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List Context Effects in Evaluative Priming

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Abstract

Evaluative priming effects are often found in the evaluative decision task, in which persons judge the affective connotation (positive versus negative) of a target word that is preceded by a prime word. The present experiments examined list-context effects to test explicitly whether evaluative and semantic priming follow the same laws. In Experiment 1, evaluative priming was found at prime-target stimulus onset asynchronies (SOAs) of 0 ms and 100 ms, but not for SOAs of -100, 600, and 1200 ms. Experiment 2 manipulated SOA (0, 200, and 1200 ms) and the proportion (25%, 50%, and 75%) of the prime-target pairs that were evaluatively related. Contrary to the typical finding that increases in the proportion of related prime-target pairs lead to increased priming effects at long but not short SOAs, we found an effect of consistency proportion at SOAs of 0 ms (for RTs) and 200 ms (in the accuracy data), but not at the 1200 ms SOA. The pattern of results is discussed in relation to possible explanatory mechanisms of evaluative priming.

List Context Effects in Evaluative Priming

Several recent theories of affect, emotion, and attitude assume that the affective connotations of environmental stimuli are evaluated very fast and with minimal cognitive processing. The activated affective connotations of environmental stimuli are furthermore assumed to influence subsequent emotional and cognitive processes (for example, Bargh, Litt, Pratto, & Spielman, 1989; Fazio, Sanbonmatsu, Powell, & Kardes, 1986; Murphy & Zajonc, 1993; Greenwald & Banaji, 1995).
Fazio et al. (1986) employed an evaluative decision task, in which persons judge the affective connotation (positive versus negative) of an evaluatively polarized target word. The target word was preceded by a prime word for which no judgment was required. When the stimulus onset asynchrony (SOA) of prime and

target was 300 ms, faster evaluative decisions were observed when the target was preceded by an evaluatively consistent prime, relative to a neutral or an evaluatively inconsistent prime. This evaluative priming effect was eliminated, however, at an SOA of 1000 ms. Hermans, De Houwer, and Eelen (1994) replicated this same pattern of results, using affectively polarized pictures as primes and targets (cf. also Wentura, 1994).

While Fazio et al. (1986) reported priming effects to the extent to which prime words were associated with highly accessible affective connotations as indexed, for example, by evaluation latency, Bargh, Chaiken, Govender, and Pratto (1992) showed that evaluative priming effects can be obtained even when the affective connotation is not highly accessible (but see Fazio 1993; Chaiken & Bargh, 1993; cf. also Greenwald, Klinger, & Liu, 1989). A recent series of experiments by Greenwald, Klinger, and Schuh (1995), using somewhat different procedures and materials, casts some doubt on the generality of evaluative priming effects in the evaluative decision task, however, because no priming effects were obtained with visible primes and SOAs of 250 ms or 300 ms. When masked prime words were used, priming effects were found in the error data, but not in response latencies.

Similar evaluative priming effects have also been observed in a number of other tasks such as the lexical decision task (Hill & Kemp-Wheeler, 1989; Kemp-Wheeler & Hill, 1992; Wentura, 1994), the naming task (Hermans et al., 1994; Bargh, Chaiken, Raymond, & Hymes, 1995), ratings of liking (Murphy and Zajonc, 1993; Murphy, Monahan, & Zajonc, 1995) as well as miscellaneous other tasks (for example, Dovidio, Evans, & Tyler, 1986; Klauer & Stern, 1992; Perdue, Dovidio, Gurtman & Tyler, 1990; Wyer & Srull, 1980).

Explanations of evaluative priming effects frequently advance mechanisms similar to those proposed for semantic priming. Bower (1991), Fazio et al. (1986), and Murphy and Zajonc (1993) all propose similar mechanisms that can be couched in terms of automatic spreading activation. Roughly speaking, the affective connotation of the prime stimulus is activated automatically and very quickly upon its presentation.

This affective activation may be integrated with the affective activation elicited by the target, leading to facilitation of evaluative decisions about evaluatively consistent, relative to neutral or evaluatively inconsistent, targets. An even closer analogy to mechanisms discussed in the context of semantic priming is a spreading-activation account at the level of the nodes of a semantic network that is also considered by these same authors. According to this account, activation in the node of the priming word spreads to nodes linked to it directly or via intermediate nodes in a vast semantic network (Hermans et al., 1994). Thereby, the time required for the activation levels to exceed recognition threshold in the activated nodes is reduced.

If the spread of activation is assumed to be unlimited in capacity (Posner & Snyder, 1975), and if it is assumed that nodes of words with equal affective connotation are all linked directly or via intermediate nodes (Bower, 1991), then evaluative priming is predicted.

The present series of experiments was designed to test the analogy drawn between semantic priming on the one hand and evaluative priming on the other hand with respect to one particular phenomenon observed in the context of semantic priming, namely the so-called relatedness proportion effect. In the context of semantic priming, the relatedness proportion refers to the proportion of semantically related word-primes and word-targets. The well-known relatedness proportion effect is the phenomenon that the magnitude of semantic priming effects increases as the relatedness proportion increases. The effect is obtained at prime-target SOAs longer than 500 ms (de Groot, 1984; den Heyer, 1985; den Heyer, Briand, & Dannenbring, 1983; Neely, Keefe, & Ross, 1989; Seidenberg, Waters, Sanders, & Langer, 1984; Tweedy, Lapinski, & Schvaneveldt, 1984), and is decreased or eliminated at prime-target SOAs of 250 ms or less (de Groot, 1984; den Heyer et al., 1983; Stolz & Neely, 1995). It is assumed to reflect the operation of slow-acting, controlled processes in the form of expectancy-based strategies or post-lexical mechanisms (Neely, 1991).

In the context of evaluative priming, the proportion of evaluatively consistent prime-target pairs can be varied. In analogy to the relatedness proportion, the consistency proportion (CP) can thus be considered. A possible CP effect would flow most naturally from an expectancy-based response-bias mechanism:

People may use the prime to predict the evaluation of the target. They would do so on the basis of their impression of the proportion of evaluatively consistent, relative to inconsistent, pairs: When CP is high (low), the evaluation of the target is likely to be the same as (the opposite of) that of the prime. People may use their predictions to prepare for the expected response to the target. For example, participants might be biased toward the key-press response that is more likely to follow given the CP. The evaluative decision would thereby be facilitated if the decision maker's prediction is met.

In the literature on evaluative priming, an explicit though untested assumption has in fact been that an SOA of 300 ms is "too brief an interval to permit subjects to develop an active expectancy or response strategy regarding the target adjective that follows" (Bargh et al., 1992, p. 894; cf. Fazio et al., 1986; Hermans et al., 1994).

The assumption is based on the finding that a relatedness proportion effect does not occur in semantic priming with SOAs of 300 ms or less. If the analogy between semantic and evaluative priming holds, the assumption is justified, and a CP effect is therefore expected not to occur at SOAs shorter than 300 ms.

