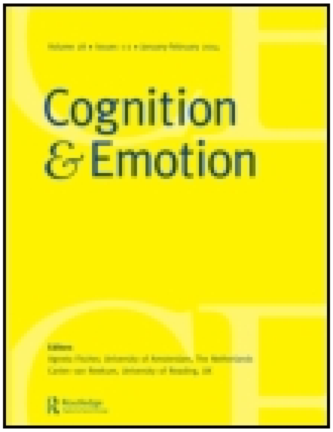

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Memory bias for negative emotional words in recognition memory is driven by effects of category membership

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BRIEF REPORT

Memory bias for negative emotional words in recognition memory is driven by effects of category membership

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Recognition memory studies often find that emotional items are more likely than neutral items to be labelled as studied. Previous work suggests this bias is driven by increased memory strength/familiarity for emotional items. We explored strength and bias interpretations of this effect with the conjecture that emotional stimuli might seem more familiar because they share features with studied items from the same category. Categorical effects were manipulated in a recognition task by presenting lists with a small, medium or large proportion of emotional words. The liberal memory bias for emotional words was only observed when a medium or large proportion of categorised words were presented in the lists. Similar, though weaker, effects were observed with categorised words that were not emotional (animal names). These results suggest that liberal memory bias for emotional items may be largely driven by effects of category membership.

Keywords: Emotional memory; Bias; Recognition memory; Category effects.

There is considerable interest in understanding how emotion affects memorial processing. Numerous studies have shown that emotional stimuli are better remembered than comparison neutral items (e.g., Doerksen & Shimamura, 2001; Kensinger & Corkin, 2003). LaBar and Cabeza (2006) reviewed evidence that emotion improves long-term consolidation of memory, suggesting that enhanced memory is more likely to be seen with delayed retention (see also Kensinger & Corkin, 2003). Indeed, many studies have found equal or poorer memory for emotional

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compared to neutral stimuli, especially when tested with immediate recognition (Dougal & Rotello, 2007; Johansson, Meckinger, & Treese, 2004; Kapucu, Rotello, Ready, & Seidl, 2008; Sharot, Delgado, & Phelps, 2004). However, it has been suggested that such null effects in studies of emotional memory could be driven by methodological problems (Grider & Malmberg, 2008; but see Thapar & Rouder, 2009). Another, more robust finding comes from recognition tasks, in which participants decide whether test items had been previously studied or not. Emotional items are more likely to be recognised in these tasks than comparison neutral items, even when the emotional items had not been studied. Thapar and Rouder (2009) found that emotional valence increased bias for emotional items, and Dougal and Rotello (2007) showed that higher hits and false alarms for emotional items were driven by a higher memory strength for emotional items.

The goal of the present study was to explore this memory bias and determine what characteristics of the emotional items are most responsible for it. Specifically, we tested the extent to which the categorical nature of emotional stimuli contributes to the recognition bias. Emotional words like *death, hurt, disease* and *failure* have common category-related features. If many emotional words are studied together in the context of a list, then memory for that context will contain strong traces of those shared emotional features. In essence, the gist of that context will have an emotional tone. Consequently, when a test word like *cancer* is used to probe memory, it would match the context more strongly because it shares features with the other negatively valenced items in memory. Such effects are predicted by global memory models in which the features of a test item are matched to the stored features in the memory trace (e.g., Grider & Malmberg, 2008; Shiffrin & Steyvers, 1997). Categorical effects of this sort have been studied extensively using the Deese, Roediger and McDermott (DRM) paradigm in which many words from a category are studied (Deese, 1959; Roediger & McDermott, 1995). DRM tasks typically result in increased false alarms for lures from the same category as the studied words, consistent with increased memory strength for those items. While this categorical mechanism would affect emotional words that share many overlapping features, it would not affect uncategorised neutral words that lack shared categorical features. In this sense, the memorial bias for emotional items could be largely driven by effects other than valence and arousal.

