MEMORY, 2006, 14 (4), 400–414

Psychology Press
Taylor & Francis Group

Retrieval of names in face and object naming in an interference study

Marie Izaute and Patrick Bonin
LAPSCO/CNRS (UMR 6024), Clermont-Ferrand, France

Two experiments using the interference paradigm are reported. In the first experiment, the participants spoke aloud the names of celebrities and the names of objects when presented with pictures while hearing distractors. In the case of proper names, we replicated the data obtained by Izaute and Bonin (2001) using the interference paradigm with a proper name written naming task. In the case of common names, the results replicated those obtained by Shriefers, Meyer, and Levelt (1990). In the second experiment, the participants produced the names of celebrities when presented with their faces while hearing distractors that were either proper names associated with the celebrities (associate condition), that belonged to a different professional category (different condition), or that corresponded to the proper names of the celebrities (identical condition). For negative SOAs, "associate" distractors were found to increase latencies compared to the "different category" condition. The implications of the findings for proper name retrieval are briefly discussed.

Are the mechanisms and the representations underlying face naming different from those underlying common name/object naming? We intuitively know that retrieving the name of a familiar face can sometimes be more difficult than retrieving the name of an object. Indeed, it has been shown than when recognising familiar people, the retrieval of the proper names is more difficult than that of the biographical information relating to them (McWeeny, Young, Hay, & Ellis, 1987; for a review see Izaute, 2003; Valentine, Brennen, & Brédart, 1996). It has been suggested that the difficulty in retrieving proper names could be due to the fact that they usually have no synonym (Brédart, 1993), and thus, unlike common name naming (referred to as "object naming" below), face naming requires the retrieval of one *specific* name.

Researchers in the field of face processing have all attempted to account for the fact that lexical access to proper names is more difficult than to common names in the proper name processing models they have constructed. Previous studies have suggested that not only uniqueness but also meaninglessness, or conceptual specificity, might account for the characteristics of proper name processing as compared to object name processing (Brédart & Valentine, 1998; Brédart, Valentine, Calder, & Gassi, 1995; Burke, MacKay, Worthley, & Wade, 1991; Burton & Bruce, 1992, 1993; Burton, Bruce, & Johnston, 1990; Cohen, 1990; Valentine, Moore, & Brédart, 1995). However, only a small number of experimental studies have attempted to investigate lexical access in face naming.

Brédart and Valentine (1992) have integrated models of speech production (Kempen & Huijbers, 1983; Levelt, 1989) with those of face naming (Bruce & Young, 1986) because they assume that face naming is a particular instance of speech

Correspondence should be addressed to Marie Izaute, Laboratoire de Psychologie Sociale et de Psychologie Cognitive, (LAPSCO-UMR 604 CNRS), Université Blaise Pascal, 34, Avenue Carnot, 63037 Clermont-Ferrand Cedex, France. Email: Marie.Izaute@srvpsy.univ-bpclermont.fr

The authors wish to thank Christopher Barry and an anonymous reviewer for very helpful comments, and Brigitte Plantade and Anne Dutheil for collecting the data.

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 DOI:10.1080/09658210500419966

production. Since the lemma/lexeme distinction is commonly thought to exist in object naming (Levelt, Roelofs, & Meyer, 1999, but see Caramazza, 1997), this distinction has also been proposed for proper naming (Brédart & Valentine, 1992; and see Valentine et al., 1996 for arguments). Lemmas correspond to abstract lexical entities that are pre-phonologically specified whereas lexemes are the phonological form of the names (Levelt, 1989).

In the Valentine et al. (1996) framework, Person Identification Nodes (PINs) are an intermediate processing stage between lemma and semantic identity specifications. The PIN is a key feature of face-naming models and clearly distinguishes them from object-naming models (Brédart, Brennen, & Valentine, 1997; Valentine, Hollis, & Moore, 1998). In object naming, the activation from semantics flows directly to lemmas, whereas in face naming the activation flow from semantics to lemmas is mediated by PINs. Because of this difference between face and object naming, the lemmas involved in face naming receive less activation than those involved in object naming. In effect, in the latter case, a given lemma receives activation from several semantic units, whereas in the former, a given lemma receives activation only from the PIN to which it is linked. More precisely, in object naming it is assumed that lemmas receive activation from several concepts due to the existence of multiple links between concepts (Levelt et al., 1999). This connectivity emphasises the fact that common names have many conceptual relations. As far as proper names are concerned, because the PINs act as token markers (Semenza & Zettin, 1989) which link the conceptual level with the lexical level (lemmas), access to people' s names on the basis of a representation of a face can only be achieved from the single link between the PIN and the lemma. Hence, for these models, the relationships between the conceptual and the lexical representations are clearly different in face and object naming processing models.

As far as lexical access to common names is concerned, Schriefers et al.'s (1990) study is certainly one of the most frequently cited in support of the lemma/lexeme distinction. Schriefers et al. made use of the picture-word interference paradigm. In this technique, pictures are presented in association with stimuli that the participants are told to ignore (distractors). For example, a picture of a CAT is presented with the written word *dog* (or with the word *dog* spoken aloud). Participants are instructed to speak the picture name aloud as quickly as possible while ignoring the written (or the spoken) word distractor. The delay between the onsets of the picture and the distractor can vary. This is the stimulus onset asynchrony (SOA). The pattern of results obtained from the manipulation of SOAs makes it possible to draw inferences about the time course of activation of the different types of representations involved in lexical access. Schriefers et al. (1990) found that when spoken word distractors were semantically related to the picture names, spoken latencies were longer than for unrelated word distractors, i.e., semantic interference effects occurred. In contrast, when the distractors were phonologically related to the picture names, facilitation effects were found. Semantic interference effects were only found when the onset of the distractor was 150 ms before the onset of the target picture (a negative SOA of -150 ms), whereas phonological facilitation effects were found with SOAs of 0 and $+150$ ms. Thus, semantic and phonological activation did not overlap in time. Given that semantic interference effects were not found in a picture recognition task, which involves conceptual activation but no overt language production, a conceptual locus for the semantic interference effect was ruled out by Schriefers et al. (1990). Moreover, as there was no SOA at which both interference and phonological facilitation were found, and given that the lexeme level is assumed by Schriefers et al. (1990) to be the genuine level of the phonological facilitation effect, then, by elimination, these authors suggested that semantic interference effects act at the lemma level.