The experiments varied SOA and the proportion of evaluatively consistent, relative to inconsistent, prime-target pairs. In Experiment 1, a fine-grained manipulation of SOA was employed to explore the temporal pattern of priming effects obtained with the procedures and materials used in the present series of experiments. Departing from Experiment 1, Experiment 2 varied the proportion of evaluatively consistent, relative to inconsistent, prime-target pairs (25%, 50%, and 75%) and SOA (0, 200, and 1200 ms).

Experiment 1

In Experiment 1, we sought to examine whether an evaluative priming effect could be obtained with the present materials and procedures and to explore the pattern of a possible priming effect with a number of prime-target SOAs: -100 ms, 0 ms, 100 ms, 200 ms, 600 ms, and 1200 ms. The CP was fixed at a high level of 75% in this experiment so that a possible CP effect would increase any priming effects observed.

Method

Design. Positive and negative words were used as primes and targets. The prime-target pairs therefore varied along the within-subjects factors of (1) prime evaluation and (2) target evaluation. A pair is called evaluatively consistent if both prime and target are of the same sign (both positive or both negative), otherwise it is evaluatively inconsistent.
SOA was varied as a between-subjects factor with levels -100 ms, 0 ms, 100 ms, 200 ms, 600 ms, and 1200 ms.

Materials. Primes and targets were German adjectives, most of them denoting personality traits. They were selected from three sources: (1) Pleasantness norms for 1032 adjectives by Hager, Mecklenbr„uker, M”ller, and Westermann (1985) and M”ller and Hager (1991), (2) evaluation norms for 840 adjectives by Schwibbe, R„der, Schwibbe, Borchardt, and Geiken-Pophanken (1994), and (3) evaluation norms for 832 adjectives by Ostendorf (1994). From each of these sources, the ten percent most positive and the ten percent most negative adjectives were taken.
This procedure yielded a pool of 174 strongly positive adjectives and a pool of 216 strongly negative adjectives. The fact that there are more negative than positive adjectives reflects a larger overlap between sources in positive adjectives.
List Construction. For each participant, a new list of prime-target pairs was constructed according to the principles outlined in the following. Each participant's list consisted of five blocks of 32 prime-target pairs. In each block, 32 positive and 32 negative words were used. They were randomly sampled without replacement from the pools of positive and negative adjectives. Thus, a given adjective occurred only once in a given block. When two evaluatively polarized words are paired to form a prime-target pair, the pair may be classified into one of the following four categories: both prime and target may be positive (+,+), or negative (-,-), the prime may be positive, and the target negative (+,-), or the reverse (-,+). The sampled words were randomly paired to form prime-target pairs with the restrictions that (a) (+,+)-pairs occurred as often as (-,-)-pairs, (b) (+,-)-pairs

occurred as often as (-,+)-pairs, and (c) the proportion of evaluatively consistent pairs ((+,+) and (-,-)-pairs) was 75%. Thus, one block contained 12 (+,+)-, 12 (-,-)-, 4 (+,-)-, and 4 (-,+)-pairs. The order of pairs was randomized within each block.
The first of a participant's five blocks served as a practice block, the remaining four were experimental blocks.
These various counterbalancing measures were to ensure that any effect of evaluative consistency, relative to inconsistency, was not confounded with the evaluations of prime and target considered separately and independently. Since for each participant, the stimulus words were newly sampled from large pools of positive and negative words, the present study also avoided a possible language-as-fixed-effect fallacy (Clark, 1973).

Procedure. Participants were tested individually. All instructions and the five blocks of stimuli were presented on the screen of a personal computer. Participants were allowed to rest briefly between blocks. Each session lasted about 30 minutes.
Instructions were fully subject-paced and presented an experimental trial in a step-by-step fashion, including all feedback messages participants might see in the course of the experiment. Moreover, participants were familiarized with the response keys. Since temporal order did not uniquely identify the target, target and prime were presented in different colours, the target in yellow, the prime word in white.
Participants were told to read both words, but to respond only to the yellow word.
They were told to read the primes but not to respond to them. With respect to targets, they were asked to indicate the targets' evaluations as quickly and accurately as possible. Participants were not informed of the CP. After seeing and reading the instructions, participants had the option to see the instructions again, or to begin with the task itself.
The words of a given pair were presented in lower-case letters within a 6 cm by 5 cm frame in the center of the computer monitor. At the beginning of a trial, the participant saw numbers counting down 3 seconds in the center of the screen. A fixation point followed for a period of 300 ms and vanished 200 ms prior to stimulus

onset. The prime was presented for 200 ms, centered at the position of the fixation point. Before onset of the prime (SOA -100 ms), simultaneously with the prime (SOA 0 ms) or following prime onset (positive SOAs), the target was presented either in the line above or below the prime as determined by a random number generator. The target remained visible until the participant had responded or a time limit of 4 s was exceeded.

Participants made their response by pressing one of two keys. They were instructed to press the key to the left, labeled by a minus sign, to indicate a negative evaluation, and to press the key to the right, labeled by a plus sign, to indicate a positive evaluation. If the participant failed to respond within 4 s, he or she heard a beep and saw the error message that the time limit had been exceeded. Participants responding correctly within 2000 ms were shown their response latency and the message that they had responded correctly. If they required more than 2000 ms for their correct response, they were also asked to respond more quickly. Feedback remained visible for one second, whereafter the next trial was initiated automatically.

In the case of a wrong response, the participant heard a beep and saw the message that the response had been false. Participants who had accumulated more than two errors within a given block were also informed of their number of errors and were told that they were committing too many errors. Participants had to acknowledge error messages by pressing an appropriate key whereupon the next trial was initiated.

Stimulus presentation and measurement of response latencies utilized a software timer and video synchronization by Haussmann (1992). Due to synchronization of video signals in stimulus presentation, the nonzero SOAs actually realized exceeded their nominal values by a small constant of approximately 14 ms. It is important to note, however, that the SOA of 0 ms was realized exactly, so that prime and target were presented simultaneously.

Participants. There were 181 male and female university-of-Heidelberg students majoring in various disciplines who participated. For their efforts, they received a ticket that allowed them to attend a cinema movie of their choice.

In pilot studies with this paradigm, a few participants in conditions with long

SOAs were found to fail to follow the instructions in that they responded to the prime rather than to the subsequent target. The phenomenon became apparent in the post-experimental interviews, and also showed in these persons' data through many unrealistically fast responses as well as many errors for evaluatively inconsistent prime-target pairs. Responding to the prime rather than to the target produces a pattern of results that artifactually suggests a priming effect in the error data. Therefore, a conservative criterion was adopted to screen out persons who might have responded to the prime in this and the following experiments: Persons who in the course of the 128 experimental trials produced more than seven response latencies shorter than 200 ms were excluded from the analysis on suspicion of having responded to the prime. This concerned one of the 181 participants. The person in question was replaced by another participant, so that in each of the six groups spanned by the factor SOA, there was a total of 30 persons for the data analysis.

