Normative data for Italian DRM lists

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ABSTRACT

The present study provides norms for DRM lists that have been used to create false memories in native speakers of Italian. The word lists reported in this paper are based on DRM lists that have been used extensively to examine illusory memories in English speakers (Deese, 1959; Roediger & McDermott, 1995). We translated 24 critical lures from 24 DRM English lists and created semantically associated Italian word lists that were then normed with native Italian speakers. Overall, the participants recalled 63% of the list items and 22% of the critical lures with the word lists developed. In addition, 56% of the list items and 82% of the critical lures were recognized by the participants. The present study provides a set of Italian lists that can be used by researchers interested in evaluating false memories in Italian speaking participants.

Introduction

The Deese/Roediger–McDermott (DRM) paradigm (Deese, 1959; Roediger & McDermott, 1995) has been widely used to study false memories. The typical procedure involves presenting participants with a sequence of words that are semantically related to a common associate word (i.e., the critical lure). At test, the participants frequently remember the critical lure despite the fact that it was never presented. For example, they may be presented with a list of words, such as *sour, candy, sugar, bitter, good, taste* and so forth, and when tested, they will often remember the critical lure *sweet*, despite the fact that *sweet* was never presented. This general finding has been replicated in a number of studies that established that the DRM effect is quite robust (see Gallo & Roediger, 2001; Marsh, McDermott, & Roediger, 2004; Norman & Schacter, 1997; Payne, Elie, Blackwell, & Neuschatz, 1996; Seamon, Luo, & Gallo, 1998; Stadler, Roediger, & McDermott, 1999). Roediger and McDermott (1995) took the six strongest lists from Deese (1959) and demonstrated robust false recall and recognition. In their second experiment, they developed an additional 18 lists, providing a total of 24 lists. Their results showed false recognition equal to veridical recognition and a level of false recall similar to that of correct recall. Stadler, Roediger and McDermott (1999) conducted a norming study showing that the different lists, although constructed in a similar manner, varied considerably in the probability with which the critical lure was falsely recalled or recognized. Subsequent studies identified factors that determine false memories in the DRM paradigm (Roediger, Watson, McDermott & Gallo, 2001; Madigan & Neuse, 2004; Breinerd, Yang, Reyna, 2008).

The DRM paradigm has been limited to English-speaking participants, with few studies examining illusory memories in other languages (for exceptions see Anastasi, De Leon, & Rhodes, 2005; Anastasi,

Rhodes, Marquez, & Velino, 2005; Pérez-Mata, Read, & Diges, 2002; Zeelenberg & Pecher, 2002). Pérez-Mata et al. tested Spanish speakers using associative Spanish lists. Zeelenberg and Pecher presented participants with items from the DRM lists that had been directly translated into Dutch. Anastasi et al. (2005) used a similar method by directly translating six of the DRM lists into Spanish, Japanese, and German in order to test foreign exchange students in their native language. To our knowledge, normative data for Italian DRM lists comparable to those reported by Stadler et al. (1999), for English, and Anastasi et al. (2005), for Spanish, are not provided yet. Considering the Italian equivalent of the critical lures used by Roediger and McDermott (1995) and Stadler et al. (1999), we developed a set of 24 Italian word lists for the present study. Then, we presented each of these 24 lists to Italian-speaking individuals and tested their memory, using both recall and recognition tests and measures. Lastly, we present normative data for both list items and critical lures for each of the lists developed.

METHOD

Participants

All the participants reported Italy as their country of origin and Italian as their native language. Ninety subjects produced association norms, which were then used to create Italian DRM lists. Their average age was M = 28.94 years (SD = 11.06). Once created, we tested 24 DRM lists on 68 additional Italian students of Sapienza University of Rome. We split the sample of 68 subjects into two groups of 34 that were used to norm Italian lists using recall and recognition tests. All participants lived in Italy and reported Italian as their native language. The average age of the participants was M = 23.93 years (SD = 1.98). The participants were tested in groups of up to 8 people each.

Materials and Procedure for Association Norms

The Italian lists in the present study were constructedusing the same general method of Anastasi et al. (2005). Anastasi et al. employed a PowerPoint presentation of the lists; instead we used an online survey to present the participants with the Italian equivalent of the 24 critical lures one at a time. We collected responses of ninety participants in a discrete association task. Participants were instructed to write in a textbox the first word that came to mind. All the instructions were given in Italian. We then constructed 24 DRM lists from the 15 most frequent responses to each 24 critical lure used as cues in the preceding discrete association task. The Italian DRM lists developed are provided in the Appendix, along with each item's approximate English translation. There were some words that had to be replaced by the next most frequent associate, due to replication in other lists[1].

