VISUAL COGNITION, 2006, 14 (2), 199–216

Psychology Press
Taylor & Francis Group

Is associative priming a valid method to differentiate the serial and parallel models of face identification?

F. Joassin, P. Maurage, S. Campanella, and R. Bruyer

Unité de Neurosciences Cognitives, Université Catholique de Louvain, Louvain-la-Neuve, Belgium

One current controversy in face identification is whether names are accessed after or in parallel to semantic information. In prior research, Schweinberger, Burton, and Kelly (2001) have shown that phonological decisions to the names of famous faces were facilitated by name but not by semantic primes, while semantic decisions were facilitated by semantic but not by name primes. They proposed a parallel rather than a serial model of face identification. We replicated these experiments by (1) adding specific semantic primes in order to examine the effect of the uniqueness of the relation between semantic or phonological information and a face, and (2) adding a neutral baseline to differentiate facilitation from inhibition effects when primes and targets were related or unrelated. Our study revealed that uniqueness plays an important role in associative priming, with the specific primes (whether lexical or semantic) producing the greatest effects. However, it was also revealed that the same primes generated different effects according to the difficulty of the task. Our results highlight the importance, in associative priming, of the specificity of the information and of the relation between the primes and the task, and raise the question of the validity of such a method to test cognitive models of face identification.

In everyday life, it is quite a common experience to recognize someone's face but to be unable to retrieve and produce his or her name. This has been extensively studied in cognitive psychology for 20 years. For instance, Young, Hay, and Ellis (1985) showed in a diary study that participants reported difficulties in retrieving people names without difficulties in retrieving biographical information about them. On the other hand, the reverse case was never observed (i.e., the ability to retrieve proper names but not other pieces of information). Several hypotheses have been put forward

Please address all correspondence to F. Joassin, Université catholique de Louvain, Unité de Neurosciences Cognitives (PSP/NESC), Place du Cardinal Mercier, 10. B 1348 Louvain-la-Neuve, Belgium. Email: frederic.joassin@psp.ucl.ac.be

The first and second authors are supported by the Belgian Foundation for Scientific Research (FNRS). The third author is supported by a FSR-ECSA No. 33C6 from the Catholic University of Louvain (UCL).

http://www.psypress.com/viscog DOI: 10.1080/13506280544000264

to explain this phenomenon, including that proper names are arbitrary or meaningless (Burke, MacKay, Worthley, & Wade, 1991; Cohen, 1990; Harris & Kay, 1995), naming a person requires the retrieval of one specific label (Brédart, 1993), proper names are unique (Burton & Bruce, 1992), the difference between name and semantic retrieval depends on the expertise with the information to be retrieved (Abdel Rahman, Sommer, & Olada, 2004), and the set of plausible phonologies is larger for people's names than for other categories of words (Brennen, 1993).

Several cognitive models have been elaborated. Bruce and Young (1986) proposed a serial model of face identification where access to semantic information about people (such as the nationality, occupation, and so on) is mandatory in order to access the lexical information about a person's name. This model has received strong empirical support as well from laboratory and diary studies on healthy participants (Bruyer & Scailquin, 1994; Bruyer, van Der Linden, Lodewijck, & Nelles, 1992; Hanley & Cowell, 1988; Hay, Young, & Ellis, 1991; McWeeny, Young, Hay, & Ellis, 1987; Schweich, van der Linden, Bredart, & Bruyer, 1992) and from neuropsychological single case studies of patients (who were unable to name people whilst being fully able to recall semantic information; Flude, Ellis, & Kay, 1989; Hittmair-Delazer, Denes, Semenza, & Mantovan, 1994; Hodges & Greene, 1998; Kay, Hanley, & Miles, 2001; Semenza & Zettin, 1988).

An alternative model of face identification has been proposed by Burton and Bruce (1992). Derived from the Interactive Activation and Competition (IAC) model of Burton, Bruce, and Johnston (1990), it suggests that names are stored in memory as a special case of semantic information, along with the other pieces of information related to people. This implicates that lexical and semantic pieces of information are accessed in parallel. The authors explain the more prominent difficulties to recall proper names by the uniqueness of names, connected to only one individual, whereas the other types of information are shared by several people and thus more easily activated in a connectionist network. This model also received some empirical and theoretical support (Brédart, Valentine, Calder, & Gassi, 1995; Scanlan & Johnston, 1997).

Overall, the status of proper names within the set of person-related information is still a matter of debate. On the one hand, serial models propose that the access to names is hierarchically dependent on the access to other pieces of semantic information. On the other hand, parallel models suggest that names are a special case of semantic information whose access is independent from the access to semantics. In order to clarify the point, Schweinberger, Burton, and Kelly (2001) carried out two experiments using a priming procedure that allowed the authors to make different predictions as a function of the models of face identification (Figure 1). Participants had to take speeded decisions about famous faces that were primed either by