Results

Response latencies pertaining to false responses were excluded from the analyses. Response latencies that fell above or below two standard deviations from a person's mean latency were replaced with latencies exactly two standard deviations above or below that mean. All results reported as significant are associated with p 05. A person's priming effect PE is evaluated by contrasting inconsistent and consistent pairs (cf., Neely, 1991). Priming effects in terms of response latencies and percent errors are the dependent variables of the subsequent analyses. In linear-model terminology, analyzing the so-defined priming effects is equivalent to looking at effects that involve the interaction of the two within-subjects factors evaluation of prime and evaluation of target. It is also equivalent to analyses of variance that consider consistency of prime and target as an independent variable with two levels. By presenting results in terms of priming effects, PE , we ignore possible effects that do not involve the interaction of prime and target evaluation. For example, a main effect of target evaluation on response latencies or percent errors is usually obtained such that negative targets are responded to more slowly and less accurately than positive targets (Pratto, 1994). Since presentation and discussion of such effects would have detracted from the major hypotheses of the paper, this neglect was considered defensible as a means to enhance the clarity of the exposition.

Table 1 shows the mean latencies and percent errors for each type of pair as a function of SOA. The priming effects are also displayed. For both latencies and percent errors, positive priming effects are observed at the short nonnegative SOAs, whereas there appears to be little priming at the negative SOA and at long SOAs.

Table 1
Response Latencies (in Milliseconds), Percent Errors, and Priming Effects (PE) for Experiment 1

Dependent Variable	SOA	(-,-)	(+,-)	(-,+)	(+,+)	PE	SE(PE)a
Latencies	-100	868	866	799	807	-5	(6)
	0	884	907	859	836	23**	(6)
	100	866	876	829	795	22**	(6)
	200	840	840	779	766	7	(8)
	600	783	779	724	729	5	(7)
	1200	823	818	765	760	0	(4)
Errors	-100	4.9	4.0	4.2	3.8	-0.2	(0.8)
	0	4.8	6.3	3.8	4.1	0.6	(0.7)
	100	5.2	6.7	4.4	3.9	1.0	(0.9)
	200	4.1	5.4	4.0	3.7	0.8	(0.8)
	600	5.4	6.3	3.6	3.9	0.3	(0.8)
	1200	4.8	3.4	4.2	2.5	0.2	(0.7)

a SE(PE)=standard error of the mean
** $p<.01$ two-tailed.

Separate analyses of variance with between-subject factor SOA were performed on the priming effect in terms of response latencies and on the priming effect in terms of percent errors. With respect to response latencies, the overall priming effect was significantly different from zero ($F(1,174) = 7.29$, $MSE = 1194$, a positive priming effect of 7 ms), and there was a significant effect of SOA ($F(5,174) = 4.03$, $MSE = 1194$). No significant effects were found in the error data.

In Table 1, the results of individual t-tests for priming effects in each group are also shown. It is seen that there is evidence for priming effects for latencies only at SOAs of 0 ms and 100 ms.

Discussion

Evaluative priming was observed for the short nonnegative SOAs of 0 ms and 100 ms. No evidence for priming was found at SOAs longer than 100 ms and at the negative SOA. While a number of studies have found priming effects with comparatively long SOAs of 300 to 500 ms (Bargh et al., 1992; Fazio et al., 1986; Greenwald et al., 1989; Hermans et al., 1994), the absence of priming effects at the moderately long SOAs (200 ms and 600 ms) of the present study repeats recent results by Greenwald et al. (1995), who also failed to obtain priming effects in the evaluative decision tasks with SOAs of 250 ms and 300 ms. Greenwald et al. (1995) argue:

Of the various procedural differences between the present and previous studies, one that may explain this difference in findings is the present use of self-initiated trials and, following self-initiation, a fixed brief interval to onset of the prime-target sequence. This procedure was implemented with the aim of maximizing participants' ability to attend to the stimuli. In retrospect, it may have worked too well. Other research indicates that attentional focus can suppress automatic activation (see reviews by Greenwald & Banaji, 1995; Mandler, 1994). (p 38)

Although the present study did not use self-initiation of trials, each trial began with a 3-s countdown, followed by a fixation point and a fixed brief interval to onset of the prime-target sequence, to maximize participants' ability to attend to the stimuli.

The results are consistent with automatic spreading-activation accounts as sketched in the introduction. Because spreading activation is assumed to be an automatic, fast-acting process (Posner & Snyder, 1975; but see Smith, Theodor, & Franklin, 1983; Smith, Besner, & Myoshi, 1994), priming at short nonnegative SOAs (0 ms and 100 ms) can be explained. Furthermore, a serial spreading-activation account would have been questioned by a priming effect at the negative SOA (-100 ms; cf. Kiger & Glass, 1983) although such an effect would have been compatible with some post-lexical accounts of evaluative priming (Klauer & Stern, 1991). Finally, if the activation is assumed to decay quickly, priming is not expected to occur at long SOAs (Murphy & Zajonc, 1993) unless additional strategic and controlled processes come into operation. In fact, even though the CP was high, priming was absent at the 1200 ms SOA. This finding suggests that unlike in the standard semantic priming paradigm, expectancy may not be operating in the evaluative priming paradigm as explained below. The purpose of Experiment 2 was therefore to provide a more explicit and comprehensive test for a possible CP effect and its temporal characteristics.

Experiment 2

Experiment 2 explicitly tested for a CP effect at SOAs of 0 ms, 200 ms, and 1200 ms, respectively. In the context of semantic priming, the temporal characteristics of the relatedness proportion effect are often explained by means of a two-process model that postulates (a) a fast-acting automatic spreading-activation mechanism and (b) a slow-acting expectancy-based strategy (Posner & Snyder, 1975; Becker, 1980, 1985; Neely, 1991), the latter strategy causing the relatedness proportion effect.
Relatedness proportion effects can also be explained by post-lexical mechanisms (Neely, 1991).
If an analogous two-process model is adopted in the context of evaluative priming, a different pattern of results is predicted for each SOA. A CP effect is not expected at short SOAs (0 and 200 ms), because the absence of relatedness proportion effects at short SOAs in the context of semantic priming have been taken to suggest, by analogy, that an SOA of 300 ms or less is too brief an interval to permit the use of an active response strategy in the context of evaluative priming (Bargh et al., 1982; Fazio et al., 1986; Hermans et al., 1994). With simultaneous presentation of prime and target, an overall priming effect should however be obtained, irrespective of CP, due to the operation of the fast-acting spreading-activation component. Based on the assumption of quick decay of activation (cf. Murphy & Zajonc, 1993) and the results of Experiment 1, no priming is expected to occur at the 200 ms SOA.
The data from Experiment 1, indicating the absence of priming at the 1200 ms SOA with a high CP, are difficult to reconcile with the expectation that a CP effect should occur at that SOA. Given an SOA that long, people are generally considered capable of generating expectancies about the target,

departing from the prime (Neely, 1977). To the extent to which the CP differs from 50%, use of the prime to generate an expectation about the likely evaluation of the target (same as prime evaluation for 75% condition, opposite from prime evaluation for 25% condition) is also functional in that it correctly prepares for the required response most of the time. It was therefore considered desirable to replicate the absence of priming with the high CP at the long SOA and to show that a CP effect does not occur at the long SOA.