We tested to what degree the category membership of emotional stimuli accounts for the liberal memory bias shown in recognition memory. We focus on category membership rather than relatedness because liberal memory bias has been shown for emotional items even when relatedness is controlled. Dougal and Rotello (2007) and Kapucu et al. (2008) found a liberal memory bias for emotional words even when comparison neutral items were matched for overall semantic interrelatedness using latent semantic analysis (LSA) (Landauer, Foltz, & Laham, 1998). Importantly, category membership was not controlled because the neutral items did not belong to a common category (to the extent that "neutral" is not a salient category).

To explore the effects of category membership on memory for emotional items, we manipulated the proportion of emotional words in a recognition paradigm where participants made old/new judgments and provided confidence ratings. In Experiment 1, participants received study and test lists with neutral words and either a low, medium or high proportion of negative emotional words. The rationale was that if very few emotional words appeared in the study list, the shared emotional features would not be strongly represented in the memory trace, and thus would not strongly affect memory bias for emotional words at test. In contrast, if a large proportion of emotional words were studied, the shared features would be strongly represented in memory and thus increase the memory strength and bias for tested emotional words. If the memory bias was driven by category membership rather than emotion, there should be little or no bias when the category saliency is low (low proportion), but a much larger bias when it is high (high proportion). Conversely, if emotion drives the bias independent of categorical effects, there should be a similar bias at each level of the proportion manipulation. Experiment 2 replicated this design with non-emotional, categorised words (animal names) to determine whether a similar pattern obtains. If the effect of category proportion is similar for a non-emotional category it would suggest that the bias for emotional items is driven more by category membership than emotion per se. To better differentiate between memory accuracy and bias effects, confidence ratings were collected to allow receiver-operating characteristic (ROC) analyses. Whereas traditional measures of discriminability, like *d′*, are often confounded with differences in bias (see Macmillan & Creelman, 2005; Rotello, Masson, & Verde, 2008), ROC curves clearly distinguish bias effects from memory accuracy (discriminability) effects.

EXPERIMENTS

Two recognition memory experiments were performed that differed only in the type of categorised words that were used. Within each experiment, the study and test lists contained either a low (12.5%), medium (25%) or high (50%) proportion of words from the category.

Participants

Undergraduate students participated in the experiment for course credit. The goal was to recruit 30 participants for each condition before the end of the semester. In Experiment 1, conducted at the Ohio State University, there were 28, 29 and 28 participants in the low, medium and high conditions, respectively. In Experiment 2, conducted at the University of Massachusetts, there were 21, 23 and 20 participants in the low, medium and high conditions. The latter experiment had fewer participants due to the smaller recruitment pool at the University of Massachusetts.

Materials

Stimuli consisted of a matched set of negative emotional and uncategorised neutral words for Experiment 1, and a separate matched set of animal names and uncategorised neutral words for Experiment 2. Stimuli for Experiment 1 were the same as in Dougal and Rotello (2007, Experiment 1B). Because memory bias effects were shown to be larger for negative compared to positive emotional words (Dougal & Rotello, 2007), only the negative and neutral words were used in the present study. The two word pools were created from the Affective Norms for English Words (ANEW) pool of words (Bradley & Lang, 1999). There were 96 negative arousing words (e.g., *poison*, *torture* and *nightmare*) and 192 neutral non-arousing words (e.g., *avenue*, *branch* and *concentrate*) that differed in valence ($M_{\text{emotional}}$ = 2.24, M_{neutral} = 5.16) and arousal ($M_{\text{emotional}}$ = 6.63, M_{neutral} = 4.15). The word pools were matched on word frequency (Francis & Kucera, 1982) and semantic interrelatedness using LSA (Landauer et al., 1998). However, as noted above the neutral words belonged to a range of different categories. The negative emotional words contained some words that could be considered taboo (e.g., "asshole"). Although it is possible that taboo words have different effects than other negative words (Kensinger & Corkin, 2003), taboo and negative words were treated as a coherent set to be consistent with Dougal and Rotello (2007). Furthermore, there were not enough taboo words in the pool to create a separate condition for the high-proportion condition.