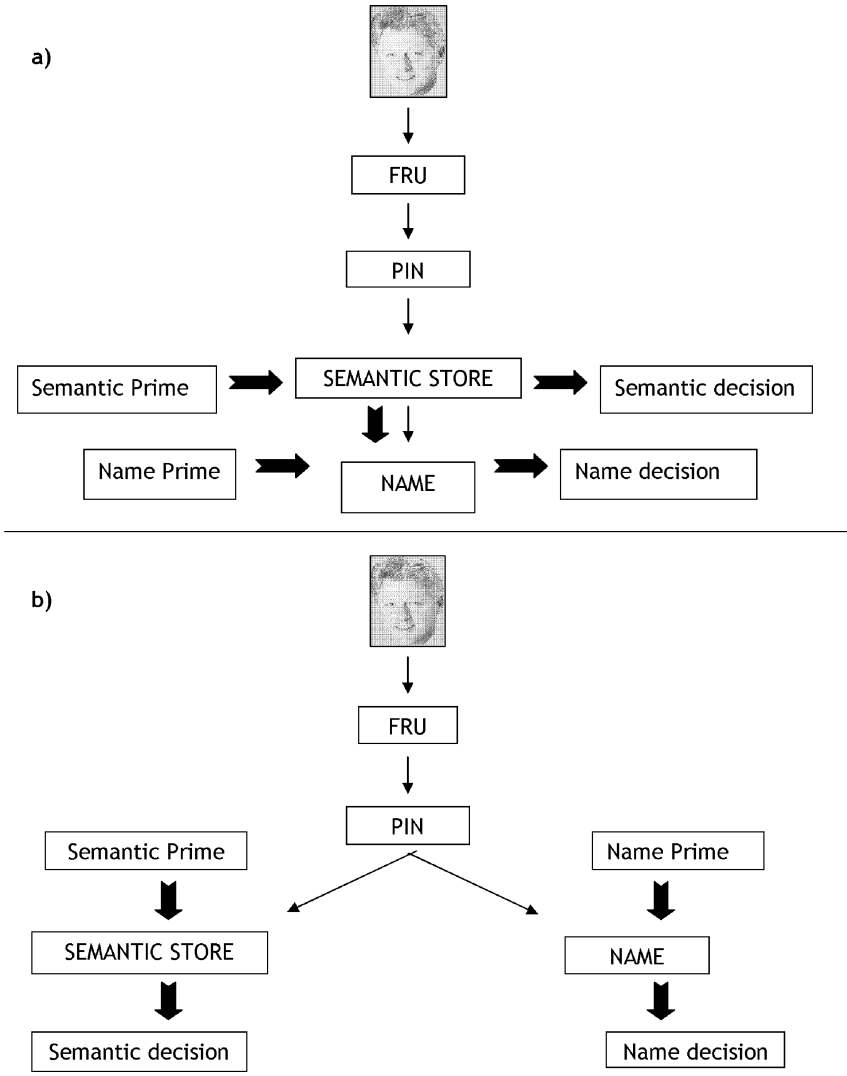

Figure 1. (a) Predictions (represented by bold arrows) based on a serial model of face identification (adapted from Bruce & Young, 1986): The semantic primes should facilitate the semantic decisions and the phonological decisions, whereas the phonological primes should only facilitate the phonological decisions, (b) Predictions based on a parallel model of face identification (adapted from Burton & Bruce, 1992): The semantic primes should facilitate the semantic decisions, whereas the phonological primes should facilitate the phonological decisions, without interactions between types of primes and types of task.

partial semantic (nationality, occupation, or dead/alive) or by phonological (initials or name fragments) information. The subjects had to access the names of celebrities (number of syllables of the forename) in Experiment 1. and the semantic information (nationality) in Experiment 2. Phonological decisions were facilitated by partial names but not by semantic primes. Conversely, only semantic primes facilitated semantic decisions.

Taken together, these results allowed Schweinberger et al. (2001) to favour a model of parallel rather than sequential access to names and semantics, both types of information being to some extent independent from each other. Nevertheless, in Experiment 2 they observed a priming effect of name fragments on semantic decisions. It was suggested that name primes were more specific to people than semantic primes, each name prime being unique to a face whereas semantic primes were shared by several faces. Thus, they could not totally exclude the possibility that the unique relationship between a name prime and a face could have influenced the priming effects, the perception of the name prime causing expectations of the specific forthcoming face. Similarly, even if the celebrities used in both experiments were matched for nationality, dead/alive information and number of syllables of the forename, they were not matched for occupations (for instance, there were nine American living actors, but only three singers, three politicians, and one TV speaker). So, the semantic primes did not share the same level of specificity and this could have contributed to the differential priming effects. Finally, the absence of a neutral baseline raises the question about whether the results reflect facilitatory effects from congruous primes or inhibitory effects from incongruous ones (Posner & Snyder, 1975).

The present study aimed to replicate the Schweinberger et al. (2001) investigation, but modifying some of the methodological details. At first, we tried to better match the number of celebrities belonging to each category, for the semantic and phonological primes, in order to reduce the possible preferential expectation generated by some primes relative to others. Secondly, we used semantic and phonological tasks that were slightly different from those used by Schweinberger and his collaborators. The semantic task consisted in categorizing people according to their native language rather than their nationality, so that no primes directly corresponded to the expected response, as was the case in Experiment 2 of Schweinberger et al. The phonological task consisted in categorizing people according to the presence of the sound "r" in their last name. The selection of a phonological task different from that used by Schweinberger et al. was guided by the fact that one-syllable forenames are far less frequent in French than in English. Nevertheless, we selected a task that allowed the targets to be categorized into two distinct categories and that required the generation of a phonological representation of the names. Thirdly, we replaced the "dead or alive" information that was used for priming by Schweinberger

et al. with semantic information specific to each celebrity within the sample of known people selected for the study. Note that the "dead or alive" information used by Schweinberger et al. was less informative than other semantic or phonological primes (nationality, occupation, name fragments, and initials). We used specific semantic information referring to only one of the selected celebrities to ensure that a unique relationship held between a prime and a face for semantic and name primes alike. Finally, we added a neutral baseline condition with primes unrelated to any celebrity used in the study, to assess facilitatory and inhibitory effects when primes and targets are respectively (in)congruous and unrelated.