Method

All aspects of the stimulus materials, procedures, and selection of participants were identical to those of Experiment 1 unless stated otherwise. Different groups of persons worked with lists containing 25%, 50%, or 75% of evaluatively consistent word pairs. A second, orthogonal between-subjects factor was prime-target SOA with levels 0, 200, and 1200 ms.
At the end of the experimental session, participants were asked to indicate their impression of the relative proportion of evaluatively consistent pairs. They did so on a five-point scale ranging from 2 ="many more evaluatively inconsistent than consistent pairs" to +2 ="many more evaluatively consistent than inconsistent pairs".

Participants. There were 274 male and female university-of-Heidelberg students majoring in various disciplines who participated. For their efforts, they received a ticket that allowed them to attend a cinema movie of their choice. In the groups with the 1200 ms SOA, four persons produced seven or more latencies shorter than 200 ms (cf. Experiment 1). They were replaced by other participants, so that in each cell defined by a given SOA and CP, there were 30 participants for the final analysis.
Although the data were collected in three studies, one for each level of SOA, the three studies are first presented in a single analysis. However, the between-subjects analyses involving the factor SOA should be interpreted with caution, because participants were not randomly assigned to the three studies.

Results

Response latencies were preprocessed as in Experiment 1. All results reported as significant are associated with p<05.
Table 2 shows the mean latencies and percent errors for each type of pair as a function of CP. Priming effects P E are also shown. Whereas positive priming effects prevail at the short SOAs of 0 ms and 200 ms for both latencies and percent errors, the data for the 1200 ms SOA are dominated by numerically negative priming effects. The priming effects increase as a function of CP at the short SOAs (0 ms and 200 ms) and at the 200 ms SOA for latencies and percent errors, respectively.

Table 2
Response Latencies (in Milliseconds), Percent Errors, and Priming Effects (PE) as a Function of SOA (ms) and Consistency Proportion

Dependent Variable	SOA	CP	(-,-)	(+,-)	(-,+)	(+,+)	PE	SE(PE)a
Latencies	0	25%	897	892	843	841	-2	(5)
		50%	928	928	886	856	15*	(6)
		75%	877	892	861	837	19**	(7)
	200	25%	837	824	783	766	2	(5)
		50%	812	806	758	746	3	(5)
		75%	803	795	759	740	5	(6)
	1200	25%	828	808	757	770	-16	(8)
		50%	809	798	735	759	-18**	(6)
		75%	848	829	779	781	-11	(6)
Errors	0	25%	5.0	5.7	3.1	2.6	0.6	(0.5)
		50%	5.0	4.9	4.7	4.6	0.0	(0.6)
		75%	5.9	6.3	4.7	4.5	0.3	(0.9)
	200	25%	5.4	4.3	3.0	4.0	-1.1	(0.9)
		50%	4.7	3.9	4.3	3.3	0.1	(0.6)
		75%	4.2	6.5	5.3	4.4	1.6	(1.0)
	1200	25%	6.1	4.6	4.2	5.7	-1.5	(0.9)
		50%	6.8	5.4	1.9	5.2	-2.3**	(0.7)
		75%	5.1	5.7	2.8	4.3	-0.5	(0.9)

a SE(PE)=standard error of the mean
* p<.05, ** p<.01, two-tailed.

By analogy with the relatedness proportion effect of semantic priming, a CP effect is a linear increase in the magnitude of the priming effect as a function of CP.

Thus, the statistical tests of central interest involve the a priori contrast that codes a linear trend as a function of CP.

Overall Analysis. An overall analysis of variance with between-subjects factors CP and SOA was performed on the error data and the latency data. The F-values and MSE-values are shown in Table 3. As can be seen, there was a significant main effect of SOA on both dependent variables. In terms of response latencies (percent errors), priming effects were +11 ms (0.3%), +4 ms (0.2%), and -15 ms (-1.4%) at SOAs of 0 ms, 200 ms, and 1200 ms, respectively. In addition, there was a significant linear trend as a function of CP for latencies with an estimated slope of 7 ms.

Table 3
Analyses of Variance with factors SOA and Consistency Proportion

		F		
Source	df	Latencies	Percent Errors	Ratings
Overall Analysis				
Constant	1	0.01	1.34	1.23
SOA	2	14.50**	4.41*	0.72
CP	2	2.03	2.10	13.24**
Linear trend CP (CP(1))	1	4.05*	2.92	26.41**
SOA x CP	4	0.88	1.10	2.51*
SOA x CP(1)	2	1.25	1.80	4.57*
S within-group error	261	(1115)	(19.06)	(0.97)
Simple Effects Analysis at the 0 ms SOA				
Constant	1	10.27**	0.45	0.84
CP	2	3.53*	0.17	2.47
Linear trend CP	1	6.38	0.11	2.64
S within-group error	87	(1044)	(15.40)	(1.07)
Simple Effects Analysis at the 200 ms SOA				

Constant	1	1.32	0.21	0.12
CP	2	0.09	2.54	12.63**
Linear trend CP	1	0.16	5.06*	25.02*
S within-group error	87	(897)	(21.33)	(0.86)

Simple Effects Analysis at the 1200 ms SOA

Constant	1	14.57**	8.91**	1.62
CP	2	0.33	1.24	4.29*
Linear trend CP	1	0.36	0.71	6.09*
S within-group error	87	(1404)	(20.43)	(0.99)

Note. Values enclosed in parentheses represent mean square errors; CP(1) = linear trend CP; S = subjects.
* p<.05. ** p<.01.

Also shown in Table 3 are the results of an overall analysis on the participants' ratings of CP. A significant main effect of CP was found that was moderated by a significant interaction of CP and SOA. Mean ratings are shown in Table 4 along with the correlations between participants' ratings and priming effects. As can be seen, the mean ratings tend to increase as a function of CP only at the SOAs of 200 ms and 1200 ms. The correlations between ratings and priming effects are low under all conditions.