The findings obtained by Schriefers et al. (1990) for semantic interference have been replicated in French in spoken production and extended to the written modality (Bonin & Fayol, 2000). It is important to stress here that semantic interference effects were obtained in object naming with the use of distractors that were categorically related to, but not verbal associates of, the picture names. In these experiments, the influence of associatively related pairs was not investigated.

In a previous study (Izaute & Bonin, 2001), we explored the semantic interference effect in face naming using an interference paradigm. When the participants had to write down the names of celebrities while hearing different names as distractors, an interference effect was found on the written latencies as compared to both a noise and a silent control condition. Moreover, this effect was observed at each of the SOAs tested

(-150ms, 0ms, $+150$ms). Importantly, contrary to what Schriefers et al. (1990) observed in object naming, we did not find that proper name distractors belonging to the same professional category as the target faces yielded more reliable interference than proper name distractors belonging to a different professional category. That is to say, the proper name distractor " JOSPIN" (French politician) did not cause more interference than the proper name distractor "DRUCKER" (French TV personality) in the naming of the face of "GISCARD" (French politician) than either of the control conditions (noise and silence). Indeed, we found that both "JOSPIN" and "DRUCKER" interfered to the same extent as both of the control conditions. Thus, a name from the same category as the target induced no more interference than a name from a different category.

The findings strongly suggest that the mechanisms that have been proposed for common name naming do not simply translate to proper name naming. They can be accounted for in Valentine et al.'s (1996) model as follows. For instance, hearing the distractor name *James Dean* will activate its corresponding lemma. Given the assumption that PINs and lemmas have one-to-one relationships, if *Jack Nicholson's* face is the target to be named then the lemmas corresponding to the distractor name and to the face will compete with each other and the resulting competition will slow down latencies as compared to control conditions. Because the specific PINs do not "contain" semantic information but only permit access to it, if the distractor is the French politician *Jacques Chirac,* who is not related to the professional category of *James Dean,* an interference will be observed compared to the control conditions. However, this interference will not be different in magnitude to that observed when *Jack Nicholson* is taken as the distractor name. However, such an explanation of interference effects in this face-naming model is, in a sense, based on a null result, i.e., the absence of any greater categorical than unrelated name interference. Further evidence is clearly needed. In particular, we thought it important to establish the fact that semantic interference can be observed in participants when they are engaged in an object-naming task but not when the same participants are performing a face-naming task. The observation of a different pattern of interference effects in the same participants would provide strong additional evidence that the representations and the mechanisms involved in object naming and in face naming are not organised in the same way.

It must be stressed, however, that our goal was not to test a locus of interference effects in face-naming models. In the Izaute and Bonin (2001) study, we hypothesised that the relationships between the semantic representations corresponding to people might be organised differently from those corresponding to objects. Whereas semantic representations corresponding to objects would seem to be organised categorically (see Caramazza & Shelton, 1998, in Bonin, 2003, for convincing evidence from brain-damaged patients), the semantic representations corresponding to people would appear to be organised around associative relationships (Barry, Johnston, & Scanlan, 1998). Therefore, even though there is already some evidence from priming experiments to support this hypothesis (Barry et al., 1998; Carson & Burton, 2001; Schweinberger, 1995; Young, Flude, Hellawell, & Ellis, 1994; for review, see Izaute, 2003), these are few in number and, moreover, we are aware of no study that has investigated this issue with the use of the Schriefers et al. (1990) interference paradigm.

Two experiments using this interference paradigm are reported and investigate the issues raised above. In the first experiment, the same participants had to name either faces or objects while hearing distractors that were categorically related or unrelated to the face/object names. The distractors were presented over a wider range of SOAs than in the Izaute and Bonin (2001) study. Moreover, unlike in this latter study, spoken production and not written production was investigated given the fact that most face- and object-naming studies have, so far, focused on the spoken modality. In the second experiment, we concentrated on face naming using associatively (and categorically) related distractors.

EXPERIMENT 1

In this experiment, the participants had to name aloud photographs of the faces of celebrities or pictures of objects, while hearing distractors that they had to ignore. In the face-naming task, the distractors were either from the same professional category as that of the celebrities, or from a different professional category. In the object-naming task, the distractors were either from the same semantic category as that of the objects, or from a different category. In the control condition, the faces and the objects were presented with a stretch of white noise. Since we wanted to determine whether the effects would span a wide range of SOAs or would be confined to the use of a specific SOA for the common and proper name conditions, five SOAs were used: −250ms, −150ms, 0ms, +150ms, and +250ms. The decision to use a wide range of SOAs was motivated by the observation that latencies are longer in face naming than in object naming. Therefore, limiting our study to just one or two SOAs might have made it impossible to observe effects in face naming. It should be noted that the SOAs of −150ms, 0ms, +150ms were used in the Schriefers et al. (1990) study and a semantic interference effect was only found with an SOA of −150 ms. SOA was a between-subject factor and Distractor type was a within-subject factor. Naming latencies and errors were measured.

In the light of the results of the Izaute and Bonin (2001) written face-naming study, we expected spoken latencies to be longer for the same category and different category conditions than in the noise condition, but did not expect the first two conditions to be reliably different. In contrast, in object naming, we predicted that spoken latencies would be longer for the same category condition than for the different category condition (Schriefers et al., 1990). Moreover, this effect should be observed with the use of an SOA of −150 ms as found by Schriefers et al. (1990).

Method

Participants. *A* total of 75 psychology students at Blaise Pascal University participated in the experiment. All were native speakers of French, and had normal or corrected-to normal vision and no known hearing deficit. The participants were tested individually and were randomly assigned to one of the SOA conditions. Half of the participants started with face naming and the remaining half with object naming. The assignment of participants to task order was randomised.

