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DISCRIMINATIVE VALIDATION OF NUMERICAL INDICES OF ATTITUDE AMBIVALENCE

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ABSTRACT

The standard procedure of quantifying ambivalence is to combine estimates of positive and negative attitude components into a numerical index. Several authors developed formulae for this purpose. However, the empirical validity of these measures is under-explored. This study is intended to partly fill this gap and compares the discriminative validity of common ambivalence formulae and one direct measure of ambivalence. One-hundred German students rated their positive and negative evaluations and their ambivalence toward a fictitious person. Discriminative validity was assessed by comparing each measures' scores across five experimental conditions assumed to elicit different levels of ambivalence. The results provide evidence for some discriminative validity of all ambivalence indices, with total effect sizes (% variance attributable to the experimental treatments) ranging from .12 to .21.

INTRODUCTION

Since the 1980s, the interest of social psychologists in attitude ambivalence--defined as the intraindividual copresence of positive and negative evaluations toward the same object--has grown strongly. In the meanwhile, ambivalence has proven relevant for a number of pivotal social psychological topics such as attitude--intention and attitude--behavior consistency (e.g., Jonas, Diehl, & Brömer, 1997; Lavine, Thomsen, Zanna, & Borgida, 1998), information processing (e.g., Bargh, Chaiken, Govender, & Pratto, 1992; Jonas et al., 1997), and prejudice and discrimination (e.g., Bell & Esses, 1997; Katz & Hass, 1988; Katz, Wackenhut, & Hass, 1986; MacDonald & Zanna, 1998).

The most common method of measuring attitude ambivalence is to have subjects provide separate estimates of their negative and positive evaluations of the same object and to combine the two indicators into an ambivalence index. Several authors have suggested formulae for the latter procedure. Table 1 shows the most common ones of these formulae. (1)

Table 1. Formulae for Computing Ambivalence Scores

Name of the Formula	Ambivalence as a Function of *S* and *W*	Authors of the Formula
Gradual threshold model (GTM)	$5W^{0.4} - S^{1/W}$	Priester & Petty (1996)
Griffin	$3W - S$	Thompson et al. (1995)
Katz	SW	Katz et al. (1986)
Kaplan	W	Kaplan (1972)
Scott a	W^2/S	Brown & Farber (1951), Scott (1966)
Scott b	$(2W + 1)/(S + W + 1)$	Scott (1966)

Notes. *S* is the stronger one and *W* is the weaker one of separately measured positive and negative evaluations of the same object. The Griffin and Kaplan formulae are displayed in simplified versions resulting from linear transformations of the original formulae.

Despite their partly widespread use, the empirical validity of these formulae is under-explored. In particular, there is no satisfying answer to the question: What are the empirical consequences of using one formula instead of the others? The present study aims at providing further evidence that helps to answer the question. At first, however, three papers have to be reviewed that also compared the formulae empirically: Thompson et al. (1995) examined the formulae of Griffin, Katz, Kaplan, and the index a of Scott; Breckler (1994) examined the index b of Scott in addition; and Priester and Petty (1996, two studies) examined all formulae shown in Table 1.

In all of these three papers, intercorrelations between the formulae were computed. The intercorrelations between the results of the formulae were generally high: The median of all 46 correlation coefficients reported in the three papers was r = .85 (with *r*s ranging from .34 to .98). In 39 of the 46 cases, the coefficients were above r = .70. The Katz measure consistently correlated least strongly with the other measures: The median correlation coefficient for this measure was r = .71 (with *r*s ranging from .34 to .96).

In addition, Priester and Petty (1996) and Thompson et al. (1995) attempted a congruent validation of the formulae's scores. In both articles, the formulae's outcomes were correlated with the scores of a scale that referred to the experience of ambivalence directly. The validity coefficients ranged from r =. 21 to r = .52, with a median of r = .42. As to the differences between the formulae, the scores of the Katz formula always correlated least strongly with the criterion whereas the Griffin formula, the GTM and the Scott index b correlated most strongly with it. So these three measures repeatedly proved the best ones when directly rated ambivalence was used as validation criterion whereas the validity of the Katz formula was least satisfying.