Table 4
Mean Ratings of CP and Correlations
of Ratings and Priming Effect in
Terms of Latencies (RT) and Errors

	CP			Correlation	
SOA	.25	.50	.75	RT	Errors
0	-0.20	-0.33	0.23	.02	-.10
200	-0.53	-0.03	0.67	.09	-.09
1200	-0.57	0.10	0.07	.23	.02

Simple Effects Analyses. Separate analyses of variance were performed at each level of SOA to address the central question of whether the CP effect was confined to the long SOA. The results are shown in Table 3: Significant CP effects (i.e. linear trends as a function of CP) were found only at the 0 ms SOA in the latency data and at the 200 ms SOA in the error data, whereas no effects of CP were found at the long SOA of 1200 ms. In addition, the +11 ms overall priming effect at the 0 ms SOA was significant as were the -15 ms and -1.4% overall priming effects at the 1200 ms SOA for latencies and percent errors, respectively.

Participants' ratings of their subjective impression of the CP were not a function of the actual CP at the 0 ms SOA. At the longer SOAs, they tended to increase as a function of the actual CP as evidenced by significant linear trends (see Table 3) and the mean values shown in Table 4. Also shown in Table 4 are the correlations of the raters' priming effects and the ratings. As can be seen, there is no evidence for a relationship between the magnitude of the priming effects and the rating of CP.

Prior Trial Type: Evaluating a Possible Account in Terms of Sequential Effects.
(Footnote 1)

A simple account of the unexpected CP effect at short SOAs is possible in terms of a sequential bias. In a digit naming task, in which participants had to name a target in the presence of a distractor, Greenwald and Rosenberg (1978) showed an effect of the percentage of agreement of target and distractor. As the percentage increased from 10% to 90%, the amount of facilitation by agreement pairs relative to conflict pairs increased. Subsequent analyses showed that the effect was largely due to a sequential bias: Trials following an agreement trial were associated with a larger amount of facilitation than trials following a conflict trial.

It is possible that a similar sequential bias operates in the evaluative priming paradigm at short SOAs, so that the priming effect is larger in trials preceded by consistent rather than inconsistent trials. According to this line of reasoning, the CP effect stems from the fact that, the higher the CP, the more trials follow consistent than inconsistent trials.

The data from Experiment 2 were therefore analyzed for a possible sequential bias. Priming effects were computed separately on the basis of trials following consistent and inconsistent trials. The results are shown in Table 5 as a function of

SOA. As shown in Table 5, a few persons were eliminated in each condition, because they saw no exemplar of one of the four different types of trial ((-,-), (-,+), (+,-), or (+,+)) following either a consistent or inconsistent previous trial.

Table 5
Priming Effects as a Function of SOA and Previous Trial Type (Standard Deviations in Parentheses)

Dependent Variable	SOA	Previous Trial Type: Cons.	Incons.	Cases
Latencies	0	5 (42)	18 (61)	87
	200	2 (48)	-2 (51)	88
	1200	-16 (67)	-17 (58)	88
Percent Errors	0	1.3 (5.7)	-0.4(6.7)	87
	200	0.4 (6.0)	0.9(7.5)	88
	1200	-0.7 (7.5)	-0.9(7.0)	88

As can be seen, the differences as a function of previous trial type do not consistently point in the surmised direction. For the 0 ms SOA, the priming effect for latencies is actually numerically smaller following consistent as opposed to inconsistent trials. None of the differences attains significance. Furthermore, when previous trial type (consistent versus inconsistent) was added as an additional factor into the analyses of variance reported above, the p-values associated with the CP effects did not shift substantially. In sum, sequential bias cannot account for the present CP effect.

General Discussion

Based on findings in the context of semantic priming in general and the so-called relatedness proportion effect in particular, a common assumption in the study of evaluative priming has been that an SOA of 300 ms or less is "too brief an interval to permit subjects to develop an active expectancy or response strategy regarding the target adjective that follows" (Bargh et al., 1992, p. 894; cf. Fazio et al., 1986; Hermans et al., 1994). Contrary to this assumption and to the analogy with semantic priming, a consistency proportion effect was found with simultaneous presentation of prime and target as well as with an SOA of 200 ms although in this latter case, the effect was confined to the error data. By analogy with the relatedness proportion effect and semantic priming, a consistency proportion effect was expected only for SOAs longer than 300 ms. When a long SOA of 1200 ms was in fact employed in the evaluative priming paradigm, the consistency proportion effect disappeared, however. Thus, the consistency proportion effect may be governed by laws that are very different from those found for the relatedness proportion effect in semantic priming.

Like the relatedness proportion effect, a consistency proportion effect flows most naturally from a prospective, expectancy-based mechanism. In the case of evaluative priming and the evaluative decision task, one possibility is an expectancy-based response-bias mechanism. As explained above, persons might use the prime to predict the evaluation of the target. They could do so on the basis of their impression of the proportion of evaluatively consistent, relative to inconsistent, prime-target pairs. If participants accurately assess the consistency proportion and if the prospective response-bias mechanism is the only causal factor, size and direction of the priming effect would be determined by consistency proportion through a linear function with zero priming occuring at consistency proportion 50%.

This same pattern of results did in fact emerge in the error data of the participants with the 200 ms SOA. At the same time, these persons' ratings of consistency proportion accurately reflected the consistency proportion of the list they worked with. Thus, the consistency proportion effect at the 200 ms SOA may have been caused by a prospective response strategy as sketched above. Although an SOA of 200 ms falls below the 300 ms threshold that is found in the literature on evaluative priming for the use of a prospective response strategy, it is plausible, in retrospect, that this threshold may have to be adjusted downward: Affective connotations such as that of the prime are quickly accessed (Zajonc, 1980; Klauer, 1991), and the prime-generated expectation is a simple binary one about the evaluation of the target (positive vs. negative) rather than about its identity.

A consistency proportion effect was, however, found even with simultaneous presentation of prime and target in Experiment 2. Although participants may first encode the prime and then generate an expectation about the likely response to the target with an SOA of 200 ms, a prospective response strategy of this kind appears to be ruled out when prime and target are presented simultaneously. Nor can the effect be explained by slow-acting post-lexical relatedness-checking mechanisms (Neely, 1991). Thus, at least the consistency proportion effect at the 0 ms SOA must have been caused by some other kind of mechanism.

It is interesting to note that McKoon and Ratcliff (1995) recently obtained list context effects in the standard semantic priming paradigm at short SOAs (250 ms for lexical decisions and 300 ms for naming). Priming for one type of semantic relation (for example, for prime-target pairs of synonyms) was eliminated if the list was composed mainly of pairs of another relation (e. g., antonym pairs). Thus, the mechanism causing the list context effects in the present research may not be restricted to the evaluative priming paradigm.

Apart from the mechanism or the mechanisms that cause the consistency proportion effect, an additional, fast-acting and automatic process may operate at short SOAs as suggested by the temporal pattern of priming effects found in Experiment 1. Positive priming effects were observed only for the short nonnegative SOAs. Similarly, in Experiment 2, the overall level of the priming effects was positive at the 0 ms SOA and much depressed as SOA was increased to 200 ms. Spreading-activation accounts as cited in the introduction with fast decay of activation can explain this pattern of results (cf. also Murphy and Zajonc's (1993) concept of so-called affective access). The contribution of an automatic component in the making of evaluative priming effects in the evaluative decision task is also suggested by results on subthreshold priming (Greenwald et al., 1989), where the prime is presented below recognition threshold and evaluative priming effects are nevertheless obtained (but see Greenwald et al., 1995).