Stimuli. The first author selected celebrity names that were judged as being familiar to students: 15 photographs of familiar personalities served as the target faces and 30 names of familiar persons as distractors. The proper names of the target photographs are listed in Appendix 1 together with the distractors corresponding to the same category proper names and the distractors corresponding to the different category proper names. A group of 50 participants who did not take part in the experiment itself rated 250 names for familiarity on a 3-point scale (1 = unfamiliar, 2 = familiar, 3 = highly familiar). In the experimental session, the participants were presented with the faces of the celebrities who were judged to be the most familiar (top 20%). The mean familiarity ratings of the proper names corresponding to the target faces, and the different and the same category distractors were 2.8,2.8, and 2.7 respectively. The mean familiarity rating did not differ significantly across the subsets of proper names (for a discussion of the familiarity and frequency of proper names, see Valentine, Bredart, Lawson, & Ward, 1991; Valentine & Moore, 1995). The mean number of letters in the proper name distractors was six for both the different and same category conditions. The mean acoustic duration of the distractors was the same across conditions, namely 728 ms for both the different and same category distractors.

As far as the object-naming task is concerned, the stimuli were selected from the Bonin and Fayol (2000) study. The mean acoustic duration of the distractors was almost exactly the same across conditions, 721 ms for both the different and same category distractors and 728 ms for the targets.

Apparatus. The experiment was created using PsyScope (1.1.) (Cohen, MacWhinney, Flatt, & Provost, 1993; Vaughan & Yee, 1994) and was run on a Macintosh LCIII. The spoken latencies were recorded with the Button-Box connected to the computer and an AIWA CM-16 small tie-pin microphone connected to the Button-Box. The distractors were prepared with SoundEditPro and were presented via digital headphones. The computer controlled the presentation of the pictures as well as the presentation of the distractors.

Procedure. The experimental design included one within-subjects factor, namely the type of priming distractor, which had three levels (same category, different category, and noise), and one crossed between-subjects factor, i.e., SOA, which had five levels. Each participant was tested individually and saw all the priming conditions. The 15 pictures were presented three times. Each picture was paired with each of the three distractors. The resulting 45 distractor-picture pairs were divided into three sets. Each set was constructed in such a way that each of the 15 pictures occurred once and each of the three distractor types occurred five times. Likewise, every participant saw each picture three times, once with each type of distractor. For each subgroup of items, the pictures were randomly presented. Different random orders of the set were created. The participants were randomly assigned to one of these orders and one of the five SOA conditions.

In the face-naming task, the participants were given a booklet showing the faces with their associated names before the experiment proper. They had to learn the names that were associated with each face. They were then told that they had to speak aloud the name corresponding to each face presented on the screen as quickly as possible. In the object-naming task, the participants also received a booklet showing the target pictures and their names. Here again, they were told to study the names of the pictures and to use only those names to refer to the pictures. The pictures and the photographs were presented centred on the screen at a viewing distance of about 60 cm. The experimenter monitored the participants' responses and scored them for correctness. The entire session lasted about 1 hour. One group of participants started with the face-naming task before completing the object-naming task. This order was reversed for the second group of participants.[1]

A test trial had the following structure. A ready signal ("****") was presented for 500 ms followed by a picture/photograph. Depending on the SOA condition, the onset of the distractor coincided with the face onset (SOA = 0 ms), preceded or followed it by 150 ms (SOA = −150ms and + 150ms respectively), or preceded or followed it by 250 ms (SOA = −250ms and +250ms respectively). The picture was removed from the screen after the participant started speaking. The next trial was presented after a pause of 5000 ms.

Results

ANOVAs were performed on the latencies and errors. Errors were scored whenever a participant did not remember the name of an object or a face, a technical problem occurred, or a participant used a common name or a proper name other than the expected one, stuttered, or produced mouth clicks. Applying these criteria led us to discard 2.1% and 4.7% of the data for object naming and face naming respectively. To prevent very long latencies on a few correct responses from influencing the naming latency data, responses over two standard deviations above the participant and item means were discarded (2.1% and 1.9% of the object-naming and face-naming data). For common names, the data excluded from the latency analysis amounted to 4.2%, and for proper names, 6.6%. In both experiments, effects were judged to be significant at $p < .05$.

For both object and face naming, ANOVAs were performed both by participants (Fl) and items (F2) (Clark, 1973).

The mean naming latencies and error rates for common names are presented in Table 1. Table 1 shows that, compared to the noise control condition, both the same and different conditions induced interference effects at all the SOAs. The interference effect was also larger for the same category than for the different category for all the SOAs, as Figure 1 illustrates.

For object naming, the main effect of distractor type was significant, $F_1(2, 70) = 123.4$, $MSE = 114826.5$; $F_2(2, 70) = 91.9$, $MSE = 108781.9$. The effect of distractor type varied across the SOAs, $F(2, 70) = 6.3$, $MSE = 5830.6$; $F_2(2, 56) = 5.1$, $MSE = 5747.2$. Planned comparisons indicated that the same category condition was reliably slower than the different category condition at

TABLE 1
Mean oral latencies (OL in ms) and errors rates (in percentage) as a function of distractor type and of SOA (−250 ms, −150 ms, 0 ms, +150 ms, +250 ms) for object name

	Distractor type	*Same category*	*Different category*	*Noise*
SOA −250 ms	Mean OL (ms)	7.40	716	674
	Error rate (%)	6.7	4.9	2.7
SOA −150 ms	Mean OL (ms)	738	716	628
	Error rate (%)	5.8	4.4	2.2
SOA 0 ms	Mean OL (ms)	744	723	630
	Error rate (%)	6.2	4.4	2.2
SOA +150 ms	Mean OL (ms)	676	661	631
	Error rate (%)	4.0	3.6	2.7
SOA +250 ms	Mean OL (ms)	694	681	655
	Error rate (%)	4.4	5.3	2.2

[1] An analysis revealed that neither a reliable main effect of order of tasks (face naming followed by object naming or the reverse) nor a significant interaction involving this factor were obtained. These effects are therefore omitted from the analyses.