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However, these studies' approach of congruently validating the formulae's scores is not fully convincing because the empirical validity of the validation criterion, the scores of the direct measures of ambivalence, was not examined. Thompson et al. (1995) already recognized this problem and suggested a discriminative validation of ambivalence measures. Specifically, they proposed to investigate how well various measures discriminated between situations assumed to induce different degrees of ambivalence. To my knowledge, this proposal has not been realized explicitly up to now. However, one study provided implicit evidence of the discriminative power of one of the mentioned ambivalence measures: Jonas et al. (1997) used the rating technique and the formula of Kaplan as manipulation check in two experiments. The authors found that the scores of the Kaplan formula did produce significant differences between the assumed non-ambivalence and ambivalence conditions. This result provides an argument in favor of the Kaplan formula but does not allow to compare it with the other formulae.

In contrast, the present study takes up the suggestion of Thompson et al. consequently. The aim of this study is to assess and compare the discriminative power of the most common ambivalence formulae (namely those listed in Table 1). Furthermore, the correlations of the formulae's scores with direct ratings of ambivalence will be computed in order to find out how robust are the findings reported above.

In the present study, as in one study of Priester and Petty (1996, combined Exp. 2 and 3), ambivalence was manipulated by providing trait lists characterizing fictitious persons. The proportion of positive and negative traits varied so that different degrees of subjective ambivalence were likely. Five experimental conditions with the following numbers of negative vs. positive traits were realized: zero vs. four, one vs. three, two vs. two, three vs. one, and four vs. zero (abbreviated as "0-neg", "1-neg", "2-neg", "3-neg", and "4-neg" in the following).

The ambivalence levels resulting from these conditions were predicted with the ambivalence model of Thompson et al. (1995). These authors stated that the more evaluatively polarized an attitude, the less ambivalence is experienced. So, in the present study, relatively low ambivalence seemed the most probable outcome when the information given was maximally polarized, that is, when only positive or only negative trait words were given (conditions 0-neg and 4-neg). Relatively high ambivalence, on the opposite, was likely in the case of equal numbers of positive and negative traits (condition 2-neg). When the numbers of positive and negative traits were unequal but above zero either (conditions 1-neg and 3-neg), an intermediate level of ambivalence was expected.

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The described procedure of manipulating ambivalence implied that the presented numbers of positive and negative trait words strongly related to the extremity of the resulting positive and negative evaluations of the target person. Therefore an ideal pool of trait words for operationalizing the experimental conditions would met two criteria: First, the words were considered positive or negative by all participants concordantly. Second, the words' evaluative connotations were equally strong compared with each other and over participants. To get a pool of items that met these criteria as well as possible, a preliminary study was conducted.

PRELIMINARY STUDY

Subjects of the preliminary study were 20 students (18 females, 2 males) belonging to the same population as the sample of the final study (social science and fine arts students of the Catholic University of Eichstätt, Germany). They received a questionnaire with the instruction: "In the following you will find a list of properties that are suitable for characterizing persons. Please judge from your personal view: How positive or negative do you consider each property, assuming that it is a trait of another person?" A list of 15 positive and 14 negative trait words followed in random order. Subjects rated the favorableness of each traits on seven-point scales anchored with positive and negative. The trait list had been derived from Deusinger (1980, chap. 2.1.4). She had investigated the subjective favorableness of more than 100 trait words among German students. The author of the present study had chosen those words that had been rated extremely both by men and women in Deusinger's studies and that seemed suitable for describing a student target person without a particular gender connotation.

For the final study, those trait words were selected that had homogeneously been judged as positive or negative by all subjects of the preliminary study and that had an absolute mean rating above 2 on the scale from -3 and 3. However, the two most extremely evaluated negative words (cruel and brutal) were discarded for reasons of evaluative symmetry as there was no positive word with a similar extreme evaluation.

The selected positive words were, in descending order of mean favorableness: humorous, dependable, honest, sociable, responsible, helpful, kind, righteous, and intelligent. These words' mean evaluations ranged from 2.7 to 2.2 (overall mean 2.5), with all standard deviations under 0.8. The selected negative words were, in descending order of mean unfavorableness: mean, deceitful, dishonest, hostile to children, vengeful, unreliable, and domineering. The mean ratings ranged from -2.7 to -2.1 (overall mean -2.4), with all standard deviations under 1.0.