At the long SOA, inhibitory priming effects or contrast effects prevailed irrespective of consistency proportion. A number of studies have found inhibitory priming effects in the context of concept or category priming (Lombardi, Higgins, & Bargh, 1987; Martin, 1986; Newman & Uleman, 1990; Strack, Schwarz, Bless, Kbler, & W„nke, 1993). Note that the term "categories" refers to personality traits in this context. Frequently, inhibitory priming effects have been observed in these studies when the priming was noticeable and participants were aware of the primes or their influence on the judgment of the target (Strack et al., 1993). Strack et al. (1993) argue that people may attempt to correct for the influence of the prime, resulting in overcorrection and contrast. As summarized by Greenwald and Banaji (1995), "reversals of potential implicit effects [such as evaluative priming effects] may occur when the judge overcompensates for the influence effect, perhaps because the judge overestimates its magnitude or is overly zealous in seeking to avoid any appearance of having been influenced" (p. 19). Since priming was quite noticeable in the present paradigm, participants may have actively (over)corrected for the influence of the prime: (Footnote 2) They may actively prepare for a target of the opposite evaluation of that of the prime to compensate for a suspected direct influence of the prime. Thus, an active, prospective response strategy may have been operative at the long SOA after all, if with characteristics other than those hypothesized for the response-bias mechanism considered above. It is interesting to note that an SOA of 200 ms was apparently too brief an interval to permit participants to (over)correct for the influence of the prime in this manner.

Although evaluative priming in the evaluative decision task has traditionally been likened to semantic priming, the present research suggests that a more appropriate analogy may be given by Stroop-like selective attention paradigms. For example, in the flanker task (Eriksen & Eriksen, 1974) as in the evaluative decision task, there are two response sets of stimuli, and irrelevant flankers (primes) from the wrong set of stimuli interfere with making the response to the target. In these Stroop-like tasks, like in the evaluative decision task, effects are typically found only for short SOAs (MacLeod, 1991), but not for long SOAs. As in the present experiments, list-context effects occur with short SOAs and even with simultaneous presentation of distractor (prime) and target (MacLeod, 1991). According to this analysis, possible explanations for the observed CP effects at short SOAs can be borrowed from studies demonstrating list-context effects in Stroop-like tasks.

One such explanation, based on a possible sequential bias and a study by Greenwald and Rosenberg (1978), has in fact been evaluated above for the data of Experiment 2 and had to be rejected. Another explanation has been proposed by Logan and Zbrodoff (1979; see also Logan, 1980; Lowe & Mitterer, 1982, and cf. Cohen, Dunbar, & McClelland, 1990): Adapted to the present situation, the decision maker's current state of evidence bearing on the evaluative decision is expressed as a weighted sum of the evidence available about the affective connotation of the target and that of the prime. Weights that represent automatic processing are fixed in magnitude and sign, whereas additional weights that represent attending to primes and targets may vary in magnitude and sign according to the current strategy to allow a flexible blending of information:

Dividing attention between dimensions [between prime and target] amounts to computing and assigning weights to each dimension [to the evaluation of the prime and to that of the target] through an act of attention. The weights would have the same sign (positive), when compatible stimuli were more frequent, and opposite signs (...) [positive for target, negative for prime] when conflicting stimuli were more frequent. (...) The unreported dimension [the evaluation of the prime] might be processed automatically as well and receive additional weight in the decision process. (Logan & Zbrodoff, 1979, p. 167)

Thus, as in the two-process models of semantic priming considered above, the eventual decision is an additive outcome of both automatic and attentional processes. Since prime and target are processed in parallel, however, the attentional component can be effective even with simultaneous presentation of primes and targets. Evidence from the flanker task sugggests that the attentional assignment of weights to exploit list-context need not rely on a conscious strategy on the part of the participant (Miller, 1987), accounting for the absence of an explicit relationship between the size of priming effects and participants' ratings of CP at the 0 ms SOA. Extending this model to accomodate the findings with long SOA (1200 ms), it would have to be assumed, however, that, as SOA increases, the evaluation of the prime is strategically assigned a large negative weight, irrespective of CP or overriding differences in weights as a function of CP. This assignment of weights could reflect an active corrective strategy (cf. Logan, 1989) of the kind described above.

The assumption, prompted by the temporal characteristics of the CP effect, that the Stroop paradigm is a more appropriate point of reference for evaluative priming in the evaluative decision task than the semantic priming paradigm, immediately leads to a wealth of additional hypotheses based on the robust empirical findings associated with Stroop analogs (MacLeod, 1991): For example, locational uncertainty of visually presented distractors and targets should increase the amount of interference effects (Underwood, 1976), advance cues about the upcoming type of trial (consistent versus inconsistent) should improve performance even at short SOAs (Logan & Zbrodoff, 1982), and different kinds of specific sequential effects should be observed (Effler, 1977; Neill & Westberry, 1987).

The present paper examined the effects of SOA and CP in the evaluative priming paradigm. The CP effect was most pronounced at the 0 ms SOA and at the 200 ms SOA for latencies and percent errors, respectively. It was eliminated at the long SOA. The pattern of results suggests that unlike the relatedness proportion effect of semantic priming, the CP effect cannot be explained by an expectancy-based mechanism or slow-acting post-lexical relatedness-checking mechanisms. Nor can it be traced back to a sequential effect of one pair to the next within a list. An explanation is possible, however, in terms of selective attention in Stroop-like tasks.

References

Bargh, J. A., Chaiken, Sh., Govender, R. & Pratto, F. (1992). The generality of the automatic attitude activation effect. Journal of Personality and Social Psychology, 62, 893-912.

Bargh, J. A., Chaiken, Sh., Raymond, P. & Hymes, C. (1995). The automatic evaluation effect: Unconditional automatic attitude activation with a pronunciation task. Journal of Experimental Social Psychology, 4, in press.

Bargh, J. A., Litt, J., Pratto, F., & Spielman, L. A. (1989). On the preconscious evaluation of social stimuli. In A. E. Bennett & K. M. McConkey (Eds.). Cognition on individual and social contexts (pp. 357-370). Amsterdam: Elsevier.

Becker, C. A. (1980). Semantic context effects in visual word recognition: An analysis of semantic strategies. Memory & Cognition, 8, 493-512.