Experiment 2 used the same design as above, but the emotional words were replaced with words from a non-emotional category: animal names. Animal names like *beaver*, *trout* and *ostrich* were taken from the Van Overschelde, Rawson, and Dunlosky (2004) database, which is an extended version of the classic Battig and Montague (1969) category norms. Additional animal names were added to create one pool of 96 names that was matched to a set of neutral words (similar to those used in Experiment 1) on word frequency and semantic interrelatedness. Since these words were chosen to demonstrate categorical effects independently of emotion, we excluded all animal names that were deemed arousing or emotionally valenced (e.g., *spider*). A separate sample of 16 participants provided valence and arousal ratings for the words in Experiment 2, confirming that the animal names did not differ from the neutral words in valence

[M_{animal} = 5.13, M_{neutral} = 5.01, $t(15) = 1.3$, $p = .21$] or arousal ratings [M_{animal} = 4.95, M_{neutral} = 4.89, $t(15) = .73$, $p = .48$]. The uncategorised neutral stimuli were similar in both experiments, though there were some differences to account for differences in the target stimuli against which they were matched (see Appendix). In both experiments, words were drawn at random from the word pools to be used in the different conditions.

Design

Participants studied a single list of words and then had to discriminate between old and new words at test. Each participant was assigned randomly to receive a low, medium or high proportion of negative or animal words from the pools. Two primacy and two recency items were presented at the beginning and end of the study lists, but were not included in the analyses. For the remaining 96 words in the study list, there were 12 categorised words for the low-proportion condition (84 neutral), 24 categorised words for the medium-proportion condition (72 neutral) and 48 categorised words for the high-proportion condition (48 neutral). In the low- and medium-proportion conditions the categorised words were spaced by at least four trials, but in the high-proportion conditions this spacing was not possible. The test lists included the 96 items from the study list plus 96 lures with the same composition as the study list (i.e., for the low-proportion test there were 12 studied and 12 new emotional items, plus 84 studied and 84 new neutral items). Trial order was randomised separately for each participant.

Procedure

The study list consisted of 100 words (96 plus 4 buffer words) each presented for 2500 ms, with a 500 ms ISI. Participants were told to study each word for a later, unspecified memory test. The test list was presented directly after the study list, and each item in the test list was presented on the screen until a response was given. Participants first indicated whether the test word was old or new by pressing the "/" and "z" keys, respectively, in Experiment 1, or the "v" and "m" keys in Experiment 2. They then indicated their confidence by pressing the 1 (sure), 2 (probably) or 3 (maybe) key. They were instructed to respond quickly and accurately. No error feedback was provided.

RESULTS

Summary statistics are shown in Table 1, and hit and false alarm rates are shown on the ROC curves in Figure 1. To summarise the results, the liberal memory bias for negative emotional words appeared only when the categorical effects were salient (medium and high proportion), suggesting the increased strength for emotional items is strongly driven by effects of category membership. A similar, albeit weaker, pattern was found with animal names that lacked emotional valence, supporting the significant role of category effects for the liberal recognition bias.

Overall response rates

For each experiment, a mixed 3 × 2 × 2 analysis of variance (ANOVA) was performed on the "old" response data, with proportion (low, medium and

Table 1. *Summary statistics averaged across participants*

	Hit rate	*False alarm rate*	A_z	zF
Experiment 1: Negative—Neutral				
Low proportion	.08*	.01	.00	.05
Medium proportion	.08*	.05*	.01	.18*
High proportion	.13*	.18*	.00	.62*
Experiment 2: Animal—Neutral				
Low proportion	.08*	.01	.02	.04
Medium proportion	.07*	.03*	.00	.13*
High proportion	.05*	.09*	.01	.34*

Note: Presented values are the difference scores for each measure calculated as the categorised words minus the neutral words; positive values indicate higher value for categorised items. A_z and zF are the discriminability and bias indices, respectively, calculated from the ROC analysis. Positive values of zF indicate a more liberal bias for categorised relative to neutral words.
*Indicates value is significantly different from 0 ($p < .05$).