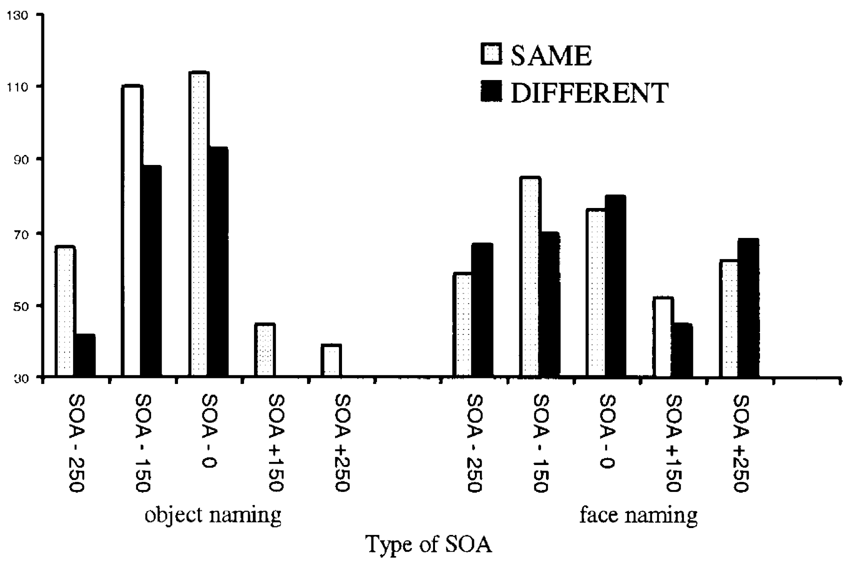

Figure 1. The mean interference effects for different type of SOA (measured relative to a white noise control condition) for object naming on the left and proper naming on the right panel of the figure.

SOAs −250 and −150—respectively, $F_1(1, 70) = 4.8$, $MSE = 4416.2$; $F_2(1, 56) = 4.3$; $MSE = 4834.10$ and $F_1(1, 70) = 4.0$, $MSE = 3714.1$; $F_2(1, 56) = 3.7$, $MSE = 4204.4$; $p = .056$—but was not significant for the 0-ms SOA, $F_1(1, 70) = 3.6$, $MSE = 3332.4$, $p = .061$; $F(1, 56) = 1.7$; $MSE = 1906.3, p = .20$, the +150-ms SOA or the +250-ms SOA. As far as errors are concerned, there was a main effect of distractor type, $F_1(2, 70) = 6.9$, $MSE = 180.9$; $F_2(2, 70) = 96.9$, $MSE = 177.9$. The error rate was greater in the different and same category conditions than in the noise condition, different greater than noise, $F_1(1, 70) = 6.5$, $MSE = 170.7$; $F_2(1, 56) = 6.1$, $MSE = 156.1$, and greater in the same condition than the noise condition, $F_1(1, 70) = 13.0$, $MSE = 342.5$; $F_2(1, 56) = 13.3$, $MSE = 341.7$. There was no significant difference in error rates between the different and same category conditions. No main effect of SOA on errors was significant for participants, but was reliable on items only, $F_2(4, 56) = 14.8$, $MSE = 388.9$.

The mean naming latencies and error rates for proper names are presented in Table 2. For face naming, the main effect of distractor type was significant, $F_1(2, 70) = 26.9$, $MSE = 110124.6$; $F_2(2, 70) = 18.6$, $MSE = 110430.7$. As illustrated by Figure 1, interference effects occurred in the same and different conditions but not in the noise condition. Planned comparisons revealed that both the same category $F_1(1, 70) = 40.9$, $MSE = 167526.4$; $F_2(1, 56) = 28.4$, $MSE = 168364.3$, and the different category conditions, $F_1(1, 70) = 39.7$, $MSE = 162813.9$; $F_2(1, 56) = 27.5$; $MSE = 162882.3$, were significantly slower than the noise condition, but that there was no reliable difference between the same and different category conditions, $F_1(1, 70) < 1$, $MSE = 33.6$; $F_2(1, 56) < 1$, $MSE = 45.4$. There was a main effect of SOA, which was reliable for items only, $F_1(4, 70) < 1$, $MSE = 18503.0$, $F_2(4, 56) = 3.7$, $MSE = 14513.3$, and no reliable interaction effect, $F_1(8, 140) < 1$, $MSE = 1123.1$, $F_2(8, 112) < 1$, $MSE = 1187$. As far as the errors are concerned, only a main effect of SOA was reliable for items, $F_2(4, 56) = 4.8$, $MSE = 182.5$.

TABLE 2
Mean oral latencies (OL in ms) and errors rates (in percentage) as a function of distractor type and of SOA (−250 ms, −150 ms, 0 ms, +150 ms, +250 ms) for proper name

	Distractor type	*Same category*	*Different category*	*Noise*
SOA −250 ms	Mean OL (ms)	990	998	931
	Error rate (%)	6.2	7.6	6.2
SOA −150 ms	Mean OL (ms)	952	937	867
	Error rate (%)	4.9	3.1	4.9
SOA 0 ms	Mean OL (ms)	982	986	906
	Error rate (%)	9.8	10.7	4.0
SOA +150 ms	Mean OL (ms)	969	962	917
	Error rate (%)	9.3	8.9	7.1
SOA +250 ms	Mean OL (ms)	957	963	895
	Error rate (%)	3.6	6.2	6.7

Discussion of Experiment 1

The findings from Experiment 1 are straightforward. For object naming, there were interference effects in both the same and different category conditions, but the interference was reliably larger in the same category conditions for SOAs of -250 ms and -150 ms (i.e., when the onset of the dis-tractors preceded the onset of the target object). Our results are in line with those obtained by Schriefers et al. (1990). In face naming, there were interference effects in both the same and different category conditions in contrast to the noise condition. However, these two conditions did not differ reliably and were not modulated by SOA. As far as face naming is concerned, we replicated the results we had previously obtained for written naming latencies (Izaute & Bonin, 2001).