Becker, C. A. (1985). What do we really know about semantic context effects

during reading? In D. Besner, T. G. Waller, & E. M. MacKinnon (Eds.).
Reading research: Advances in theory and practice. Vol. 5 (pp. 125-166).
Toronto: Academic Press.
Bower, G. H. (1991). Mood congruity of social judgments. In J. Forgas (Ed.).
Emotion and social judgments (pp. 31-53). Oxford: Pergamon.
Chaiken, S. & Bargh, J. A. (1993). Occurrence versus moderation of the automatic attitude activation effect: Reply to Fazio. Journal of Personality
and Social Psychology, 64, 759-765.
Clark, H. (1973). The language-as-fixed-effect fallacy: A critique of language
statistics in psychological research. Journal of Verbal Learning and Verbal
Behavior, 12, 335-339.
Cohen, J. D., Dunbar, K., & McClelland, J. L. (1990). On the control of automatic processes: A parallel distributed processing account of the Stroop
effect. Psychological Review, 97, 332-361.
De Groot, A. M. B. (1984). Primed lexical decision: Combined effects of the
proportion of related prime-target pairs and the stimulus-onset asynchrony
of prime and target. Quarterly Journal of Experimental Psychology, 36A, 253-280.
Den Heyer, K. (1985). On the nature of the proportion effect in semantic priming. Acta Psychologica, 60, 25-38.
Den Heyer, K., Briand, K., & Dannenbring, G. (1983). Strategic factors in a
lexical decision task: Evidence for automatic and attention-driven processes.
Memory & Cognition, 11, 374-381.
Dovidio, J. F., Evans, N., & Tyler, R. B. (1986). Racial stereotypes: The
contents of their cognitive representations. Journal of Experimental Social
Psychology, 22, 22-37.
Effler, M. (1977). The influence of serial factors on the Stroop task. Psychologische
Beitr„ge, 19, 189-200.
Eriksen, B. A. & Eriksen, C. W. (1974). Effects of noise letters upon the
identification of a target letter in a nonsearch task. Perception and Psychophysics,
16, 143-149.
Fazio, R. H. (1993). Variability in the likelihood of automatic attitude activation:
Data reanalysis and commentary on Bargh, Chaiken, Govender, & Pratto (1992). Journal of Personality and Social Psychology, 18, 753-758.
Fazio, R. H., Sanbonmatsu, D. M., Powell, M. C., & Kardes, F. R. (1986).
On the automatic activation of attitudes. Journal of Personality and Social
Psychology, 50, 229-238.
Greenwald, A. G. (1992). New Look 3: Unconscious cognition reclaimed.
American Psychologist, 47, 766-779.
Greenwald, A. G. & Banaji, M. R. (1995). Implicit social cognition: Attitudes,

self-esteem, and stereotypes. Psychological Review, 102, 4-27.
Greenwald, A. G., Klinger, M. R., & Liu, Th. J. (1989). Unconscious processing
of dichoptically masked words. Memory & Cognition, 17, 35-47.
Greenwald, A. G., Klinger, M. R., & Schuh, E. (1995). Activation by marginally
perceptible ("subliminal") stimuli: Dissociation of unconscious from conscious
cognition. Journal of Experimental Psychology: General, 124, 22-42.
Greenwald, A. G. & Rosenberg, K. E. (1978). Sequential effects of distracting
stimuli in a selective attention reaction time task. In J. Requin (Ed.). Attention
and Performance, VII (pp. 487-504). Hillsdale, NJ: Erlbaum.
Hager, W., Mecklenbr„uker, S., M”ller, H., & Westermann, R. (1985). Emotionsgehalt,
Bildhaftigkeit, Konkretheit und Bedeutungshaltigkeit von 580 Adjektiven: Ein
Beitrag zur Normierung und zur Prfung einiger Zusammenhangshypothesen.
[Emotionality, imageability, concreteness, and meaningfulness of 580 adjectives:
A contribution to norming and test of correlations.] Archiv fr Psychologie,
137, 75-97.
Hasher, L. & Zacks, R. T. (1979). Automatic and effortful processes in memory.
Journal of Experimental Psychology: General, 108, 356-388.
Haussmann, R. E. (1992). Tachistoscopic presentation and millisecond timing
on the IBM PC/XT/AT and PS/2: A Turbo Pascal unit to provide general-
purpose routines for CGA, Hercules, EGA, and VGA monitors. Behavior
Research Methods, Instruments, & Computers, 24, 303-310.
Hermans, D., De Houwer, J., & Eelen, P. (1994). The affective priming effect:
Automatic activation of evaluative information in memory. Cognition and
Emotion, 8, 515-533.
Hill, A. B. & Kemp-Wheeler, S. M. (1989). The influence of context on lexical
decision time for emotional and non-emotional words. Current Psychology:
Research and Reviews, 8, 219-227.
Jacoby, L. L., Lindsay, D. S., & Toth, J. P. (1992). Unconscious influences
revealed: Attention, awareness, and control. American Psychologist, 47, 802-
809.
Kemp-Wheeler, S. M. & Hill, A. B. (1992). Semantic and emotional priming
below objective detection threshold. Cognition and Emotion, 6, 113-128.
Kiger, J. I. & Glass, A. L. (1983). The facilitation of lexical decisions by a
prime occurring after the target. Memory & Cognition, 11, 356-365.
Klauer, K. C. (1991). Einstellungen: Der Einfluá der affektiven Komponente
auf das kognitive Urteilen. [Attitudes: The influence of the affective component
on cognitive judgments.] G”ttingen: Hogrefe.
Klauer, K. C. & Stern, E. (1992). How attitudes guide memory-based judgments:

A two-process model. Journal of Experimental Social Psychology, 28, 186-206.
Lewicki, P., Hill, T., & Czyzewska, M. (1992). Nonconscious acquisition of
information. American Psychologist, 47, 796-801.
Logan, G. D. (1980). Attention and automaticity in Stroop and priming tasks:
Theory and data. Cognitive Psychology, 12, 523-553.
Logan, G. D. (1989). Automaticity and cognitive control. In J. S. Uleman & J.
A. Bargh (Eds.). Unintended thought (pp. 54-74). New York: Guilford Press.
Logan, G. D. & Zbrodoff, N. J. (1979). When it helps to be misled: Facilitative
effects of increasing the frequency of conflicting stimuli in a Stroop-like task.
Memory and Cognition, 7, 166-174.
Logan, G. D. & Zbrodoff, N. J. (1982). Constraints on strategy construction in
a speeded discrimination task. Journal of Experimental Psychology: Human Perception and Performance, 8, 502-520.
Lombardi, W. J., Higgins, E. F., & Bargh, J. A. (1987). The role of consciousness
in priming effects on categorization: Assimilation versus contrast as a function
of awareness of the priming task. Personality and Social Psychology Bulletin,
13, 411-429.
Lowe, D. G. & Mitterer, J. O. (1982). Selective and divided attention in a
Stroop task. Canadian Journal of Psychology, 36, 684-700.
Mandler, G. (1994). Hypermnesia, incubation, and mind-popping: On remembering
without really trying. In C. Umilt… & M. Moscovitch (Eds.), Attention and
performance, XV: Conscious and nonconscious information processing (pp. 3-33). Cambridge, MA: MIT Press.
MacLeod, C. M. (1991). Half a century of research on the Stroop effect: An
integrative review. Psychological Bulletin, 109, 163-203.
Martin, L. L. (1986). Set/reset: Use and disuse of concepts in impression
formation. Journal of Personality and Social Psychology, 51, 493-504.
McKoon, G. & Ratcliff, R. (1995). Conceptual combinations and relational contexts in free association and priming in lexical decisions and naming. Psychonomic
Bulletin and Review, 2, 527-533.
Miller, J. (1987). Priming is not necessary for selective-attention failures:
Semantic effects of unattended, unprimed letters. Perception & Psychophysics,
41, 419-434.
M”ller, H. & Hager, W. (1991). Angenehmheit, Bedeutungshaltigkeit, Bildhaftigkeit
und Konkretheit- Abstraktheit von 452 Adjektiven. [Pleasantness, meaningfulness,
imageability, and concreteness-abstractness of 452 adjectives]. Sprache

