-emotion and valenced evaluations also was not clear; their similarity may have been due, however, to our reduction of the discrete emotion items to positive and negative evaluation and to the limited array of discrete-emotion items. Researchers using the HUE measure should consider whether adding items to the HUE such as sadness, shame, or guilt might be helpful in specific contexts. By using the discrete emotion items themselves (rather than their evaluative average), researchers could examine their influence on attitudes. Although some researchers have proposed that the affective component is represented more readily by valenced evaluation

than by discrete emotions (Kahneman, 1999; Ortony et al., 1988), the results of Study 2 indicate that affective attitudes may be more differentiated when the affective attitude is more extreme. These findings are consistent with a hierarchical model of emotion with discrete emotions represented one level below positive and negative evaluations (e.g., Tellegen, Watson, & Clark, 1999). Future research might examine each discrete emotion as a separate affective-motivational system (e.g., Lerner & Keltner, 2000) but also consider that mixed emotions and therefore mixed appraisals often exist in the real world. Current evidence points towards valenced evaluation playing a particularly strong role in our attitudes and risk perceptions when emotions are mixed (Peters, Burraston, & Mertz, 2004).

Green, Goldman, and Salovey (1993) suggested that several brief, but methodologically distinct, measures are likely to be more informative than a single longer measure. This approach allows multiple scales to counteract the effects of systematic response bias such as acquiescence bias. In order to have methodologically distinct scales, the unipolar HUE measures might be used in combination with the bipolar valence measure. Although the bipolar discrete emotion measure could be used with the unipolar valence measures instead, the lack of clear polar opposites for discrete emotions makes this approach more problematic. The HUE plus bipolar valence scales meet the present paper's criteria: ease of use, reliability, and predictive power.

If images are desired (e.g., in order to identify important attributes of a place or object), the order effects of Studies 2 and 3 suggest that the researcher should consider placing them last in a questionnaire. This seems to be particularly true if the researcher is interested in the relation between the affective component and behaviour, since early image production seemed to depress this relation. Researchers should also consider that one common questionnaire technique (i.e., asking participants to write down spontaneous thoughts before continuing with the more structured part of the questionnaire) may reduce the correspondence between later responses.

The present findings are limited to self-reported past and future behaviours. The extent to which these findings will generalise to actual behaviours is unclear. A meta-analysis by Kraus (1995) found that attitudes do substantially predict future actual behaviours although the relationship was stronger with self-reported behaviours. It seems likely that the predictability of actual behaviours would also be lower than that of the self-reported behavioural intentions of the present study. However, some stimuli appeared to elicit more emotional reaction (e.g., "cigarettes"). Because a predisposition to act is considered part of an emotion, the correlation between actual behaviours and the affective component may be compromised less for those stimuli that elicit stronger emotional reactions.

Affect as a less reportable process. It was clear that the holistic measures were more reliable and predictive than the imagery measures. The combined results of Studies 2 and 3 suggest that this difference was the result of image verbalisation disrupting affective processes rather than the result of images introducing noise into the assessment process (although it is possible that verbalised imagery adds noise in a way that silent imagery does not). There is certainly an affective response to imagery, as suggested by the many studies that use imagery as a mood manipulation (e.g., Chung et al., 1996; Martin & Williams, 1990). In these mood-manipulation studies, however, participants generally thought about images, without verbalisation, and the content of the images was unimportant (and unknown) but produced the required mood effect. Suler (1985) found, however, that participants in a verbal-imagery condition reported producing less personally relevant associations and more censored associations relative to participants in a visual-imagery condition. He suggested that translating imagery into the verbal system results in the loss of the representation of affective feeling because the intellectualised verbal processes restrain the spontaneous, affective qualities of the imagery experience. In other words, imagery may allow access to emotional material, but verbalising the images may impair this same access.

In this regard, Schooler et al. (1993) concluded that verbalisation can result in the disruption of nonreportable processes. They asked participants to solve problems that required insight. One group of participants was interrupted and asked to verbalise their strategies while a control group was interrupted to do an unrelated task. The verbalise-strategy group performed significantly worse than the control group. In related work (Wilson & Schooler, 1991) students asked to analyse reasons why they preferred one jam over another agreed less with *Consumer Reports* experts than students who did not analyse reasons prior to expressing their preferences. It may be that the motivation for individuals' choices comes from one source (perhaps affective evaluation), but that individuals can provide rational justifications for their choices that are constructed from a different non-affective source (e.g., Nisbett & Wilson, 1977). This use of a different source may disrupt nonreportable processes (e.g., Schooler et al., 1993), or create noise by making less relevant thoughts more salient. Alternatively, it may create a mismatch between the component of an attitude (either affective or cognitive) cued by verbalising reasons and the component (either affective or cognitive) prominent in the subsequent attitude (Millar & Tesser, 1986, 1989). Verbalising images of an object may create affective asynchrony through any one of these same processes (although the results of Study 3 were inconsistent with the noise hypothesis).

In addition, the present results may be important to how the affective component is represented in memory. Giner-Sorolla (1999) differentiated between two different types of affective attitude components—immediate

and deliberative. He claimed that any self-reported feelings or emotions are more likely to reflect deliberative affect because they potentially include all conscious emotional associations with the object. We suggest, however, that responding to discrete emotion terms may be qualitatively different than producing images or thoughts. The first task requires recognition—a more implicit memory task (e.g., Jennings & Jacoby, 1993); the second task relies more on generation and explicit processes. If the affective component of attitudes is represented in our relatively abstract "semantic memory" rather than "episodic memory" (Ajzen & Sexton, 1999; Tulving, 1983), then the controlled production of thoughts and images may interfere in the more natural automatic expression of affective attitude temporarily and lead to the hypothesised asynchrony effect.