These modifications led to the following predictions: (1) If the unique relationship between a face and a prime—either phonological or semantic—modulates associative priming, we should observe facilitated responses for both phonological and semantic decisions when primes are congruous with the displayed faces. (2) If the specificity of the information itself is not critical, we should not observe any priming from the specific semantic primes in the phonological task, or from the phonological primes in the semantic task. Such results would be in line with those of Schweinberger and colleagues, and thus would support their interpretation of the associative priming in terms of parallel access to proper names and semantic information. (3) Moreover, the use of relatively short prime–target intervals (500 ms) should ensure that the primes generate facilitation effects rather than inhibition effects. This follows from the assumption that inhibition influences priming only at long prime–target intervals (>800 ms) because it is a slow, strategic expectancy-based process; facilitation effects can emerge regardless of the prime–target interval because of fast and automatic activation between related representations (Neely, 1977; Plaut & Booth, 2000; Posner & Snyder, 1975).

METHODS

Participants

Forty-eight undergraduate students (38 females) took part in the study. Half of the participants performed the phonological task; the other half performed the semantic task. Participants were aged 18–24 (mean = 19.1, $SD = 1.33$). Forty-six participants were right-handed.

Stimuli

The same material was used in both the phonological and the semantic conditions. There were 32 black and white photographs of celebrities

(13 women and 19 men) presented in a frontal position with a neutral facial expression. Any visual information other than the faces was removed and replaced by a grey background with Adobe® Photoshop® 6.0 (Adobe Systems Incorporated). Each face covered a surface of 200×150 pixels (6.67×5 cm) with a resolution of 30 pixels/cm. Half of the celebrities were French native speakers (eight French and eight Belgian people), the other half being English native speakers (eight British and eight American people). Within each linguistic category, we selected two actors, two politicians, two singers, and two sportsmen or women (see the Appendix).

The primes were presented in capital black letters on a grey background, in Trebuchet MS font with a size of 60 points, corresponding to an height of 1 cm. The phonological primes were the initials of people or fragments of the complete name (forename and last name) with 50% of the letters (the remaining letters were replaced by dots). The semantic primes were the nationality (Belgian, French, British, American), the occupation (politician, sportsman/woman, singer, actor), or a specific semantic information (politicians—their political adherence or party; actors—one typical word belonging to the title of one of their movies; singers—their musical style; sportsmen/women—their discipline; see the Appendix). Note that specific semantic primes were unique to each celebrity only within the sample of people selected as stimuli for this study. The neutral primes were four fragments, four initials, two occupations (writer and TV presenter), two nationalities (Spanish and German) and four examples of specific semantic information titles of books) that did not correspond to any of the 32 faces.

Procedure

Training. Participants were first enrolled in a training session in order to familiarize them with the celebrities and primes used in the experiment. Each person was first displayed on a Macintosh® monitor along with his or her name, nationality, occupation, and any specific semantic information. Participants were asked to read all the information and to try to remember it, with no time pressure. They were then shown the faces alone and asked to recall all the previous pieces of information related to each celebrity. Errors were immediately corrected before continuing the training phase. In a second phase, each celebrity was presented along with his or her initials and name fragments. Participants were asked to pay attention to the primes in order to recall the complete name of each individual. They were then shown the initials and name fragments alone and asked to recall the complete name corresponding to each phonological prime. Again, errors were immediately corrected by the experimenters. The experiment began immediately after the end of the training phase.

Experiment. In the experimental session of the study, participants were shown 10 blocks of 48 trials on a computer screen placed approximately 50 cm from their eyes. The same trials were used in both tasks. Each trial consisted of a cross appearing at fixation for 500 ms, followed by a prime appearing for 250 ms. An empty interstimulus interval of 250 ms preceded the onset of the face, that remained on the screen until participants gave a response (in less than 5 s). Four hundred and eighty trials were presented in each task, each of the 32 faces preceded by the five types of primes, either congruous, incongruous (i.e., congruous primes of other celebrities), or neutral. All types of primes were randomized inside each block.

The task was a speeded two-choice phonological or semantic categorization task, submitted to two samples of participants. The phonological task (24 participants) consisted in judging whether the last name corresponding to the face contained or not the sound "r". The semantic task (24 participants) consisted in judging whether the celebrity was a French or an English native speaker. Participants had to answer by pressing one of two keys on the keyboard with the right hand. The display of trials and the recording of answers were achieved by using Superlab® Pro 1.74 software (Cedrus Corporation, Phoenix, Arizona, USA). Written instructions were given to participants with particular emphasis on the importance of paying attention to each prime, and some practice trials were carried out before the experiment in order to familiarize the participants with the task.

RESULTS

The first set of analyses consisted in analysing correct latencies (RTs) and the percentages of correct responses (accuracy) as a function of the kind of prime. As tasks were performed by two samples of participants, they were first examined separately. Moreover, such a procedure allowed a direct comparison with the results of Schweinberger et al. (2001). All analyses were made by participant (*Fp; tp*) and by item (*Fi; ti*). When a by-participants effect was verified in the by-items analysis, only the former one will be mentioned. The effects whose probability was lower than .05 were considered as statistically significant. All and only significant effects will be reported.