FINAL STUDY

Method

Subjects of the final study were 100 students of social sciences and fine arts of the Catholic University of Eichstätt, Germany. Seventy-five of the subjects were female, 24 male, and one did not indicate his or her sex. Approximately one half of the subjects were psychology students. For every experimental condition, 20 questionnaires had been prepared and were administered to the subjects on a random basis.

On the first page of the questionnaire, the subjects read the instruction: "Figure a person who is approximately as old as you and a university student. In the following, you will find a list of adjectives referring to this person. Every adjective was reported by another acquaintance of the person. The adjectives are listed in random order. First of all, read the list several times and try to form an impression of the person."

The four trait words followed. To control for the influence of the concrete trait combinations on the ambivalence ratings, the trait words for every questionnaire had been selected by a computer random procedure. Thus, in each experimental condition, the respective numbers of positive and negative traits were constant as described above, but the concrete trait words varied across questionnaires. Moreover, it had been made sure that logically contradictory trait words did not appear on the same questionnaire (in particular: honest and dishonest, dependable and unreliable).

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On the second page of the questionnaire, subjects were instructed to figure and note down one action for every trait, namely an action that the target person might perform in everyday life and that was characteristic for the respective trait. An example followed. This task was intended to make the subjects elaborate their picture of the person and thus to facilitate the subsequent evaluation of the person.

On the third page, sympathy was measured on a 11-point scale anchored with "I find the person likeable" and "I find the person disagreeable". The two measures of ambivalence followed in random order.

The first, indirect measure was to provide the data for the ambivalence formulae and consisted of two items formulated in the style of Kaplan (1972) and Thompson et al. (1995). The first item was: "Now consider only the positive beliefs and feelings the person causes in you and ignore the negative ones. How positive is your evaluation of the person?", followed by a six-point rating scale anchored with "not at all positive" and "very positive". The second item had the same wording with the exception that positive was replaced by negative and vice versa.

The second, direct measure of ambivalence referred to the experience of ambivalence directly and was a shortened and modified version of Priester and Petty's (1996) three-item scale. Subjects had to respond to the instruction: "Now further characterize your thoughts and feelings" on two six-point scales anchored with "My feelings toward the person are mixed" vs. "My feelings toward the person are clear and unambiguous" and "I have contradictory beliefs concerning the person" vs. "I have consistent beliefs concerning the person".

Results

All questionnaires were filled out completely. Thus the size of the total sample equaled 100 for every analysis reported in the following, with $n = 20$ in each experimental condition. All inferential-statistical tests were one-sided with a significance level of alpha < .05 except where indicated

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The means of the positive and negative ratings (scored 1 = not at all to 6 = very) were 3.8 (SD = 1.7) and 3.9 (SD = 1.7), respectively. (2) Negative and positive evaluations correlated moderately with the corresponding number of negative and positive traits (*r*s = .55 and .56, respectively, *p*s < .001). This provided first evidence of the effectiveness of the treatments. Theoretically, the difference between positive and negative evaluations was an estimate of the bipolar overall attitude (Kaplan, 1972). Here this index did strongly relate to the sympathy measure ($r = .82$, $p < .001$). So, in total, the unipolar evaluations seemed to be valid in this study.

For further use, the ratings of the negative and positive evaluations were recoded into the variables "weaker evaluation" and "stronger evaluation". If positive and negative ratings had the same value, this value was coded for both variables. Finally, all ambivalence indices listed in Table 1 were computed from the two variables (see Table 2 for means and standard deviations).

The two direct ratings of ambivalence (scored 1 to 6) were summed to an overall index (M = 6.48; SD = 3.15). This scale had satisfying internal consistency (Cronbach's alpha = .80).

Table 2 shows the correlations between all ambivalence formulae together with the respective means and standard deviations. As in the previous studies cited above (Breckler, 1994; Priester & Petty, 1996; Thompson et al., 1995), the correlations between the formulae's scores were generally high. Again, as in all three papers, the scores of the Katz formula related least strongly to the results of the other measures.

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Table 2. Correlations Between the Ambivalence Measures

Indirect Measures	1.	2.	3.	4.	5.	6.	Direct Measure	*M*	*SD*
1. Griffin	-						.62	2.58	3.83
2. GTM	.92	-					.54	4.56	2.79
3. Kaplan	.96	.88	-				.57	2.58	1.22
4. Katz	.82	.77	.92	-			.45	13.34	6.90
5. Scott a	.97	.81	.83	.96	-		.61	1.63	1.38
6. Scott b	.95	.91	.63	.85	.89	-	.60	0.69	0.20

Notes. All *p*s < .001 for the correlation coefficients, all *n*s = 100.