The notion of affective asynchrony may have more general implications for the extent of reliance on the affective component in guiding evaluative judgements (e.g., the affect heuristic, Slovic et al., 2002). Although deliberation can certainly produce feelings when determining the meaning of information (Peters, Västfjäll, Slovic, Mertz, Mazzocco, & Dickert, 2006), the present results suggest that thinking harder can also disrupt affective processes that otherwise would guide judgements. In situations that require active deliberation about objects for which we have previously developed feelings but cannot easily put those feelings into words, input from the affective system may be compromised. When even greater deliberative processing is required (e.g., when reasons are analysed, Wilson & Schooler, 1991, or when an individual is accountable to others, e.g., Tetlock, 1991), reliance on the affective component may be further reduced.[5]

Affective asynchrony is consistent with the notion of constructed attitudes and preferences (Ajzen & Sexton, 1999; Slovic, 1995). In other words, we frequently do not know our own "true" attitudes towards an object or situation. Instead we construct a value from internal and external cues available to us at the time. Affective attitudes, in particular, may strongly influence behaviour, but deliberative efforts may mask affective input and make the affective component temporarily less available as a cue.

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[5] Increases in deliberative thought, however, may impair affective access only when faced with relatively unfamiliar objects (Hodges & Wilson, 1993) or when appropriate dimensions are difficult to identify (Kmett, Arkes, & Jones, 1999).

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APPENDIX

BEHAVIOURAL AND ATTITUDINAL ITEMS USED IN THE INDEX FOR EACH STIMULUS WORD

"Nuclear energy" items—attitudinal, risk perception and acceptance

B96. If your community was faced with a potential shortage of electricity, do you strongly agree, disagree, or strongly disagree that a new nuclear power plant should be built to supply that electricity? [Strongly disagree = 1; Disagree = 2; Agree = 3; Strongly agree = 4]

B97. In light of health concerns about acid rain, damage to the ozone layer, and climate change associated with the burning of coal and oil, America should rely more heavily upon nuclear power to meet its future electricity needs.[Strongly disagree = 1; Disagree = 2; Agree = 3; Strongly agree = 4]

B98. In order to avoid importing energy from other countries to meet our future electricity needs America should rely more heavily upon nuclear power. [Strongly disagree = 1; Disagree = 2; Agree = 3; Strongly agree = 4]

B99. The nuclear power industry says that it is now possible to build a new generation of nuclear power plants that will be safer than existing plants. Assuming the nuclear power industry is correct, I would support such new generation nuclear plants to supply the

country's future electricity needs. [Strongly disagree = 1; Disagree = 2; Agree = 3; Strongly agree = 4]
B100. Please indicate how acceptable nuclear power is to you for meeting the nation's future energy needs. [Not at all acceptable = 1; Slightly acceptable = 2; Moderately acceptable = 3; Very acceptable = 4]

"Las Vegas, Nevada" items—likelihood of behaviour (The same questions were asked for "Seattle, Washington" and "San Francisco, California")

J96. If you had a good job offer in Las Vegas, Nevada, for after graduation, how likely would you be to relocate to this city? [Not at all likely = 0; Slightly likely = 1; Moderately likely = 2; Very likely = 3]
J97. You have some vacation time coming. How likely are you to vacation in Las Vegas, Nevada? [Not at all likely = 0; Slightly likely = 1; Moderately likely = 2; Very likely = 3]
J98. You are nearing retirement. How likely are you to retire to Las Vegas, Nevada? [Not at all likely = 0; Slightly likely = 1; Moderately likely = 2; Very likely = 3]
J99. Your company has asked you to plan an important conference. How likely are you to hold the conference in Las Vegas, Nevada? [Not at all likely = 0; Slightly likely = 1; Moderately likely = 2; Very likely = 3]

"Church" items—self-report of behaviours

C96. How many days out of the year do you attend church services?
C98. How many hours each week do you spend in church-related activities?

"Cigarette" items—self-report of behaviours

L96. How often have you smoked cigarettes in the past six months? [Range = 1–5 where: Never = 1, Occasionally = 3, Frequently = 5]
L97. Does anyone, including yourself, smoke inside your home? [Range = 1–5 where: Never = 1, Occasionally = 3, Frequently = 5]
L98. Do you go to restaurants/bars/other places that allow smoking inside? [Range = 1–5 where: Never = 1, Occasionally = 3, Frequently = 5]
L99. How often do you sit in the smoking sections of restaurants/bars/other places that allow smoking inside? [Range = 1–5 where: Never = 1, Occasionally = 3, Frequently = 5]

"Recycling" items—self-report of behaviours

M96. Do you recycle paper, plastic, or other materials at home? [Range = 1–5 where: Never = 1, Occasionally = 3, Frequently = 5]
M97. Do you recycle paper, plastic, or other materials at work or school? [Range = 1–5 where: Never = 1, Occasionally = 3, Frequently = 5]
M98. Do you pick up other people's garbage and recycle it? [Range = 1–5 where: Never = 1, Occasionally = 3, Frequently = 5]
M99. Do you use a compost heap? [Range = 1–5 where: Never = 1, Occasionally = 3, Frequently = 5]
M100. Do you encourage other people to recycle more than they currently do? [Range = 1–5 where: Never = 1, Occasionally = 3, Frequently = 5]