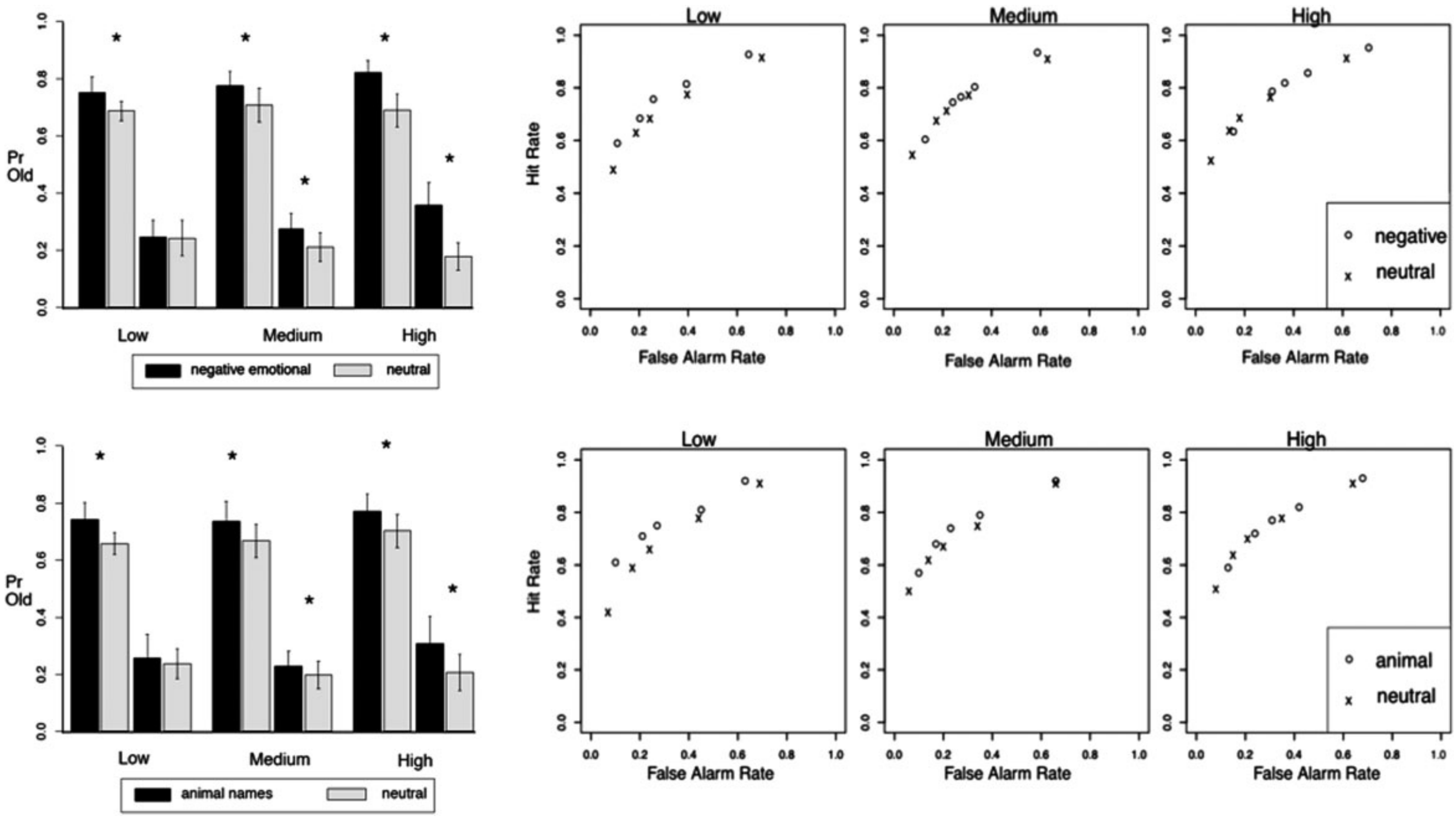

Figure 1. *Left: Hit and false alarm rates averaged across participants. Dark bars represent categorised words (emotional or animal names) and light bars represent neutral words. Error bars represent 95% confidence intervals. Right: ROCs averaged across participants. Low, medium and high refer to the proportion of categorised words in the lists (see text for details). * = $p < .05$.*