Phonological task

The mean RTs and accuracy for congruous and incongruous primes of each prime type can be seen in Table 1 (upper part). ANOVAs were performed with prime type (fragments, initials, nationality, occupation, specific semantic information) and priming (congruous or incongruous) as repeated factors.

TABLE 1
Mean reaction times (ms), percentages of correct responses (in parentheses) and standard deviations (*SD*) for congruous, incongruous, and neutral primes of each prime type in the by-participant analysis

	Fragments	*Initials*	*Nationality*	*Occupation*	*Semantic specific*
Phonological task					
Mean congruous	858 (92.3)	924 (92.6)	913 (91.5)	911 (93.4)	880 (91.8)
SD	143.1 (6.2)	128.1 (7.5)	138.8 (8.6)	130.5 (8.2)	137.5 (7.7)
Mean incongruous	947 (90.4)	950 (90.6)	918 (91.8)	922 (90.0)	951 (90.2)
SD	147.6 (7.7)	148.2 (8.3)	133.3 (8.2)	124.2 (8.2)	142.7 (7.8)
Priming	89 (−1.9)	26 (−2.0)	5 (0.3)	11 (−3.4)	71 (−1.6)
Mean neutral	919 (91.4)	921 (91.4)	899 (91.1)	881 (92.9)	877 (92.4)
SD	132.8 (7.7)	109.9 (8.2)	115.7 (9.6)	119.9 (8.2)	128.5 (8.3)
Semantic task					
Mean congruous	663 (92.9)	692 (91.6)	697 (92.1)	700 (90.6)	662 (92.5)
SD	138.4 (6.0)	102.6 (8.0)	106.3 (8.2)	72.9 (8.8)	127.3 (6.9)
Mean incongruous	744 (91.5)	731 (91.6)	713 (92.3)	733 (89.4)	738 (90.6)
SD	121.4 (8.5)	112.0 (7.7)	94.9 (7.0)	99.6 (6.2)	103.1 (8.5)
Priming	81 (−1.4)	39 (0.0)	16 (0.2)	33 (−1.2)	76 (−1.9)
Mean neutral	720 (93.1)	720 (92.0)	707 (91.7)	694 (91.7)	697 (92.0)
SD	113.8 (7.7)	108.1 (6.6)	96.5 (7.1)	96.0 (7.6)	92.4 (7.9)

Upper part: phonological task; lower part: semantic task. Priming: differences between mean congruous and mean incongruous RTs and percentages of correct responses.

For RTs, the ANOVAs revealed a significant main effect of priming, $Fp(1, 23) = 13.31$, $p < .001$, and the interaction between prime type and priming was significant in the by-participants analysis, $Fi(4,124) = 1.74$, $Fp(4, 92) = 4.50$, $p < .001$. Therefore, the priming effect was examined for each type of prime. The phonological task was significantly speeded by congruous fragments, $Fp(1, 23) = 19.79$, $p < .001$, and specific semantic primes, $Fp(1, 23) = 8.47$, $p < .01$, as compared with incongruous fragments and specific information primes.

The same ANOVAs were performed on accuracy. It appeared a significant main effect of priming, $Fp(1, 23) = 9.28$, $p < .01$, indicating that participants answered more accurately when the faces were preceded by a congruous than by an incongruous prime.

Semantic task

Accuracy and RTs can be seen in Table 1 (lower part). ANOVAs with prime type and priming as repeated factors were carried out on RTs. It showed a

significant main effect of priming, $Fp(1, 23) = 56.49$, $p < .001$, and a significant interaction between prime type and priming, $Fp(4, 92) = 4.74$, $p < .001$. Comparisons between congruous and incongruous primes for each prime type showed that the semantic decision was significantly speeded by congruous fragments, $Fp(1, 23) = 25.57$, $p < .001$, initials $Fp(1, 23) = 11.55$, $p < .001$, occupation, $Fp(1, 23) = 7.01$, $p < .01$, and specific information, $Fp(1, 23) = 29.11$, $p < .001$, but not by nationality.

The same ANOVAs were performed on accuracy. Significant main effects of prime type, $Fi(4, 124) = 0.89$, $Fp(4, 92) = 3.83$, $p < .01$, and of priming, $Fi(1, 31) = 0.54$, $Fp(1, 23) = 4.76$, $p < .04$, appeared in the by-participants analysis. The effect of prime type was due to the fact that the trials containing occupation primes were performed slightly less well than the other trials. The effect of priming indicated that congruous trials were better performed than incongruous ones.

Comparison of the tasks

We conducted a direct comparison between the two tasks. ANOVAs were computed with the task as between participants factor, and prime type (phonological—mean of fragments and initials; semantic—mean of nationality, occupation, and specific semantic information) and priming (congruous, incongruous) as repeated factors.

For RTs, the main task effect was significant, $Fp(1, 46) = 42.13$, $p < .001$, indicating that the phonological task was performed more slowly than the semantic one. Again, we observed a significant main effect of priming, $Fp(1, 46) = 48.09$, $p < .001$, favouring congruous over incongruous trials.

For accuracy, as expected, a significant main priming effect was observed, $Fp(1, 46) = 14.04$, $p < .001$, favouring congruous over incongruous trials.