Materials and Procedure for 24 DRM lists

Twelve lists were presented to each of the two groups of 34 participants, in order to assess the likelihood that each list would produce false memories for the critical lure during recall and recognition testing (see Appendix).

Several sessions of the same experiment were conducted in a room of the Psychology Faculty at Sapienza University of Rome. The participants, who were tested in order to norm the lists, were instructed to view each word as it was presented on a 4 m[2] (2x2) screen for 2 sec and were informed that their memory for these words would be tested[2]. Participants then viewed each word of the first list

presented in 80-point font centered on the screen. Then participants were instructed to write down all the words that they could remember. This was repeated for all 12 lists of each group. After the final recall test, the participants were instructed to compile a 72-item, paper-based, *yes/no* recognition test that contained 36 list items (3 from each of the 12 presented lists), 12 critical lures from the presented lists, and 24 non-list items. The non-list items were unrelated to the items of lists and to critical lures. All the instructions were given in Italian.

RESULTS

We use SPSS software for our data analysis.

Recall Data

List and critical lure recall data for each Italian list are presented in Table 1. This table also provides the proportion of list items and critical lures recalled in the English and in the Spanish lists normed by previous studies (Anastasi, De Leon & Rhodes, 2005; Stadler, Roediger & McDermott, 1999; Roediger & McDermott, 1995). Data from the Italian lists showed great variability in the probability that the different lists would produce illusory memories. For example, *uomo* list resulted very few critical lures being recalled, whereas *lento* led to more critical lures being recalled (.71) than list items (.59). Overall, Italian lists were more likely to produce correct recall (M = .63, SD = .21) than critical recall (M = .22, SD = .37) [t(23) = .13.11, p < .001].

The level of recall in the present study differs somewhat from that reported by Stadler et al (1999) and Anastasi et al. (2005), but the pattern is similar. For example, Stadler et al. found that a greater proportion of list items (.60) were recalled than critical lures (.40). Likewise in Anastasi et al. (2005) the list items proportion (.53) was higher than the list items proportion (.30).

As in Stadler et al. (1999), the lists from the present study were split into the 12 lists most likely to lead to false memories and the 12 lists least likely to result in false memories. List recall was not significantly higher for the bottom 12 lists (M = .63, SD = .06) than for the top 12 lists (M = .62, SD = .05) [t(23) = 0.66, p = .513]. However, not surprisingly, critical lure recall was higher for the top 12 lists (M = .31, SD = .15) then for to the bottom 12 lists (M = .13, SD = .07) [t(23) = 3.71, p = .001]. Furthermore, list recall was significantly greater than critical lure recall both for the top 12 lists [t(11) = 6.31, p<.001] and for the bottom 12 lists [t(11) = 19.22, p<.001].

Table 1

Mean Proportions of Critical Lures and List Items Recalled for Each Italian List in the Present Study, for the English List Normed by Stadler, Roediger, and McDermott (1999) and Roediger, and McDermott (1995), and for the Spanish List Normed by Anastasi, De Leon, and Rhodes (2005)

	Italian				English		Spanish	
	Present Study				Roediger and McDermott, 1995*; Stadler et al., 1999		Anastasi et al., 2005	
	Critical Lures		List Items		Critical Lures	List Items	Critical Lures	List Items
List	M	SD	M	SD				
Lento (slow) (despacio)	.71	.46	.59	.26	.42	.53	.00	.59
Dolce (sweet) (dulce)	.44	.49	.60	.23	.54	.63	.62	.42
Freddo (cold) (frio)	.41	.47	.63	.18	.44	.61	.52	.60
Gomma (rubber)	.29	.46	.58	.19	.32	.53		
Amaro (bitter)	.26	.43	.51	.24	.01*	.68*		
Giustizia (justice)	.26	.43	.68	.15	.30*	.59*		
Sedia (chair) (silla)	.24	.43	.66	.19	.54	.64	.44	.58
Lampada (lamp)	.24	.42	.59	.25	.14*	.61*		
Rabbia (anger) (enojo)	.21	.41	.69	.27	.49	.50	.20	.46
Bandiera (flag)	.21	.40	.64	.17	.31	.63		
Fiume (river) (río)	.21	.40	.69	.19	.42	.64	.38	.55
Fumo (smoke)	.21	.40	.57	.20	.54	.64		
Ladro (thief) (ladrón)	.21	.40	.64	.23	.23	.61	.24	.51
Penna (pen)	.21	.39	.70	.15	.35	.36		
Ragno (spider) (araña)	.18	.39	.56	.18	.37	.62	.52	.44
Soffice (soft) (suave)	.18	.40	.61	.21	.46	.59	.12	.51
Ago (needle) (aguja)	.18	.37	.75	.19	.52	.60	.26	.51
Alto (high) (alto)	.18	.37	.53	.22	.26	.58	.68	.48
Pane (bread) (pan)	.15	.36	.66	.17	.31	.55	.16	.52
Piede (foot) (pie)	.12	.27	.64	.26	.35	.64	.28	.61
Musica (music) (musica)	.09	.26	.57	.22	.34	.59	.38	.55
Re (king) (rey)	.06	.22	.68	.18	.10	.65	.12	.61
Ragazza (girl) (niña)	.03	.17	.67	.27	.32	.67	.30	.50
Uomo (man) (hombre)	.03	.16	.63	.26	.24	.56	.18	.56
Average	.22	.37	.63	.21	.35 (.16)	.59 (.08)	.32 (.19)	.53 (.06)