The findings that the same and different conditions interefere with the noise condition in face naming are in line with Valentine et al.'s (1996) model of face naming. In their model, access to the semantic system for proper names is mediated by PINs. As explained in the Introduction, PINs are only token markers and thus do not provide semantic information. PINs have a one-to-one connection to lemmas. Every famous face has a *specific* PIN. Therefore, hearing a person' s name will activate the corresponding PIN and when a face has to be named, interference will occur when the two names are different. The fact that the interference effect in face naming was not reliably larger for same category than for different category distractors contrasts with the results obtained for object naming (e.g., Bonin & Fayol, 2000; Schriefers et al., 1990).

However, it is important to note that Young, Ellis, Flude, McWeeny, and Hay (1986), who used an interference paradigm in a face-naming task, found that when associate names were presented together with faces, e.g., the face of *Stan Laurel* and the name *Oliver Hardy,* the interference effect was larger than when the distractors were unrelated names. Importantly, Young et al. (1986) showed that face naming with distractor names that were either unrelated or categorically related to similar performance levels to those we observed in Experiment 1. Moreover, using a face/face priming paradigm, Barry et al. (1998) observed a facilitation effect on naming performance only with associates of faces but not when same category or unrelated faces were used.

It might be argued that the observation of different patterns of interference effects for face and object naming was obscured by the fact that there were more different types of categories for objects than for faces in Experiment 1. Using a procedure similar to the interference paradigm technique, in which participants had to name objects either in homogeneous blocks (only examplars of tools) or in heterogeneous blocks (examplars of tools, vegetables, fruits, animals . . .), Damian, Vigliocco, and Levelt (2001) found a reliable categorical interference effect on latencies when using five different semantic categories. In Experiment 1 there were five different semantic categories for faces. We do not think, therefore, that the difference in the patterns of interference in object and face naming is due to the different number of types of category used in the object- versus face-naming tasks.

The findings obtained using the interference paradigm and the priming paradigm provide a coherent picture of face naming. The semantic representation corresponding to objects seems to be organised differently from the representation corresponding to faces. Indeed, according to Barry et al. (1998), the semantic representations of objects are thought to be related via abstract superordinate categories, whereas the representations of people are organised on the basis of interpersonal relatedness or associative relations (closely associated with each other in addition, sometimes, to belonging to the same occupational category). However, Barry et al. (1998) also pointed out that the nature of the semantic representations corresponding to proper names needs to be explored in greater depth in order to evaluate the specificity of proper names, and, more particularly, it is necessary to clarify the relationships between PINs and semantic representations. More evidence is needed if we are to sustain the hypothesis that the semantic representations of people are organised around associative relationships. To our knowledge, this issue has not been addressed within the Schriefers et al. (1990) interference paradigm for proper names. The next experiment was designed to test whether an associative relationship between a distractor word and a face name would interfere with naming latencies as found using the priming paradigm.

EXPERIMENT 2

As in the previous experiment, the participants had to quickly say aloud the names of celebrities while hearing distractors. The distractors were either associates of the celebrities whose faces were presented, belonged to a different occupational category but were not associates, or corresponded to the name of the target celebrities. As in the previous experiment, the faces in the control condition were presented with a stretch of white noise. Since our study is the only "face-name" associate interference naming task study to make use of acoustic distractors, we also wanted to find out whether the effects would span a wide range of SOAs or would be confined to the use of a specific SOA. The same SOA range as in Experiment 1 was used here.

Method

Participants. A total of 80 students taken from the same pool as in Experiment 1 took part in the experiment. None of the participants had participated in the previous experiment. They were all native speakers of French, and had normal or corrected-to normal vision and no known hearing deficit.

Stimuli. The first author selected celebrity names that were thought to be familiar to the students. A group of 50 participants, who had not taken part in the naming experiment, had to produce associate names for 240 selected proper names. Among the 240 proper names, we chose 16 names for which the same corresponding associate name was produced more than 80% of the time. Likewise, 16 names and corresponding photographs served as targets, 16 as associate distractors, and 16 as different category distractors. Another pool of participants, who had not taken part in the naming experiment, rated the 48 selected names for familiarity (Valentine & Moore, 1995) on a 3-point scale (0 = unfamiliar, 1 = familiar, 2 = highly familiar). The mean familiarity ratings for the target proper names, and different category and associate distractors were 1.77, 1.74, and 1.72 respectively. The number of letters for the target proper names was 6.81, and 6.94 and 6.75 for the different category and associate conditions respectively. The mean acoustic duration of the distractors was the same across conditions: 798 ms for the target proper names, 799 ms for the different category, and 798 ms for the associate conditions. There was one within-subjects factor, namely distractors type, which had four levels, (associate, different category, identical, and noise) and one between-subjects factor, namely SOA, which had five levels (the same as those in Experiment 1). We used the same criteria as in Experiment 1 to create four groups of 16 picture-distractor pairs. Different random orders were created for each of these subgroups of items on the basis of the same criteria as were used in Experiment 1. The proper names of the experimental photographs are listed in Appendix 2 together with the distractors corresponding to the different category proper names and the distractors corresponding to the associate category proper names.

Apparatus and procedure. These were the same as in Experiment 1.

Results

The criteria defined in Experiment 1 were applied in order to exclude some of the data. Applying these criteria led us to discard 7.6% of the data for errors and 2.8% of the data representing latencies over two standard deviations above the participant and item means. Overall, these errors represented 10.4% of the total data. The ANOVAs were performed with SOA (-250ms, -150 ms, 0 ms, and $+150$ms, $+250$ms) and distractor type entered as main factors. The mean naming latencies and error rates are shown in Table 3. The pattern of the interference and facilitation effects is presented in Figure 2.