Facilitation and inhibition

The last set of analyses consisted in comparing, in both tasks and for each prime type, the congruous primes to the neutral ones in the one hand, and the incongruous primes to the neutral ones in the other hand, to check for facilitatory effects when the prime correctly announced the face and for inhibitory effects when the face was incorrectly announced. As the phonological task was performed more slowly than the semantic one, we transformed our data into relative RT values, by applying the formula

$$(\text{neutral prime} - \text{congruous prime}) * 100/\text{neutral prime}$$

to compute a relative index (in %) of the gain generated by the congruous primes, and the formula

$$(\text{incongruous prime} - \text{neutral prime}) * 100/\text{neutral prime}$$

to obtain a relative index of the cost generated by the incongruous primes. Student t-tests comparing the relative values to zero were computed (Figure 2).

In the phonological task, the only congruous primes that generated a significant facilitation were the fragments, $tp(23) = 2.85$, $p < .01$. The four other congruous types of primes produced a nonsignificant inhibition effect. Incongruous occupations, $tp(23) = -2.90$, $p < .01$, and specific information, $tp(23) = -5.02$, $p < .001$, generated a significant inhibition effect, as incongruous fragments in the by-participants analysis, $ti(31) = -1.96$, $tp(23) = -2.28$, $p < .03$.

In the semantic task, a facilitation effect was observed for the following congruous primes: Fragments, $tp(23) = 3.68$, $p < .001$; initials, $ti(31) = 1.85$, $tp(23) = 2.64$, $p < .01$; and specific information, $ti(31) = -0.76$, $tp(23) = 2.43$, $p < .02$, but only in the by-participants analyses. An inhibition effect from the incongruous primes relative to the neutral ones was observed in the by-participants analyses for fragments, $ti(31) = -1.52$, $tp(23) = -2.61$, $p < .02$, and for specific information, $ti(31) = -1.36$, $tp(23) = -3.53$, $p < .001$, and in both analyses for occupation, $tp(23) = -4.02$, $p < .001$.

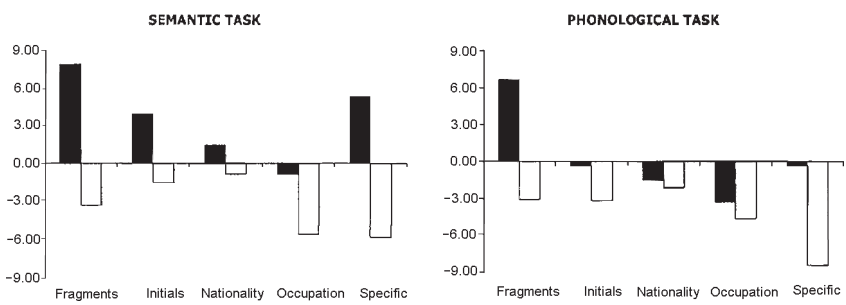

Figure 2. Illustration of the comparison between the five types of primes and the neutral primes in the semantic (left) and phonological tasks (right). Black dashes: Mean values (in %) of the gains generated by the congruous primes relative to the neutral ones (formula: [neutral −congruous] * 100/neutral); white dashes: Mean values of the costs generated by the incongruous primes relative to the neutral ones (formula: [incongruous −neutral] * 100/neutral).

DISCUSSION

This study was carried out to investigate the facilitation and inhibition effects generated by name (fragments of the names and initials) and semantic (nationality, occupation, and specific information) primes in tasks requiring the phonological or the semantic categorization of famous faces. In previous similar experiments, Schweinberger et al. (2001) had shown that (1) phonological decisions were speeded by phonological but not by semantic primes, and (2) semantic decisions were speeded by semantic but not by phonological primes. These results led the authors to conclude in favour of a parallel model of face identification with independent access to names and to semantic information.

The results of the present study are at variance with those of Schweinberger et al. (2001). Indeed, when the same statistical analyses as those performed by these authors were computed, we observed, at least in the by-participants analyses, that (1) in the phonological task, responses were speeded by fragments but also by specific information, and (2) in the semantic task, RTs were decreased not only by occupation and specific information, but also by fragments and initials. Moreover, the direct comparison of the two tasks failed to show any significant interaction between prime type and task. We did not thus observe the independence in the access to personal semantics and names as claimed by Schweinberger et al.

The main question raised by Schweinberger et al. (2001) was whether names are accessed after or in parallel with semantic information. They favoured a parallel model of face identification because their phonological task was facilitated by name primes and their semantic task was facilitated by semantic primes. Unfortunately, the present results do not allow us to favour one of these models of face identification, for two main reasons.

Firstly, considering only the comparisons between congruous and incongruous primes, it seems that both models are able to account for some of our unpredicted results. For instance, the fact that fragments influenced semantic decisions, which is at odds with the predictions based on the serial model of Bruce and Young (1986), could nevertheless be explained in the light of the serial model of name recognition proposed by Valentine, Brédart, Lawson, and Ward (1991). In this model, the perception of a proper name activates a NRU (name recognition unit) that allows subjects to recognize the name as that of a familiar person. Once the name is recognized as familiar, it gives access to the corresponding PIN (person identity node) and to all the identity-specific semantics about that person. Finally, a representation of the face can be accessed from the PIN by the activation of the face code generation system. Since this serial model of name recognition is analogous to the serial model of face identification of Bruce and Young, it is then easy to hypothesize that a phonological prime could activate the

corresponding NRU and thus give access to the PIN of the celebrity, which consecutively will speed the semantic decision when the face is presented. This hypothesis is relevant as (1) Bruce and Young proposed other recognition units involved in person identification, including the NRUs; and (2) it has been shown that names are at least as effective as faces in allowing access to the person recognition system (Craigie & Hanley, 1993).