Table 2 also displays the relationships between the formulae's results and the scores of the direct measure. The highest correlation coefficient was obtained for the Griffin formula, followed by the formulae a and b of Scott, the Kaplan index, the GTM, and--far behind--the Katz formula.

In contrast to the mentioned previous validation studies, the design of the present study allowed to explore whether the empirical convergence between the indirect measures and the direct measure depended on the level of elicited ambivalence. To do so, the correlations between each indirect measure and the direct measure were computed for the conditions with postulated low ambivalence (conditions 0-neg and 4-neg, collapsed), medium ambivalence (conditions 1-neg and 3-neg) and high ambivalence (condition 2-neg) separately. Table 3 shows the results. In general, the more ambivalence had been induced, the greater the overlap between the direct measure's and the indirect measures' scores was. The correlations for low, medium, and high ambivalence ranged from .30 to .46, .49 to .60, and .47 to .69, respectively. The relative positions of the indirect measures were similar across levels of ambivalence: the Katz formula always took last place, and the Griffin and Scott (b) formulae always took first and second place.

Table 3. Correlations Between the Direct Measure and the Indirect Measures for Postulated Low, Medium, and High Ambivalence

Postulated Ambivalence	*n*	Griffin	GTM	Kaplan	Katz	Scott a	Scott b
Low	40	.46**	.41**	.39**	.30*	.41**	.44**
Medium	40	.60***	.50***	.56***	.49***	.58***	.60***
High	20	.66***	.64***	.59**	.47*	.61**	.69***

Notes. Low postulated ambivalence: experimental conditions 0-neg and 4-neg. Medium postulated ambivalence: experimental conditions 1-neg and 3-neg. High postulated ambivalence: experimental condition 2-neg.
*p < .05. **p < .01. ***p < .001.

To test the discriminative power of the measures, first of all, a one-way analysis of variance (ANOVA) was conducted for each ambivalence measure over the five experimental conditions. For each measure, significant overall effects resulted (see the right section of Table 4). The effect sizes (eta squared) indicated that the scores of the Kaplan index related to the treatments most strongly, which explained a fifth of the scores' variance. Slightly smaller proportions of explained variance were found, in decreasing order, for the index a of Scott, the Katz and Griffin formulae, the GTM, and the direct measure. The scores of the Scott formula b were least sensitive to the experimental manipulation: the independent variable explained only about an eighth of their variance. (3)

The cell means (Table 4, middle section) provide more detailed information about the discriminative power of the measures. For ease of interpretation, the scores were *z* standardized, multiplicated by 100, and the mean of the condition 0-neg was added to all scores for each measure. So the ambivalence scores of the 0-neg condition can serve as reference points, and all scores are comparable over measures.

Table 4. Cell Means and Results of Inferential-Statistical Mean Comparisons

Measure	Experimental Condition					Results of the One-way ANOVA	
	0-neg	**1-neg**	**2-neg**	**3-neg**	**4-neg**	***F* (4, 95)**	**Eta²**
Direct	0_A (79)	44 (103)	114_A (111)	65 (85)	43 (92)	3.84**	.161
Griffin	0_A (80)	71 (93)	115_{Aa} (104)	68 (117)	38_a (68)	4.09**	.172
GTM	0_A (109)	85 (89)	112_A (79)	63 (115)	59 (74)	3.84**	.162
Kaplan	0_{aA} (72)	83_a (93)	116_{Ab} (107)	74 (120)	27_b (59)	4.93**	.207
Katz	0_{ab} (72)	88_a (91)	97_b (109)	73 (122)	22 (64)	4.15**	.174
Scott a	0_A (61)	60 (90)	114_{Aa} (120)	68 (119)	23_a (59)	4.37**	.184
Scott b	0_a (103)	56 (86)	102_a (94)	53 (109)	46 (86)	2.89*	.121
Mean	**0**	**70**	**110**	**73**	**37**		**.161**

Notes. The values in the middle section represent means and standard deviations (in parentheses). For each measure, the scores were z standardized, multiplicated by 100, and a constant was added to each score so that the respective mean of the first experimental condition was zero. Cell means having the same subscripts within a row differ at $p < .005$ (lower-case letters) or $p < .001$ (upper-case letters) according to two-sided t tests. 0-neg, 1-neg, 2-neg, 3-neg, 4-neg: experimental conditions with zero through four negative trait words, corresponding to, in order, low, medium, high, medium, and low ambivalence.
$^*p < .05$. $^{**}p < .01$.