The main effect of distractor type was significant, $F_1(3, 75) = 103.5$, $MSE = 399682.9$; $F_2(3, 60) = 70.6$, $MSE = 428825.4$. Planned comparisons revealed that naming latencies were longer with associate distractors than with different category distractors, $F_1(1, 75) = 5.7$; $MSE = 22053.1$; $F_2(3, 60) = 4.5$, $MSE = 26992.2$. Also, naming latencies were longer with different category distractors than in the noise condition, $F_1(1, 75) = 72.8$, $MSE = 281046.3$; $F_2(3, 60) = 49.0$, $MSE = 297661.1$. In addition, naming latencies were shorter in the identical than in the noise condition, $F_1(1, 75) = 19.6$, $MSE = 75779.5$, $F_2(3, 60) = 13.0$, $MSE = 79006.3$. More importantly, the effect of distractor type varied across the SOA range, $F_1(12, 75) = 4.4$, $MSE = 16863.6$; $F_2(12, 60) = 7.0$, $MSE = 18218.7$. Planned comparisons indicated that the associate condition

TABLE 3
Mean oral latencies (OL in ms) and errors rates (in percentage) as a function of distractor type and of SOA (−150 ms, 0 ms, +150 ms) for proper name

	Distractor type	*Associate*	*Different category*	*Noise*	*Identical*
SOA	Mean OL (ms)	1057	994	916	830
−250 ms	Error rate (%)	10.5	0.5	7.8	5.9
SOA	Mean OL (ms)	1019	969	895	813
−150 ms	Error rate (%)	12.5	12.9	6.6	5.1
SOA	Mean OL (ms)	1022	1015	895	864
0 ms	Error rate (%)	16.4	12.1	5.9	6.6
SOA	Mean OL (ms)	1019	1019	915	899
+150 ms	Error rate (%)	18.8	18.8	8.6	8.2
SOA	Mean OL (ms)	954	958	915	911
+250 ms	Error rate (%)	14.5	11.3	9.0	6.3

was reliably slower than the different category condition only at SOAs −250 ms, $F_1(1, 75) = 8.3$, $MSE = 32111.9$; $F_2(1, 60) = 12.9$, $MSE = 33597.6$ and −150 ms, $F_1(1, 75) = 5.3$, $MSE = 20585.8$; $F_2(1, 60) = 10.6$, $MSE = 27457.5$. In the identical condition, mean reaction times were faster than in the noise condition only for the −250 ms, $F_1(1, 75) = 15.2$; $MSE = 58878.6$; $F_2(1, 60) = 12.9$, $MSE = 33597.6$, and −150 ms SOAs, $F_1(1, 75) = 13.7$, $MSE = 52782.3$; $F_2(1, 60) = 10.6$, $MSE = 27457.5$.

As far as errors were concerned, there was a main effect of distractor type, $F_1(3, 75) = 21.7$, $MSE = 1257$; $F_2(3, 60) = 12.8$, $MSE = 1207$. The error rates were greater in the associate and different category conditions than in the noise condition: greater in associate than in noise, $F_1(1, 75) = 31.9$, $MSE = 1847.9$; $F_2(1, 60) = 15.7$, $MSE = 1485.4$, and greater in the different than in the noise condition, $F_1(1, 75) = 21.3$, $MSE = 1230.7$; $F_2(1, 60) = 11.3$, $MSE = 1063.5$. There was no significant difference in the error rate between the associate and different category conditions and between the noise and identical conditions. As regards errors, a main effect of SOA was only reliable for items, $F_2(3, 45) = 70.6$, $MSE = 428825.4$, and the interaction was only significant for items, $F_2(12, 180) = 7.0$, $MSE = 18218.7$.

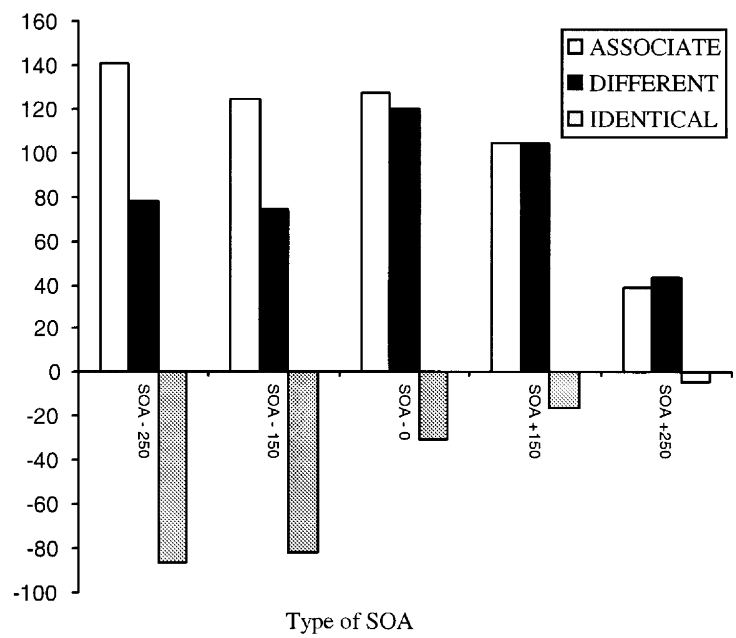

Figure 2. The mean interference effects for different type of SOA for associate and different conditions and the facilitation effect for identical condition (measured relative to a white noise control condition) for proper name.

Discussion of Experiment 2

The results from Experiment 2 are clear-cut. The interference effect due to associates was reliably larger than that induced by unrelated names only when the onset of the distractor preceded the onset of the target face (i.e., negative SOAs). A facilitatory effect from identical distractors was also observed with negative SOAs. The time taken to name a face has been shown to be sensitive to a repetition effect due to previous written exposure to the same name (Ellis, Flude, Young, & Burton, 1996; Valentine et al., 1998). Moreover, the locus of the repetition priming effect is not dependent on repetition of the stimulus in the same perceptual domain, but is instead attributable to the same name being accessed on two separate occasions (Ellis et al., 1996).

Taken together, Experiments 1 and 2 strongly suggest that the semantic representations of PINs are established on the basis of association relationships as proposed by Barry et al. (1998) and also suggested by Izaute and Bonin (2001).