high) as the between factor and stimulus type (categorised, neutral) and study status (studied or new) as within factors. For Experiment 1 (negative words), there was a main effect of stimulus type [F(1,82) = 45.9, MSE = .585, p < .001], with higher hit and false alarm rates for negative words than neutral words. The interaction between stimulus type and proportion was significant [F (2,82) = 9.11, MSE = .116, p < .001], showing that the proportion manipulation affected the negative words more than the neutral words. The three-way interaction reached significance [F (2,82) = 4.29, MSE = .021, p = .017], showing that the category-proportion effect differed for hits and false alarms. Planned comparisons revealed significantly more hits for negative compared to neutral words in each of the three proportion conditions (t's > 2.5, see Figure 1), but the effect did not vary across proportion [F(2,82) = 2.08, MSE = .02, p = .15]. In contrast, the increase in false alarms for negative words did vary across proportion [F(2,82) = 8.49, MSE = .10, p < .001]. Planned comparisons showed that the increase in false alarms for negative words was significant in the high-proportion [t(27) = 6.89, p < .001] and medium-proportion [t(28) = 2.12, p = .042] conditions, but not in the low-proportion condition [t(27) = .59, p = .56]. Thus, increasing the saliency of the category affected the liberal bias primarily by increasing the false alarm rate for negative words.

The results for animal names were strikingly similar. There was a main effect of stimulus type with more hits and false alarms for animal names compared to neutral words [F(1,60) = 35.9, MSE = .168, p < .001]. The interaction between stimulus type and proportion was significant [F(2,60) = 3.19, MSE = .008, p =.048], showing that the proportion manipulation affected the animal names more than the neutral words. The three-way interaction approached significance [F (2,60) = 2.89, MSE = .012, p = .064], suggesting different category-proportion effects for hits and false alarms. Planned comparisons showed a pattern similar to the results of Experiment 1. Hit rates were higher for animal names in each proportion condition (t's > 2.5), but the difference did not vary with proportion [F(2,82) =.182, MSE=.001, p =.83]. For false alarms there was a marginally significant interaction between stimulus type and proportion [F(2,60) = 2.7, MSE = .019, p = .076], with higher false alarms for animal names in the high-proportion [t(18) = 3.24, p = .005] and medium-proportion [t(22) = 2.23, p = .036] conditions, but not the low-proportion condition [t(20) = .665, p = .52]. Again the effects of category membership were most prominent in the false alarm rate for the categorised lures.

Across both experiments the false alarm rate for categorised words increased with proportion. There was little evidence for a memorial bias in the low-proportion condition but a significant increase in false alarms for categorised words in the medium- and high-proportion conditions. We turn now to the ROC data to corroborate these results.

ROC analyses

ROCs were constructed by plotting the hit rates against the false alarm rates across each level of confidence. Differences in discrimination are reflected by points that fall on distinct theoretical curves for different conditions, with points near the top-left corner reflecting better discriminability for those items (i.e., more hits and fewer false alarms); accuracy can be quantified as the area under the ROC, A_z, which ranges from .5 (chance) to 1.0 (perfect). Memory bias is reflected by the relative position of points on the same curve. Points nearer to (1,1) reflect higher hit and false alarm rates, indicating a more liberal memory bias. Thus, separate curves for the categorised and neutral items indicate differences in memory accuracy, whereas similar curves that are shifted relative to one another reflect differences in bias.

In Figure 1, there is a slight advantage in discriminability for both types of categorised words relative to neutral words only in the low-proportion condition, reflected by the fact that the circles lie above the x's. This advantage was not present in the medium- and high-proportion conditions, and the discriminability analyses below show that the differences were weak and did not reach significance. The data also show no evidence for a liberal memory bias in the low-proportion condition, as the circles are not shifted right of the *x*'s. However, the bias is apparent in the medium and high conditions, consistent with the analysis of the response rates.