Evidently, all measures tended to produce a pattern of means that was consistent with the expectations: The highest scores were obtained for the condition with equal numbers of positive and negative traits (2-neg), the lowest scores for the two conditions with unipolar either positive or negative information (0-neg and 4-neg).

This expected pattern was combined with an unexpected trend: the scores of each measure tended to be higher in the case of negative unipolar information (4-neg) compared to the case of positive unipolar information (0-neg). On average, the difference between these two conditions equaled approximately one third of the standard deviations (here: 100 for each measure). As will be shown in the following, this tendency was not significant. Nevertheless, since there are plausible post hoc explanations for this tendency, it will be taken up again in the Conclusions section.

Inferential-statistical comparisons between the treatments provided additional indicators of the measures' discriminative ability. As mentioned above, the five conditions were expected to correspond to three distinguishable levels of ambivalence: 0-neg and 4-neg to a low level, 1-neg and 3-neg to a medium level, and 2-neg to a high level. So the ambivalence scores in conditions 0-neg and 4-neg should be significantly lower than in conditions 1-neg and 3-neg on the one hand and condition 2-neg on the other hand; the scores in conditions 1-neg and 3-neg should be significantly lower than in condition 2-neg. These hypotheses were tested through contrasts based on one-sided t tests for every ambivalence measure. Table 5 displays the results. Since the formulae of Griffin, Kaplan, Katz, Scott (a), and the GTM produced significantly differences in variances between cells (*p*s < .05 according to the Levene test), the estimated variance for the *t* test was derived from the contrasted samples for each measure (and not from the total sample), and the degrees of freedom of the *t* value were corrected to compensate for heterogeneous variances. (4)

Table 5. Comparison of Experimental Conditions with Postulated Low, Medium, and High Ambivalence

Measure	Compared Levels of Postulated Ambivalence		
	High vs. Low	**Medium vs. Low**	**High vs. Medium**
Direct	$t(30.5) = 3.28$**	$t(73) = 1.65$	$t(33) = 2.05$*
Griffin	$t(28.9) = 3.67$***	$t(65.1) = 2.46$**	$t(38.3) = 1.59$
GTM	$t(42.9) = 3.57$***	$t(69) = 2.07$*	$t(46.9) = 1.53$
Kaplan	$t(26.4) = 3.92$***	$t(59.8) = 3.26$**	$t(38) = 1.27$
Katz	$t(26.6) = 3.24$**	$t(60) = 3.46$***	$t(37.1) = 0.57$
Scott a	$t(23.9) = 3.58$**	$t(56.6) = 2.74$**	$t(33.7) = 1.57$
Scott b	$t(38.3) = 3.12$**	$t(72.8) = 1.52$	$t(39.2) = 1.83$*

Notes. High postulated ambivalence: experimental condition 2-neg. Medium postulated ambivalence: experimental conditions 1-neg and 3-neg. Low postulated ambivalence: experimental conditions 0-neg and 4-neg.
*$p < .05$. **$p < .01$. ***$p < .001$.

All measures detected the greatest postulated difference (high vs. low ambivalence) with at least high significance. As to comparisons involving the conditions with predicted medium levels of ambivalence, more substantial differences between the measures emerged: No measure except the direct measure and the Scott index b discriminated significantly between the conditions with supposed high and medium ambivalence. These two measures, on the other hand, were the only ones failing to distinguish significantly between the conditions with supposed low and medium ambivalence. In this respect, the Katz and Kaplan formulae proved best, that is, allowed to reject the H0 with lower error probabilities than the other measures.

To further explore the discriminative qualities of each measure, two-sided *t* tests were conducted for all possible pairs of cell means. As the aim of the pairwise comparisons was to detect also unexpected differences, the *t* tests required an adjusted significance level. It was reduced to alpha = .005 through Bonferroni correction (given ten pair comparisons for each measure).