Note – We calculated means and standard deviations just of data reported in this table. Thus those values don't refer to means and standard deviations reported in cited original papers. In order to know these values, see recall results paragraph.

Recognition Data

List item and critical lure recognition data for each Italian list are presented in Table 2. This table also provides the proportion of list items and critical lures recalled in the English and in the Spanish lists normed by previous studies (Anastasi, De Leon & Rhodes, 2005; Stadler, Roediger & McDermott,

1999; Roediger, and McDermott, 1995). The recognition data showed that 97% of the participants tested with the *soffice* list recognized the critical lure, whereas 67% of the participants recognized the critical lure when given *uomo* and *ragazza* list. Overall, the participants were significantly more likely to recognize critical lures (M = .82, SD = .11) than list items (M = .56, SD = .16) [t(23) = 5.89, p<.001]. This evidence is consistent with that obtained by Stadler et al. (1999), who reported that critical lures were falsely recognized 68% of the time; list items were correctly recognized 70% of the time. As with the recall data, recognition data were also split into the top 12 and bottom 12 lists on the basis of the probability that the critical lure would be recognized. The participants recognized critical lures more often for the top 12 lists (M = .90, SD = .04) than for the bottom 12 lists (M = .74, SD = .05) [t(11) = 8.35, p<.001]. List items mean for the top 12 lists (M = .59, SD = .20) were not significantly different from the mean of the bottom 12 lists (M = .54, SD = .23) [t(11) =0.52, p = .605]. Similarly for recall, recognition data are comparable to those of the English and Spanish lists. In fact Stadler et al. (1999) reported their top lists resulted in 71% of list items and 77% of critical lures being recognized, whereas their bottom lists resulted in 74% of list items and 55% of critical lures being recognized. Similarly, Spanish lists (Anastasi et al., 2005) provided 77% of list items and 84% of critical lures being recognized for the top lists, whereas 70% of list items and 54% of critical lures for the bottom lists.

Table 2

Mean Proportions of Critical Lures and List Items Recognized for Each Italian List in the Present Study, for the English List Normed by Stadler, Roediger, and McDermott (1999) and Roediger, and McDermott (1995), and for the Spanish List Normed by Anastasi, De Leon, and Rhodes (2005)

	Italian				English		Spanish	
	Present Study				Roediger et al.,2001*; Stadler et al., 1999		Anastasi et al., 2005	
	Critical Lures		List Items		Critical Lures	List Items	Critical Lures	List Items
List	M	SD	M	SD				
Soffice (soft) (suave)	.97	.47	.67	.09	.81	.63	.54	.73
Fumo (smoke)	.96	.49	.64	.18	.73	.84		
Lento (slow) (despacio)	.93	.49	.97	.25	.69	.56	.36	.76
Re (king) (rey)	.92	.43	.23	.27	.27	.69	.72	.77
Bandiera (flag)	.92	.50	.40	.21	.60	.62		
Penna (pen)	.91	.50	.56	.22	.57	.68		
Sedia (chair) (silla)	.89	.50	.54	.29	.74	.74	.52	.69
Ladro (thief) (ladrón)	.89	.45	.72	.30	.70	.71	.94	.67
Fiume (river) (río)	.88	.49	.59	.29	.67	.76	.74	.81
Alto (high) (alto)	.87	.32	.88	.30	.72	.77	.94	.73
Ago (needle) (aguja)	.85	.49	.38	.34	.68	.71	.70	.91
Musica (music) (musica)	.85	.51	.51	.34	.69	.59	.82	.76
Freddo (cold) (frio)	.81	.44	.74	.37	.84	.79	.72	.85
Giustizia (justice)	.81	.39	.82	.32	.76*			
Rabbia (anger) (enojo)	.80	.33	.64	.35	.79	.69	.54	.51
Lampada (lamp)	.79	.49	.64	.31	.63*			
Gomma (rubber)	.77	.01	.44	.41	.67	.64		
Ragno (spider) (araña)	.76	.50	.44	.41	.58	.71	.92	.75
Amaro (bitter)	.71	.33	.76	.44	.26*			
Pane (bread) (pan)	.71	.17	.44	.44	.64	.51	.34	.67
Piede (foot) (pie)	.69	.45	.25	.42	.62	.59	.76	.74
Dolce (sweet) (dulce)	.69	.33	.88	.39	.78	.68	.94	.82
Uomo (man) (hombre)	.67	.40	.19	.42	.61	.80	.70	.72
Ragazza (girl) (niña)	.67	.45	.28	.47	.58	.88	.70	.71
Average	*.82*	*.41*	*.56*	*.33*	*.65 (.14)*	*.69 (.09)*	*70 (.19)*	*.74 (.09)*