Comparisons were performed on the measures calculated from the ROC curves to complement the visual inspection of the ROC curves. Values of A_z were derived from each participant's data to provide a bias-free measure of discriminability, and the *z*-transform of the false alarm rates was calculated to provide a measure of bias, *zF*. Other measures of bias can be used, but we focused on the false alarm-based one since the most reliable effects were observed for that measure. Higher values of *zF* indicate more liberal memory bias (i.e., greater false alarms) and lower values of A_z indicate poorer discriminability. These measures were submitted to a 3 (proportion: low, medium, high) × 2 (stimulus type) mixed ANOVA. In Experiment 1, there was a more liberal bias overall for negative words [$F(1,82) = 42.35$, MSE = 3.32, $p < .001$], but that effect was qualified by a significant interaction with proportion [$F(2,82) = 15.96$, MSE = 1.25, $p < .001$]. Planned comparisons showed that bias was more liberal for negative words in the high [$t(27) = -7.67$, $p < .001$] and medium proportions [$t(28) = -2.35$, $p = .026$], but not the low proportion [$t(27) = -.679$, $p = .503$]. Experiment 2 revealed a similar pattern. Bias was overall more liberal for animal words [$F(1,60) = 9.34$, MSE = .861, $p < .001$], but it was qualified by a marginally significant interaction with proportion [$F(2,60) = 2.73$, MSE = 2.37, $p = .076$]. Bias was more liberal for animal names in the high [$t(19) = -2.98$, $p = .008$] and medium proportions [$t(22) = -2.1$, $p = .048$], but not the low proportion [$t(20) = -.326$, $p = .748$]. The ANOVA on A_z showed no differences in discriminability for either experiment indicating comparable memory accuracy between each class of words across the different proportion conditions (see Table 1).

GENERAL DISCUSSION

The present results complement a growing body of literature suggesting that certain effects for emotional items in recognition memory are due to factors other than emotional valence or arousal. We showed a liberal memory bias for negatively valenced stimuli only when the categorical theme was a salient aspect of the study list. Similar bias was shown for animal names that did not differ from the neutral words in valence or arousal, suggesting that the results are driven by category membership. This pattern was demonstrated in the response rates, the visual ROCs and the indices of discriminability and bias, suggesting a reliable effect of category membership. However, this finding is inconsistent with Kensiger and Corkin (2003), who found no increase in false alarms for their categorised emotional words. One potential reason for this discrepancy is that their study had low false-alarm rates which might have been subject to floor effects.

There was no increase in hits across the proportion manipulation, in contrast to the predicted effect of the memory boost from overlapping category features. One explanation is that the shared category features that affected false alarms are also features that are readily committed to memory. That is, the category features of the studied words would likely be stored in memory even without strong categorical effects, thus any boost from feature overlap for studied words would be negligible. There could also be "oddball" effects of the categorised words in the low-proportion conditions. The infrequent occurrence of these items could increase their salience and distinctiveness in the study list, both of which can improve later retention for the items (see Talmi & Moscovitch, 2004). This distinctiveness would decrease if many of those words appeared in the list. Thus, the category effects and distinctiveness would trade-off across the proportion manipulation, and result in a null effect of proportion on the hit rate. Future work will be needed to unpack these possibilities.

The same pattern of bias was shown for negative words and animal names, but the effects were stronger for the negative words. The bias effect in high-proportion condition was r = .8 for emotional words, but only r = .6 for animal names. This might imply that the emotional words are more categorically related than the animal names (but see Kensinger & Corkin, 2003), even though they have similar LSA interrelatedness scores. Conversely, it could suggest that the valence and arousal of the emotional words affect memory bias beyond the categorical effects explored in this study. In fact, the negative emotional words used in this study produced a stronger memory bias than positive emotional words in previous studies (Dougal & Rotello, 2007; Kapucu et al., 2008), even though the positive words were categorically related in the same manner as the negative words. Since those words were matched on arousal, the difference was likely driven by valence. In support of this hypothesis, Thapar and Rouder (2009) found that valence affects bias differently across ageing, with younger participants showing a bias for negative items and older participants showing a bias for positive items (c.f. Kapucu et al., 2008). Recent work also suggests that valence can affect categorical similarity, as positively valenced information is more similar and interrelated than negatively valenced information (Unkelbach, Fiedler, Bayer, Stegmüller, & Danner, 2008). However, that would predict stronger, not weaker, memory bias for positive than negative words, which is the opposite of what Dougal and Rotello (2007) found. These findings suggest that valence (and arousal) could affect bias beyond the categorical effects we found, and future work is needed to further explore how these factors contribute to bias and categorical effects in memory. Nonetheless, the bias effects in this study were qualitatively similar for the animal names that did not differ from the neutral words in valence or arousal.