Table 4 shows that all measures significantly discriminated between the 2-neg condition (supposed high ambivalence) and the 0-neg condition (one of the two conditions with supposed low ambivalence). These differences were least pronounced for the Katz and Scott b formulae. In the case of the symmetric comparison 2-neg vs. 4-neg, all measures showed less discriminative power, as the higher error probabilities indicate. Only the differences obtained for the Kaplan, Griffin, and Scott a formulae were significant here.

However, most measures failed to differentiate each of the two medium ambivalence conditions (1-neg, 3-neg) from the other conditions. The only exceptions were the formulae of Katz and Kaplan, which produced significant differences between the 0-neg and 1-neg condition.

CONCLUSION

The congruent validity coefficients obtained in this study (i.e. the correlations between the formulae's scores and the direct ambivalence ratings) exceeded the corresponding coefficients reported in the relevant previous papers (Priester & Petty, 1996; Thompson et al., 1995). This may indicate a higher validity of the formulae's scores and/or the direct ratings in this study. The relative positions of the Griffin and the Katz formulae proved the most stable ones: As in the mentioned previous studies, the Katz formula accounted for the lowest congruent validity coefficient and the Griffin formulae for one of the two greatest coefficients.

Furthermore--and more importantly in the present context--, all ambivalence measures had some discriminative validity: Every measure significantly discriminated between two of three postulated levels of ambivalence and between at least one pair of experimental conditions in the expected direction; no measure produced significant cell differences that were contrary to the expectations. Given some generality of these results, they suggest that all formulae had sufficient discriminative power if they were used to detect rather big differences in ambivalence between populations (approximately corresponding to the difference between the 0-neg and 2-neg condition or above). In contrast, in the case of rather small population differences in ambivalence, some formulae may assign significantly different scores to the compared samples while other formulae may not when applied to the same raw data. According to the results of the present study, the Kaplan measure seems to be the one that is most likely to belong to the first group. However, given the small sample size, this superiority may well have been due to chance. In particular, it may well be that one of the only slightly inferior indices (Griffin, Katz, and Scott a) would take first place in a replication study. So all conclusions about differences between the measures are preliminary and almost speculative until further studies on the discriminative validity of the measures are available.

A specific limitation of the direct measure used in the present study is that it referred only to conflict *within* the affective or cognitive domain. In addition, ambivalence can result from a conflict *between* affect and cognition ('When your heart tells you one thing and your mind tells you another thing'; see MacDonald & Zanna, 1998; Thompson et al., 1995). The empirical validity of the direct measure might have been higher if items tapping such affective--cognitive ambivalence would have been included (e.g., like in the scale of Jamieson, 1988).

Other limitations of the present study may result from the fact that it used a very specific sample (German students of fine arts and social sciences), artificial and only one sort of target objects (fictitious persons) and experimentally induced evaluations. So the results might not be generalizible to other populations, to other, in particular: natural objects, and to more stable evaluations. However, the finding that the correlational results of this study were similar to those of the relevant previous studies in some respect (namely in the relative convergent validity of the Griffin and Katz formulae) suggests that the data had some qualities similar to those obtained for other populations and target objects (i.e., for those of Priester and Petty, 1996, and Thompson et al., 1995: American and Canadian college students and diverse, partly natural topics, e.g., political issues). This may justify the above tentative general conclusions about the measures' discriminative validity.

Future attempts to validate the formulae should use more heterogeneous populations (including non-college populations) and various, also natural evaluation objects to increase the generality of the results. In addition, future studies could compare the validity of several direct measures of ambivalence (e.g., the scales of Jamieson, 1988; Priester & Petty, 1996) with each other and with the indirect measures. The direct measure of the present study had only moderate discriminative power compared to the indirect measures. So it does not seem to be a superior alternative. In general, the assessment of unipolar evaluations (which is necessary for applying the ambivalence formulae) has genuine advantages: It allows to compute the intensity ($S + W$), strength of polarization ($S - W$) and direction (positive minus negative evaluation) of the overall evaluation in addition to ambivalence. So the indirect approach to the assessment of ambivalence will seem more advantageous than the use of direct measures unless a clear empirical superiority of the latter will be proven. Moreover, future validation studies could include other, albeit less common methods of assessing ambivalence, for example, open-ended questions (Bell et al., 1996) and the adjective lists of Cacioppo, Gardner, and Berntson (1997).