Note – We calculated means and standard deviations of the data reported in this table. Thus those values don't refer to means and standard deviations reported in the cited original papers. In order to see these values, see the recognition results paragraph.

Correlation Data

Pearson correlations were calculated for the mean proportion of critical lures and list items recalled and recognized by each participant.

These results showed a significant correlation between critical lure recall and critical lure recognition (r = .73, p < .001), since the participants tended to produce false memories at similar levels in recall and recognition tasks. Also a significant moderate correlation between list item recall and list item recognition (r = .25, p < .05) was found. These data are coherent with Stadler et al. (1999), who found the recall vs recognition correlation higher for critical lure (.77) than for list items (.52). Anastasi et al. (2005), instead report just a correlation in list items between recall and recognition (.34). Furthermore, as argued by previous researchers (e.g. Seamon et al., 1998, Stadler et al., 1999), recognition performance could be influenced by the previous recall task. Additional correlations were computed to determine whether false recall and false recognition for the present Italian norms were related to the English norms published by Stadler et al. (1999) and Spanish norms published by Anastasi et al. (2005). These data revealed a moderate correlation between critical lure recognition for the present norms and the Anastasi et al. Spanish norms (r = .43, p = .05). In a similar analysis for critical lure recall, in which these norms were compared, no significant correlation was observed.

DISCUSSION

In the present study, we created a set of Italian associative lists using native Italian speakers. To our knowledge, no other study has developed associative lists using the DRM paradigm and provided normative data for recall and recognition for Italian lists. Such normative data can be useful for researchers interested in investigating illusory memories in Italian speakers using the DRM paradigm (Deese, 1959; Roediger & McDermott, 1995). As Anastasi et al. (2005) suggested, another potentially important use of these lists is to conduct research investigating bilinguals, in order to help delineate the theoretical explanations for the false memory effect. Furthermore, in the present study we used the general method proposed by Anastasi et al. (2005)for converting the DRM lists into the Italian language. These results demonstrate the robustness of the DRM false memory paradigm in other languages. The normative data for the present Italian lists are similar to those for the English lists normed by Stadler et al. (1999) and to those for Spanish lists normed by Anastasi et al. (2005). The effectiveness of the lists in producing false memories showed variability, with some lists demonstrating high levels of false recall or recognition, whereas other lists were much less likely to lead to false memories. For example, the *lento* list resulted in 71% of the participants recalling the critical lure, whereas 3% of the participants recalled the critical lure for the *uomo* and *ragazza* lists. These two are the lists most unlikely to produce false recognition, instead s*office* was the list most likely to result in false recognition (M = 97%). Finally, we demonstrated a significant correlation between those lists that led to high levels of false recall and those that led to false recognition. However, there were some exceptions. For example, the *re* list was very effective in producing false recognition (M = .92) but not for producing false recall (M = .06).

The false memory effect has already gained the attention of many memory researchers, nevertheless the majority of studies have tested English speakers using the DRM paradigm. The present study adds to the literature by providing a set of Italian lists that can be used by researchers interested in testing individuals who speak Italian. These norms are useful for researchers interested in assessing illusory memories with the DRM paradigm.

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NOTES

1.The appendix include 24 lists divided in two homogeneous groups (A and B). Our interest in the present study was to avoid word repetitions within each list and not between group A and group B. Indeed, participants were divided in two groups and saw 12 lists of group A or 12 lists of group B.

2.Previous studies have demonstrated that presenting list items in an auditory modality results in an increase in false memories (Gallo, McDermott, Percer, & Roediger, 2001; Smith & Hunt, 1998), as compared with a visual mode of presentation. The present study utilized a visual presentation modality similar to other norming studies (Anastasi, De Leon, & Rhodes, 2005; Stadler, Roediger, & McDermott, 1999).

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