On the other hand, the effect of semantic primes on the phonological decision, although superficially contrary to the classical parallel model of Burton and Bruce (1992), is actually not incompatible with it if we consider the differences of complexity between the two tasks. A direct comparison of the tasks showed that semantic decisions were performed significantly faster than phonological decisions, indicating that the phonological task was more difficult to perform. It is possible then that the time needed to take a phonological decision was long enough to allow the spreading of the activation from the semantic primes to the representation of the name, facilitating phonological decisions.

The level of specificity of the primes can give us an alternative explanation. Burton and Bruce (1992, 1993), in their IAC model, proposed that the problems frequently encountered in recalling names arise because names tend to be unique to the individuals, whereas semantic information is shared by many people. Perception of a familiar face, voice, or written name will activate a PIN giving access to the SIUs (semantic information units) linked to it. As a PIN is linked to many SIUs (such as occupation, nationality) and as a given SIU can be shared by many PINs, some SIUs will have more connections to different PINs than others. Especially, SIUs corresponding to the name of the person or to unique information relative to him (or her) will be connected with only one PIN. This implies that semantic information unique to an individual should be as difficult to recall as their name. This was precisely observed by Bruyer and Scailquin (1994) with "ordinary" addresses, i.e., addresses not referring to a famous place, an occupation, an unfamiliar person's name, or a famous person's name. But in the special situation of associative priming, perhaps operating at the PIN level (McNeill & Burton, 2002), the uniqueness of an information could have a rather different effect. In contrast to Schweinberger et al. (2001), we used specific semantic as well as phonological primes and found that priming occurred across tasks from both phonological and semantic primes. This would follow if both types of specific primes activate the corresponding SIU, giving access to only one PIN, and a consequent priming effect.

Two further comments are necessary. At first, we observed that occupation primes produced a priming effect in the semantic task, whereas one could argue that if priming is influenced by the preactivation of a unique PIN, we should not observe any facilitation of responses when faces are primed by occupation primes, as they give access to several PINs connected

to it, leading to a large spreading of the activation. Actually, it seems that occupation can be considered as a special form of semantic knowledge. As claimed by Cohen (1990, p. 295), "occupation is clearly the key feature in person recognition, defining the person's identity and providing the access point to further information". If occupation is the first piece of semantic information that is accessed about someone, it is not surprising that it produced a priming effect in the semantic task, requiring the direct access to semantics. Secondly, we observed that initials were less efficient than fragments primes: They did not produce any significant priming effect in the phonological task and they produced less priming on latencies than fragments (39 ms) in the semantic task. It remains possible that the initials were less informative than the fragments because they were formed with only two letters compared to the fragments that were constituted by half of the letters of the entire names (forename and last name). Relative to fragments, a plausible but post hoc speculation would be that initials did not contain enough visual information to produce an equal priming effect. Additional experiments are needed to clarify this point.

The second reason that prevents us from claiming strong conclusions in favour of one or another model of face identification comes from the fact that the predictions based on these models are valid only if the tasks performed to test these predictions depend on the same cognitive mechanisms. Unfortunately, it seems that the semantic and the phonological tasks are not sustained by the same cognitive processes. When compared to neutral primes, unrelated to any face and used as a baseline to differentiate facilitation from inhibition effects, we observed in the by-participants analyses that the same primes generated different effects in the two tasks. In the semantic task, congruous fragments, initials, and specific information primes facilitated decisions; incongruous fragments, specific information, and occupation primes led to an inhibition effect. In contrast, in the phonological task, the fragments were the only primes to produce a facilitation effect, all the other types of primes leading to an inhibition effect. Like Schweinberger et al. (2001), we hypothesized that using short prime–target intervals (500 ms) should generate facilitation effects as it is classically assumed that facilitation priming occurs regardless of the prime–target interval because activation is fast and automatic (Neely, 1977; Plaut & Booth, 2000). In contrast, inhibition arises only at long prime–target intervals (>800 ms) because it reflects a slow, strategic expectancy-based process. Nevertheless, we think that facilitation and inhibition do not depend only on prime–target intervals but also on the differences of complexity between the two tasks.

We observed that (1) the semantic task was easier than the phonological task (shorter RTs in the former one); (2) within each task, congruous trials were performed faster than incongruous ones, which could reflect differences

of attentional needs for each kind of trial. As it has been claimed that inhibition occurs when the task is structured so that the priming signal draws the subject's close attention (Posner & Snyder, 1975), it is then plausible that in the easier task (i.e., the semantic task), congruous primes led to facilitation, and that incongruous primes, more difficult, led to inhibition. In the more difficult phonological task, requiring more attentional resources, participants may have developed more controlled expectation strategies leading to inhibition effects that could have masked any smaller automatic semantic effect. It is worth noting that these differences between the two tasks had already been observed by Schweinberger et al. (2001): They observed a significant main effect of experiment indicating that RTs in their semantic task were significantly faster compared with RTs in their phonological task. However, in their case, the lack of neutral baseline prevented any differentiation of facilitatory effects from inhibitory effects.