An additional, unexpected finding of the current research was the tendency of both the direct ambivalence ratings and the formulae's scores to indicate stronger ambivalence in the negative univalent condition (4-neg) compared to the positive univalent condition (0-neg). Finally, This finding shall be discussed since it suggests further topics for future research.

A possible explanation for this tendency is that a person possessing only negative attributes is not compatible with everyday experiences so that the participants ascribed additional, positive traits to the target person in the 0-neg condition. As a result, the participants may have associated evaluative inconsistent and therefore ambivalence-inducing information with the target person, although the information given was evaluatively consistent.

Another reason may be that evaluating a person very negatively--as the participants were forced to do in the 4-neg condition--interfered with social norms or values expressing a need of judging people benevolently (e.g., the value of charity to one's neighbor). Thus subjects may have felt a conflict between affect-based dislike of and norm-based benevolence toward the target person in that condition. This conflict, too, would have fostered ambivalence toward the target person.

The attitude model of Cacioppo and Berntson (1994; also Cacioppo et al., 1997) provides a more general explanation for the observed tendency. Cacioppo and Berntson assumed that people evaluate any object with a "positivity offset". This model predicts that, even if no information about an object is available, people evaluate that object slightly positively. Given that positive and negative evaluative processes are independent (as Cacioppo and Berntson suggest and the very concept of ambivalence implies), it follows from this model that negative evaluations are always mixed with positive evaluations (equaling at least the amount of the positivity offset) and thus always produce a certain amount of ambivalence. This, too, would explain why providing purely negative information in this study tended to result in more ambivalence than providing purely positive information.

Future research could explore the stability and generality of the positive--negative asymmetry appearing in the present study. In the next step, the determinants of this effect could be investigated. To do so, for example, one could compare ambivalence across objects associated with different norms or values or manipulate the salience of norms or values before assessing ambivalence (see Study 2 of Katz & Hass, 1988, for an example of the latter procedure).

FOOTNOTES

(1) To the author's knowledge, only three further ambivalence formulae besides those listed in the table have been suggested in the literature. These formulae were not considered in the following for different reasons: Bell, Esses, and Maio's (1996) formula actually is a linear transformation of the Griffin formula so that it would provide redundant scores in the present study; Priester and Petty's (1996) so-called abrupt threshold model, a preliminary version of their GTM, holds practical disadvantages (an additional, independent indicator of ambivalence is necessary to specify one parameter of the formula); Hewstone's (1986, p. 126) ambivalence formula ($W + S$), which was only used in that study, evidently corresponds to a measure of evaluation intensity and therefore cannot be considered an ambivalence index. Note that the latter is also true for the Katz measure--a critique mentioned in the most important recent reviews of ambivalence measures (Breckler, 1994; Priester & Petty, 1996; Thompson et al., 1995) and therefore probably well-known among ambivalence researchers in the meanwhile. Nevertheless, the Katz measure was considered here because of its relatively frequent use in previous research and to enable complete comparisons of the present study's correlational results with those of the three mentioned reviews.

(2) Note that for some measures (namely GTM, Katz, and Scott a) it makes a difference whether the ratings are scored 0 to 5 or 1 to 6. Since the GTM is not applicable to the former case (*W* must not equal zero), the ratings were scored 1 to 6 for all analyses reported herein. Additional analyses revealed that the use of scores from 0 to 5 did not change the results substantially in general. The exceptions are mentioned in the following.

(3) The relative positions of the measures depended on how the raw data had been scored. In particular, when the Katz and Scott (a) index were applied to ratings scored 0 to 5 (instead of 1 to 6), the effect sizes (eta squared) for these measures decreased to .146 and .158, respectively. However, all other pivotal results reported in the following (numbers and types of significant between-cell differences; levels of *p*) were not affected by the coding system.

(4) As an ANOVA theoretically requires homogeneity of the variances of the compared samples, the ANOVA results reported above might appear questionable for the formulae producing heterogeneous sample variances. However, according to Glass, Peckham, and Sanders (1972), an ANOVA is robust against heterogeneity of variances if the compared samples have the same size. The current research met this assumption.

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