und
Kognition, 10, 39-51.
Murphy, S. T., Monahan, J. L., & Zajonc, R. B. (1995). Additivity of nonconscious
affect: Combined effects of priming and exposure. Journal of Personality and
Social Psychology, 69, 589-602.
Murphy, S. T. & Zajonc, R. B. (1993). Affect, cognition, and awareness:
Affective priming with optimal and suboptimal stimulus exposure. Journal
of Personality and Social Psychology, 64, 723-739.
Neely, J. H. (1977). Semantic priming and retrieval from lexical memory: Roles
of inhibitionless spreading activation and limited capacity attention. Journal
of Experimental Psychology: General, 106, 226-254.
Neely, J. H. (1991). Semantic priming effects in visual word recognition: A
selective review of current findings and theories. In D. Besner & G. Humphreys
(Eds.). Basic processes in reading: Visual word recognition (pp. 264-337).
Hillsdale, N. J.: Erlbaum.
Neely, J. H. & Keefe, D. E. (1989). Semantic context effects on visual word
processing: A hybrid prospective/retrospective processing theory. In G. H.
Bower (Ed.). The psychology of learning and motivation: Advances in research
and theory (Vol. 24, pp. 207-248). New York: Academic Press.
Neely, J. H., Keefe, D. E., & Ross, K. L. (1989). Semantic priming in the
lexical decision task: Roles of prospective prime-generated expectancies and
retrospective semantic matching. Journal of Experimental Psychology: Learning,
Memory, and Cognition, 15, 1003-1019.
Neill, W. T. & Westberry, R. L. (1987). Selective attention and the suppression
of cognitive noise. Journal of Experimental Psychology: Learning, Memory,
and Cognition, 13, 327-334.
Newman, L. S. & Uleman, J. S. (1990). Assimilation and contrast effects in
spontaneous trait inference. Personality and Social Psychology Bulletin, 16,
224-240.
Ostendorf, F. (1994). Zur Taxonomie deutscher Dispositionsbegriffe. [Ataxonomy
of German dispositional concepts.] In W. Hager & M. Hasselhorn (Eds.).
Handbuch deutschsprachiger Wortnormen. [Handbook of German word norms]
(pp. 383-441). G”ttingen: Hogrefe.
Perdue, C. W., Dovidio, J. F., Gurtman, M. B., & Tyler, R. B. (1990). Us
and them: Social categorization and the process of intergroup bias. Journal
of Personality and Social Psychology, 59, 475-486.
Posner, M. I. & Snyder, C. (1975). Attention and cognitive control. In R. L.

Solso (Ed.). Information processing and cognition: The Loyola symposium (pp. 55-85). Hillsdale, N. J.: Erlbaum.
Pratto, F. (1994). Consciousness and automatic evaluation. In P. M. Niedenthal
& Sh. Kitayama (Eds.). The heart's eye (pp. 115-143). New York: Academic Press.
Reber, A. S. (1989). Implicit learning and tacit knowledge. Journal of Experimental
Psychology: General, 118, 219-235.
Schwibbe, M., R„der, K., Schwibbe, G., Borchardt, M., & Geiken-Pophanken,
G. (1994). Zum emotionalen Gehalt von Substantiven, Adjektiven und Verben.
[The emotional meaning of substantives, adjectives, and verbs.] In W. Hager &
M. Hasselhorn (Eds.). Handbuch deutschsprachiger Wortnormen. [Handbook of German word norms] (pp. 272-284). G”ttingen: Hogrefe.
Seidenberg, M. S., Waters, G., Sanders, M., & Langer, P. (1984). Pre- and post-
lexical loci of contextual effects on word recognition. Memory & Cognition,
12, 315-328.
Smith, M. C., Besner, D., & Myoshi, H. (1994). New limits to automaticity:
Context modulates semantic priming. Journal of Experimental Psychology, 20, 104-115.
Smith, M. C., Theodor, L., & Franklin, P. E. (1983). The relationship between
contextual facilitation and depth of processing. Journal of Experimental Psychology:
Learning, Memory, and Cognition, 9, 697-712.
Stolz, J. H. & Neely, J. H. (1995). When target degradation does and does not
enhance semantic context effects in word recognition. Journal of Experimental
Psychology, 21, 596-611.
Strack, F., Schwarz, N., Bless, H., Kbler, A., & W„nke, M. (1993). Awareness
of the influence as a determinant of assimilation versus contrast. European
Journal of Social Psychology, 23, 53-62.
Tweedy, J. R., Lapinski, R. H., & Schvaneveldt, R. W. (1977). Semantic-context effects on word recognition: Influence of varying the proportion of
items presented in an appropriate context. Memory & Cognition, 5, 84-99.
Underwood, G. (1976). Semantic interference from unattended printed words.
British Journal of Psychology, 67, 327-338.
Wentura, D. (1994). Gibt es ein "affektives Priming" im Ged„chtnis? [Is there
an affective priming effect in memory?] Paper presented to the 36th meeting
of experimental psychologists, TeaP, Munich.
Wyer, R. S. & Srull, T. K. (1980). The processing of social stimulus information:
A conceptual integration. In R. Hastie, T.M. Ostrom, E.B. Ebbesen, R.S. Wyer, D.L. Hamilton, & D.E. Carlston (Eds.). Person memory: The

cognitive
basis of social perception. Hillsdale, N.J.: Erlbaum.
Zajonc, R. B. (1980). Feeling and thinking: Preferences need no inferences.
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Footnotes

1 We thank A. G. Greenwald for pointing out this possible alternative account.

2 Priming as measured by means of the contrast between consistent and inconsistent
prime-target pairs should be most easily noticed when consistent and inconsistent
prime-target pairs frequently follow each other in successive trials, and thus at the .50
CP condition in the present experiment. The "overcorrection" explanation therefore
predicts the strongest inhibitory priming effects at the CP of .50, which was indeed
observed as shown in Table 2.