The present results speak to the role of category membership in memorial bias, but they do not differentiate the roles of encoding and retrieval because the same proportions were used at study and test. However, if bias was driven by the composition of the test list rather than the study list, it should be more pronounced in the second half of the test list (after more categorised words had been encountered). In brief, the data do not support this possibility; for each proportion-condition the magnitude of bias for categorised words was roughly the same for both halves of the test list. Thus, the bias effect is most likely due to encoding effects, which we believe are a consequence of the build-up of shared category features in the memory trace.

Although the present study focused on recognition memory, related work suggests that categorical effects have a similar influence on emotional memory in other domains like free recall. Talmi and Moscovitch (2004) found greater recall for emotional stimuli when compared to unrelated neutral stimuli, but not when compared to neutral stimuli that were drawn from a single category (e.g., driving- or kitchen-related items; see also Talmi, Luk, McGarry, & Moscovitch, 2007). When category relatedness and distinctiveness were controlled, there was no longer a recall advantage. There are important distinctions between recall and recognition tasks, but the results from recall tasks are consistent with the idea that some of the memorial effects of emotion might be driven by the categorical nature of emotional items.

Finally, our results suggest a methodological approach for researchers interested in effects of emotional memory independent of categorical effects. Presenting these target stimuli infrequently in the lists reduces the saliency of the categorical effects, eliminating the liberal bias. We have employed this approach previously to prevent participants from noticing the stimuli of interest, and similarly did not observe a liberal bias for emotional words (White, Ratcliff, Vasey, & McKoon, 2009, 2010). These findings also bring into question whether previous studies of emotional memory were potentially confounded with categorical effects, which could obscure our understanding of how emotion and memory interact.

In conclusion, the present study shows that emotion affects immediate recognition memory bias primarily through effects of category membership. The memorial bias found for negative emotional words was dependent on the saliency of the category in the study list and was similar to the bias for non-emotional animal names, suggesting that valence and arousal were not the primary causes of the effects. Importantly, these results should not be taken to imply that emotion has no effects on memory. The effects of category membership in this study were stronger for the emotional words than non-emotional animal names, suggesting that emotion might influence memory by providing strong organising features for relational processing (Phelps et al., 1998).

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APPENDIX

Negative emotional and matched neutral words (Exp 1)

Negative		*Neutral*			
enraged	crash	absurd	elbow	lighthouse	salute
intruder	quarrel	activate	elevator	limber	scissors
leprosy	hatred	alien	engine	locker	seat
pervert	killer	alley	errand	lump	sentiment
tornado	punishment	aloof	excuse	machine	serious
trauma	scared	ankle	fabric	manner	shadow
vandal	cancer	appliance	farm	mantel	sheltered
annoy	devil	arm	finger	medicine	ship
crucify	tumour	avenue	foot	metal	shy
disloyal	disaster	bandage	fork	milk	sceptical
hostage	victim	banner	frog	mischief	solemn
roach	divorce	basket	fur	modest	sphere
slap	guilty	bathroom	glass	muddy	spray
drown	slave	beast	golfer	museum	stagnant
mutilate	troubled	bench	habit	mushroom	statue
plague	accident	bereavement	hairpin	mystic	stiff
torture	rejected	blase	hammer	neurotic	stomach
toxic	violent	bowl	hat	news	stool
vomit	bomb	boxer	hawk	nonchalant	storm
whore	incest	branch	hay	nonsense	stove
betray	mad	bus	headlight	nursery	swamp
distressed	evil	butter	hide	obey	tamper
jealousy	hate	cabinet	highway	odd	tank
rape	warfare	cane	horse	owl	teacher
ulcer	terrible	cannon	hotel	paint	tease
ambulance	anger	cat	humble	pamphlet	thermometer
rude	destroy	cellar	icebox	passage	tool
surgery	tragedy	chin	indifferent	patent	tower
brutal	afraid	circle	inhabitant	patient	truck
despise	lie	clock	ink	pencil	trumpet
riot	danger	clumsy	insect	phase	trunk
terrified	pain	coarse	invest	pig	umbrella
bloody	stress	coast	iron	plant	unit
thief	suffer	column	item	poetry	vanity
agony	fear	concentrate	jacket	poster	vest
demon	guillotine	contents	jelly	prairie	village
nightmare	humiliate	context	journal	privacy	violin
wicked	terrorist	cord	jug	quart	wagon
poison	death	cork	kerchief	radiator	watch
sin	herpes	corner	kerosene	rain	whistle
slaughter	panic	corridor	ketchup	rattle	windmill
assault	terror	cow	kettle	razor	window