GENERAL DISCUSSION

The findings can be easily summarised. When participants have to say the names of celebrities aloud while hearing distractors, general reliable interference effects are found when the distractors are associatively or categorically related, and/or belong to a different category from the target names when compared to a control condition consisting of a stretch of white noise. However, and more importantly, the interference effect was reliably greater with associated than with categorically related distractors, with the interference effect not being reliable in the latter case. As far as categorically related distractors are concerned, the results of Experiment 1 replicate those found in a previous study that we conducted in the field of written face naming (Izaute & Bonin, 2001). Distractors that are identical to the target name faces produce general facilitation effects.

As already mentioned in the Introduction, in the field of object naming, distractors that are from the same semantic category as those of the target names are known to interfere with naming latencies (Bonin & Fayol, 2000; Maess, Friederici, Damian, Meyer, & Levelt, 2002; Schriefers et al., 1990; Starrevelt & La Heij, 1995). This result was found in the object-naming task used in Experiment 1. The strength of our study lies in the fact that we were able to reveal a different pattern of interference for object and face naming in the same participants. In the former, but not in the latter task, distractors that were categorically related to the targets reliably produced more interference than unrelated distractors, i.e., distractors that belonged to a semantic category different from that of the targets.

In the literature on object naming, a categorical semantic interference effect has been found in several studies and has given rise to a serious debate about the precise locus at which these effects act and about the mechanisms that underlie them. It is not our intention to review the rather technical debates that have taken place among different object-naming theorists. Importantly, they almost all share the idea that the categorical interference effect is due to some level of competion between activated lexical entries. The authors differ as to whether the effects are located at the lemma level or at the lexeme level (Caramazza, 1997; Levelt et al., 1999). As far as face naming is concerned, there is no reason to hypothesise that a similar competitive mechanism is involved. However, our goal was not to determine the locus/i at which interference effects occur in face naming models.

When we consider face naming, then, in line with the proposal made by Barry et al. (1998), the findings strongly suggest that the semantic representations corresponding to people are organised differently from those corresponding to objects. In effect, if the semantic representations corresponding to people followed the same organisational principle as those corresponding to objects, we should have observed that proper name distractors belonging to the same professional category as the target faces interfered more reliably than proper name distractors belonging to a different professional category from the target faces. For instance, the proper name distractor ‘‘MITTERAND’’ (French politician) should have caused more interference than the proper name distractor ‘‘PALMADE’’ (French humorist) in the naming of the face of ‘‘CHIRAC’’ (French politician) as compared to the control conditions (noise). However, we found that both distractors interfered to the same extent as the control conditions. In contrast, we found that associate distractors (‘‘KENNEDY’’ American president, is associated with ‘‘MONROE’’ American actress) produce more interference in the naming of the face of ''MONROE''. Thus, we found that associate distractors interfered more reliably than different category distractors. This suggests that the mechanisms that have been proposed for object naming do not simply translate to proper name naming.

As far as name processing is concerned, the findings of our study replicate those of previous studies using the priming paradigm (Barry et al., 1998; Young et al., 1994) and a simultaneous interference paradigm (Young et al., 1986). In the former study, this effect was observed when the associate names were heard before the presentation of the face to be named, and in the latter when the distractors was presented simultaneously with the face to be named. As far as the associates are concerned, these associative priming effects have been found more frequently than categorical priming effects. Young et al. (1994) showed that participants responded faster to familiar names when the target was preceded by a prime consisting of an associate' s face than when it followed the face of a person from the same category. This associative priming effect has been replicated in several studies (Brennen & Bruce, 1991; Bruce & Valentine, 1986; Rhodes & Tre-mewan, 1993; Schweinberger, 1995; Young, Hel-lawell, & de Haan, 1988). Further experiments have shown that associative prime-target relationships also result in priming for face naming (Young et al., 1986 1994). In such cases, the primes are associatively related to the target face or name in addition to being semanti-cally related (sharing the same occupation). In our experiment, the associative relationship was cumulative with the shared occupational category for 14 persons (out of 16). Some experiments (Young et al., 1986) have revealed an associative interference effect but no categorical interference effect. Two experiments have directly compared these two semantic conditions, associate and categorical. The first, conducted by Barry et al. (1998), failed to obtain a priming effect for categorical primes for faces but obtained a robust priming effect when the target was preceded by the face of an associate. In the second, Young et al. (1994), the faces to be named were preceded by a prime face which could have been an associate or a member of the same category. Naming times in the associate condition were shorter than in either the neutral or the unrelated conditions. However, there was no priming at all for faces from the same category. Nevertheless, when categorical priming has been observed, the effects have been weaker than in associative priming studies (Brennen & Bruce, 1991; Carson & Burton, 2001). The associative effect could then, as suggested by Carson and Burton (2001), be more robust than the categorical effect.

Our findings can be accomodated within several models of face naming. In Valentine et al.'s model (1996), semantic memory for people and objects is based on an interactive activation and competition model of face processing. Even though this model might predict that a categorical relationship between two items should be sufficient to produce interference, we suggest that it might also lead to the prediction that a different category relationship could produce interference in a naming task. Access to information about an individual is only possible via a single' person identification node' (PIN). Each representation of a person has only one PIN. The PIN is connected to different attributes stored in semantic information units (SIUs). The person identity nodes (PINs) act as a gateway to stored personal information coded in the form of semantic information units (SIUs). Activating one PIN, ''Jack Nicholson'', might activate a range of SIUs, which would then in turn pass activation on to other items and therefore produce ''different category'' interference.

The interference can be even greater. If two people share a personal fact (e.g., they are married to one another) this is represented by links between each PIN and that particular SIU. In this context, it seem reasonable to propose that close associates will share more SIUs than other associatively unrelated but categorically related pairs. This is also reasonably consistent with the IAC account of semantic priming (Burton et al., 1990).

Using cartoon characters, Johnston and Bruce (1994) have reported findings that support the hypothesis that the priming effect is due to an associative relationship between related pairs. If we consider that cartoon characters are special objects, these experiments provide additional evidence indicating that faces and objects are equally susceptible to associative priming effects. In a similar fashion, but in the field of object naming, Barry et al. (1998) found both associative and categorical priming effects. The time taken to name a picture (bird) was significantly reduced by the prior presentation of both an associate (feather) and a member of the same semantic category (penguin).