Whatever, our study showed that the phonological and semantic tasks that we used generated different cognitive processes (more automatic in the semantic task, more controlled in the phonological task) and can not thus be compared between each other. This argument can be proposed in relation to a problem raised by Damian and Abdel Rahman (2003). In their study, they compared the effects of visually presented prime words with either objects (Experiment 1) or famous faces as targets (Experiment 2). Targets were either manually categorized with regard to the number of syllables or they were overtly named. In the first experiment, they observed that naming an object was executed faster when it was preceded by a related prime (correct category of object) than when preceded by an unrelated one (incorrect category). However, they failed to obtain similar effects in the syllable judgement task. Moreover, they observed the same pattern of results in the second experiment, i.e., a robust semantic priming effect on faces when they had to be named after the presentation of a related prime (correct occupation), and an absence of priming when faces had to be categorized according to the number of syllables of their name. As both tasks, requiring the generation of a phonological representation of the targets, could have been expected to be equally sensitive to semantic context, it appears that it is the kind of task itself that influences the presence or absence of a semantic effect. These observations led Damian and Abdel Rahman to conclusions similar to ours: A positive finding (e.g., the semantic priming effect found in their naming task, or semantic priming in the phonological task and phonological priming in the semantic task here) is not informative about the cognitive architecture underlying the identification of faces, as explained above, and a null finding (as the absence of priming effect in their syllable decision task) cannot be taken as an evidence against conceptual mediation in name retrieval for faces, as claimed by Schweinberger et al. (2001), but can

only be considered as an evidence that a syllable judgement task is insensitive to semantic priming relative to a naming task.

In conclusion, although semantic priming is a classical procedure for experimentally investigating the structure of semantic memory (for a review, see Hutchison, 2003), the study of Damian and Abdel Rahman (2003) and the present experiment gave rise to results that are at variance with those of Schweinberger et al. (2001), raising the question of the validity of semantic priming for investigating the serial or parallel access to semantics and names. Several factors seem to interact and prevent clear conclusions from emerging, including the level of specificity of information from primes and the different levels of complexity of the tasks involved (which may be more automatic or strategic). Further experiments are needed to clarify these points. One way could involve using other experimental paradigms, such as a go/no-go decision task to semantic and phonological questions. This kind of paradigm has already been used for studying the face identification processes (Abdel Rahman, Sommer, & Schweinberger, 2002). In the ERP study of Abdel Rahman et al. (2002), participants had to categorize faces of known politicians according to their nationality (foreign or domestic, easy semantic task) or their political party (government or opposition party, difficult semantic task). The execution or nonexecution of the responses depended on the initial vowel of the politician's surname (*a* or *e*). As it offers faster response times, more accurate responding, and fewer processing demands than classical categorization tasks (Perea, Rosa, & Gomez, 2002), we think that it would be useful to adapt our design to such a paradigm to better match the difficulty of the tasks and then to examine the influence of the specificity of an information on the associative priming of famous faces.

REFERENCES

Abdel Rahman, R., Sommer, W., & Olada, E. (2004). I recognize your face, but I can't remember your name: A question of expertise? *Quarterly Journal of Experimental Psychology*, *57*(5), 819–834.

Abdel Rahman, R., Sommer, W., & Schweinberger, S. R. (2002). Brain-potential evidence for the time course of access to biographical facts and names of familiar persons. *Journal of Experimental Psychology: Learning, Memory, and Cognition*, *28*(2), 366–373.

Brédart, S. (1993). Retrieval failures in face naming. *Memory*, *1*, 351–366.

Brédart, S., Valentine, T., Calder, A., & Gassi, L. (1995). An interactive activation model of face naming. *Quarterly Journal of Experimental Psychology*, *48A*, 466–486.

Brennen, T. (1993). The difficulty with recalling people's names: The plausible phonology hypothesis. *Memory*, *1*, 409–431.

Bruce, V., & Young, A. (1986). Understanding face recognition. *British Journal of Psychology*, *77*, 305–327.

Bruyer, R., & Scailquin, J. C. (1994). Person recognition and aging: the cognitive status of addresses: An empirical question. *International Journal of Psychology*, *29*(3), 351–366.

Bruyer, R., van der Linden, M., Lodewijck, M., & Nelles, B. (1992). Age differences in putting names and occupations to faces? *Archives de Psychologie*, *60*(234), 243–257.

Burke, D. M., MacKay, D. G., Worthley, J. S., & Wade, E. (1991). On the tip of the tongue: What causes word finding failures in young and older adults? *Journal of Memory and Language*, *30*, 542–579.

Burton, A. M., & Bruce, V. (1992). I recognize your face but I can't remember your name: A simple explanation. *British Journal of Psychology*, *81*, 361–380.

Burton, A. M., & Bruce, V. (1993). Naming faces and naming names: Exploring an interactive activation model of name retrieval. *Memory*, *1*, 457–480.

Burton, A. M., Bruce, V., & Johnston, R. A. (1990). Understanding face recognition with an interactive activation model. *British Journal of Psychology*, *81*, 361–380.

Cohen, G. (1990). Why is it difficult to put names to faces? *British Journal of Psychology*, *81*, 287–297.

Craigie, M., & Hanley, J. R. (1993). Access to visual information from a name is contingent on access to identity-specific semantic information. *Memory*, *1*(4), 367–391.