(*Continued*)

Negative		*Neutral*			
burn	bitch	curtains	key	reserved	wine
rage	slut	custom	kick	reverent	writer
horror	faggot	dentist	knot	revolver	yellow
abuse	asshole	desk	lamb	rock	
hostile	cunt	detail	lamp	rough	
murderer		dirt	lantern	runner	
suicide		egg	lawn	salad	

Animal names and matched neutral words (Exp 2)

Animal names		*Neutral*			
anaconda	herring	absurd	kick	bell	rail
ant	hornet	alien	knot	boot	rim
bass	horse	alley	lamp	boss	rope
bear	lion	aloof	lawn	breeze	sack
bee	lizard	ankle	limber	brick	sail
beetle	minnow	appliance	locker	bush	sauce
blackbird	moose	bandage	lump	café	scotch
boa	mosquito	banner	mantel	cake	shoe
bug	moth	basket	medicine	carpet	shovel
butterfly	mouse	bathroom	Mischief	carrot	skate
canary	oriole	beast	modest	cave	skull
cardinal	ostrich	boxer	muddy	cereal	slope
carp	owl	blasé	mushroom	chalk	soup
cat	parrot	bowl	mystic	closet	spice
caterpillar	penguin	butter	neurotic	coin	stain
catfish	pig	cabinet	obey	coke	stove
antelope	pigeon	cannon	pamphlet	curb	string
chicken	pike	cellar	poster	diving	tail
cobra	python	chin	prairie	drum	tap
cod	rabbit	clock	quart	flag	tin
cow	raccoon	clumsy	radiator	fuel	tomato
cricket	rat	coarse	rattle	fur	toy
crow	raven	contents	razor	garlic	tray
deer	robin	cord	reserved	gin	umpire
dog	salmon	cork	reverent	glove	waist
dolphin	shark	corridor	revolver	gown	walrus
donkey	Sheep	curtains	salad	grocer	bark
dove	sparrow	custom	salute	hood	bean
duck	spider	egg	sentiment	jail	broom
eagle	squirrel	elbow	sheltered	jam	cider
elephant	tiger	errand	sceptical	juice	clown
elk	trout	excuse	sphere	lemon	cookie
falcon	tuna	fabric	spray	basin	doll
finch	turtle	fork	stagnant	lip	jar
flamingo	viper	golfer	statue	map	jewel
flea	vulture	habit	stiff	maple	pear
flounder	wasp	hammer	stool	mate	pie
fly	whale	hay	storm	mouse	pill
fox	wolf	headlight	stove	nickel	plate
giraffe	worm	hide	swamp	pan	parcel
gnat	zebra	humble	tease	paste	miner
goat	beaver	icebox	thermometer	pearl	rocket
goldfish	goose	ink	trumpet	pedal	blouse
grasshopper	monkey	invest	trunk	pen	zipper
halibut	camel	jelly	umbrella	pickle	

(*Continued*)

Animal names		*Neutral*		
hamster	eel	jug	vanity	pile
hawk	frog	kerosene	vest	pole
	ape	kettle	whistle	oven
	bat		aisle	potato
			banana	purse