In the word recognition literature, the "semantic priming" effect has been one of the most frequently studied effects. Studies of this effect have yielded a large number of inconsistent results (Ferrand & New, 2003), and we do not intend to discuss this heterogeneity since our study focuses on face and object naming. However, and importantly, recent studies of (categorical) semantic and associative priming in word recognition have shown that semantic priming effects can be distinguished from associative effects. For instance, McRae and Boisvert (1998) found semantic priming effects in lexical decision with prime-targets pairs (e.g., "*whale-dolphin*") that were highly similar in terms of the featural description but not associatively related (i.e., the probabilty of a word being called to mind by another word). Ferrand and New (2003) were able to test for pure semantic and associative priming within the same lexical decision experiment. They selected items that varied on semantic similiarity in terms of shared semantic features while controlling for the strength of the verbal association (e.g., "*dolphin-whale*") and used items that varied in the strength of the verbal association while controlling for semantic similarity (e.g., "*spider-web*"). Using a lexical decision task with three prime durations and a low proportion of related primes, they found both pure semantic priming effects and pure associative priming effects on the RTs at each prime duration.

It is important to note that the leading object naming models (e.g., Caramazza, 1997; Dell, Schwartz, Martin, Saffran, & Gagnon, 1997; Levelt et al., 1999) are all able to account for semantic interference effects but do not include associative lateral connections between different representational units (Alario et al., 2000). In spoken picture naming, using the priming paradigm, Alario et al. (2000) found facilitatory effects with associative primes at an SOA of 234 ms, and semantic interference effects with semantic primes (i.e., same category primes) at an SOA of 114 ms. Facilitatory effects are compatible with the existence of direct links between units belonging to the same representational level. However, one outstanding issue is to determine the nature of the representations that underpin associative effects in object naming: Do these representations correspond to concepts (Collins & Loftus, 1975), lemmas (Levelt, 1989), or lexemes? Consequently, the observation of robust associative effects clearly appears to be specific to proper name processing in contrast to object name processing.

To conclude, the present empirical study makes a valuable contribution in that it demonstrates that the semantic-specific categorical interference effect frequently reported for common name naming is not observed in oral face naming. An interference effect was found with associative distractors in face naming, thus suggesting that the semantic representations underlying access to proper names from face perception is clearly sensitive to these types of relationship. Nevertheless, the associate distractors are also categorically related. It would be interesting (as suggested by a reviewer) to examine the interference effect of associates only in the absence of any category relationships. It now seems clear that researchers will have to take these findings into account when building face-naming models. It is important that future research determines the precise locus/i of associative effects in face-naming models.

Manuscript received 9 July 2004
Manuscript accepted 11 November 2004
PrEview proof published online 11 April 2006

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APPENDIX 1

List of the stimuli used in Experiment 1

Common names

Same category distractors	*Different category distractors*	*Target common names*
TERRE (earth)	CASQUE (helmet)	ETOILE (star)
CREVETTE (shrimp)	DRAPEAU (flag)	POISSON (fish)
ECROU (nut)	TELEPHONE (phone)	MARTEAU (hammer)
BANANE (banana)	BOUTON (button)	POIRE (pear)
COCHON (pig)	VERRE (glass)	CHEVAL (horse)
CHAUSSETTE (sock)	MONTAGNE (mountain)	BOTTE (boot)
VIOLON (violin)	BOBINE (reel)	ACCORDEON (accordion)
ARMOIRE (cupboard)	TAMBOUR (drum)	BUREAU (desk)
REVOLVER (gun)	CEINTURE (belt)	FUSIL (rifle)
ARROSOIR (watering can)	BAGUE (ring)	RATEAU (rake)
PIPE (pipe)	ASPERGE (asparagus)	CIGARETTE (cigarette)
ELEPHANT (elephant)	ECHELLE (ladder)	CROCODILE (crocodile)
AUTOBUS (bus)	BOUTEILLE (bottle)	TRACTEUR (tractor)
RAQUETTE (racket)	AIGLE (eagle)	BALLON (ball)
CASQUETTE (cap)	FLEUR (flower)	BONNET (bonnet)
DOIGT (finger)	COMPAS (compass)	OREILLE (ear)

Proper names

Same category distractors	*Different category distractors*	*Target proper names*
DELON	CANDELORO	WILLIS
VENTURA	ZIDANE	MOORE
DENEUVE	PEREC	BELMONDO
SIGNORET	LIZARAZU	DE NIRO
DION	LUX	PARADIS
HALLYDAY	ZITRONE	GOLDMAN
FIORI	BAFFIE	ZAZIE
OBISPO	ROLAND	SOUCHON
MASURE	BOUQUET	SINCLAIR
DECHAVANNE	DEPARDIEU	POIVRE D' ARVOR
DELARUE	STALLONE	FOUCAULT
PIVOT	CLAVIER	DRUCKER
JOSPIN	LEGITIMUS	TIBERI
MITTERAND	PALMADE	CHIRAC
KENNEDY	ROBIN	CLINTON
DE GAULLE	COLUCHE	AUBRY

APPENDIX 2

List of the stimuli used in Experiment 2

Associate distractors	*Different category distractors*	*Target proper names*
GALL	DELON	BERGER
BIRKIN	ZIDANE	GAINSBOURG
BONALY	DRUCKER	CANDELORO
MITTERRAND	GILDAS	CHIRAC
WINSLET	LEPERSE	DI CAPRIO
ROBERTS	MASURE	GERE
DUTRONC	CLINTON	HARDY
CRUISE	AUBRY	KIDMAN
KENNEDY	JOSPIN	MONROE
FORGET	SINCLAIR	NOAH
DEPP	PEREC	PARADIS
CHAZAL	SIGNORET	POIVRE D' ARVOR
PALMADE	TIBERI	ROBIN
COPPERFIELD	DELARUE	SCHIFFER
VOULZY	DECHAVANNE	SOUCHON
HALLIDAY	LIZARAZU	VARTAN

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