Damian, M., & Abdel Rahman, R. (2003). Semantic priming in the name retrieval of objects and famous faces. *British Journal of Psychology*, *94*, 517–527.

Flude, B. M., Ellis, A. W., & Kay, J. (1989). Face processing and name retrieval in anomic aphasic. *Brain and Cognition*, *11*, 60–72.

Hanley, J. R., & Cowell, E. S. (1988). The effect of different types of retrieval cues on recall of names of famous faces. *Memory and Cognition*, *16*, 545–555.

Harris, D. M., & Kay, J. (1995). I recognize your face but I can't remember your name: Is it because names are unique? *British Journal of Psychology*, *86*, 345–358.

Hay, D. C, Young, A. W., & Ellis, A. W. (1991). Routes through the face recognition system. *Quarterly Journal of Experimental Psychology*, *43A*, 761–791.

Hittmair-Delazer, M., Denes, G., Semenza, C., & Mantovan, M. C. (1994). Anomia for people's names. *Neuropsychologia*, *32*(4), 465–476.

Hodges, J. R., & Greene, J. D. W. (1998). Knowing about people and naming them: Can Alzheimer's disease patients do one without the other? *Quarterly Journal of Experimental Psychology*, *51A*, 121–134.

Hutchison, K. A. (2003). Is semantic priming due to association strength of feature overlap? A mzcroanalytic review. *Psychonomic Bulletin and Review*, *10*(4), 785–813.

Kay, J., Hanley, J. R., & Miles, R. (2001). Exploring the relationship between proper name anomia and word retrieval: A single case study. *Cortex*, *37*(4), 501–517.

McNeill, A., & Burton, A. M. (2002). The locus of semantic priming effects in person recognition. *Quarterly Journal of Experimental Psychology*, *55A*(4), 1141–1156.

McWeeny, K. H., Young, A. W., Hay, D. C, & Ellis, A. W. (1987). Putting names to faces. *British Journal of Psychology*, *78*, 143–151.

Neely, J. H. (1977). Semantic priming and retrieval from lexical memory: Roles of inhibitionless spreading activation and limited capacity attention. *Journal of Experimental Psychology: General*, *106*, 226–254.

Perea, M., Rosa, E., & Gomez, C. (2002). Is the go/no-go lexical decision task an alternative to the yes/no lexical decision task? *Memory and Cognition*, *30*(1), 34–45.

Plaut, D. C, & Booth, J. R. (2000). Individual and developmental differences in semantic priming: Empirical and computational support for a single-mechanism account of lexical processing. *Psychological Review*, *107*(4), 786–823.

Posner, M. I., & Snyder, C. R. R. (1975). Facilitation and inhibition in the processing of signals. In P. M. A. Rabbit & S. Dornič (Eds.), *Attention and performance V* (pp. 669–682). New York: Academic Press.

Scanlan, L. C, & Johnston, R. A. (1997). I recognize your face, but I can't remember your name: A grown-up explanation? *Quarterly Journal of Experimental Psychology*, *50A*(1), 183–198.

Schweich, M., van der Linden, M., Brédart, S., & Bruyer, R. (1992). Day-life difficulties in person recognition reported by young and elderly subjects. *Applied Cognitive Psychology*, *6*(2), 161–172.

Schweinberger, S. R., Burton, A. M., & Kelly, S. W. (2001). Priming the access to names of famous faces. *British Journal of Psychology*, *92*, 303–317.

Semenza, C., & Zettin, M. (1988). Generating proper names: A case of selective inability. *Cognitive Neuropsychology*, *5*, 711–721.

Valentine, T., Bredart, S., Lawson, R., & Ward, G. (1991). What's in a name? Access to information from people's names. *European Journal of Cognitive Psychology*, *3*, 147–176.

Young, A. W., Hay, D. C, & Ellis, A. W. (1985). The faces that launched a thousand slips: Everyday difficulties and errors in recognizing people. *Quarterly Journal of Experimental Psychology*, *38A*, 297–318.

Manuscript received November 2003
Manuscript accepted March 2005

APPENDIX

List of the celebrities used in the two experiments, categorized by occupation, nationality, and native language (specific semantic information primes in parentheses)

	French native speakers		*English native speakers*	
	Belgians	*French*	*British*	*Americans*
Sportsmen/women	Jean-Michel Saive (ping-pong)	Marie-José Perec (athlétisme)	David Beckham (football)	Lance Armstrong (cyclisme)
	Justine Henin (tennis)	David Douillet (judo)	David Coulthard (formule 1)	Michael Jordan (basket)
Politicians	Didier Reynders (libéral)	Jacques Chirac (gaulliste)	Tony Blair (travailliste)	Georges Bush (républicain)
	Isabelle Durant (écolo)	Lionel Jospin (socialiste)	Margaret Thatcher (conservateur)	Bill Clinton (démocrate)
Actors	Marie Gillain (appât)	Catherine Deneuve (indochine)	Hugh Grant (notting hill)	Robert De Niro (heat)
	Benoît Peulvoorde (randonneurs)	Gérard Depardieu (Cyrano)	Kate Winslet (titanic)	Sharon Stone (instinct)
Musicians	Jean-Luc Fonck (humour)	Chantal Goya (enfant)	Gery Halliwell (dance)	Janet Jackson (R and B)
	Axelle Red (variétés)	Jean-Michel Jarre (électro)	Paul McCartney (rock)	Will Smith (rap)