Strategies to resolve recall failures for proper names: New data

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Abstract

Personal names are particularly susceptible to retrieval failures. Studies describing people's spontaneous strategies for resolving such failures have indicated that people frequently search for semantic or contextual information about the target person. However, previous experimental studies have shown that, while providing phonological information may help resolve a name recall failure, by contrast, providing semantic information is usually not helpful. In the first study, in order to reduce a bias present in previous studies of spontaneous strategies, explicit instructions were given to participants, specifying that the focus of the study was on a voluntary search for information. Participants reported strategically searching for semantic/contextual strategies when they tried to resolve a name retrieval failure more often than they reported searching for phonological/orthographic information. In addition, phonological/orthographic strategies were perceived as more difficult than semantic/contextual strategies. In a second experiment, we investigated whether retrieving phonological information by oneself is objectively difficult in a face naming task: in the event of retrieval failure, participants were instructed to search for phonological information in some trials and for semantic information in other trials. Participants recalled semantic information in 94% of the trials when instructed to search for semantic information. By contrast, when instructed to search for phonological information, participants remained unable to recall any correct piece of phonological information in about 55% of the trials. This result shows that the retrieval of phonological information is objectively difficult. This difficulty could explain why people do not privilege searching for phonology to resolve name retrieval failures.

Introduction

Retrieving the names of people is important for everyday verbal communication. Indeed, names are commonly used not only to call and to greet others, but also to hold their attention during a conversation (Cohen, 1994). In addition, names may be of practical importance in referring to people that are not present during the conversation (Allerton, 1996; Enfield & Stivers, 2007). Unfortunately, the retrieval of proper names in memory is particularly prone to failure (for reviews, see Brédart, 2017; Hanley, 2014). Such retrieval failures may be discomforting in social situations. Hence, several studies have investigated how people try to overcome such failures in everyday life (Cohen & Faulkner, 1986; Finley & Rothberg, 1991; Reason & Lucas, 1984) and in laboratory settings (Finley & Sharp, 1989; Yarmey, 1973). A recent review of these relatively old studies (Brédart, 2018) indicates that people frequently use spontaneous strategies based on a mental search for semantic information (biographical details) or contextual information (usually where a person has been met previously) about the target person in order to overcome name retrieval failures, rather than searching for phonological or orthographic information (e.g. searching for the first or the last sound/letter of the person's name). Such a result is somewhat surprising, given that a number of cueing and priming studies have shown that, while providing phonological information may help resolve experimentally-induced name recall failures, by contrast, providing semantic information is usually not helpful (e.g. Brennen, Baguley, Bright,& Bruce, 1990; Hanley and Cowell , 1988; White, Abrams, & Frame, 2013).

Thus, there is a discrepancy between the type of information (semantic information) that people report searching for frequently in order to resolve name retrieval failure and the type of information (phonological / orthographic) that objectively can help resolve retrieval failures.

At least two possible explanations can be found for these seemingly contradictory findings. First, most of the studies that have investigated people's explicit reports of using spontaneous strategies for resolving naming failures have been potentially biased (Brédart, 2018). Indeed, in these studies, the instructions given by the authors when collecting participants' strategic behaviours make it difficult to be certain that participants based their responses only on information they had strategically searched for, and not on information that was involuntarily retrieved. For example, in the Yarmey (1973) study, when participants experienced a name retrieval failure, they were invited to indicate in which order they could recall different pieces of information, such as the number of syllables in the person's name, the initial and last letter of the person's name, the place where they most often saw the person, the person's profession, and so on. On considering such a procedure, it is not obvious whether, for instance, the profession was the first voluntarily searched for piece of information or the first one simply to pop up in the participant's mind. Bearing this in mind, in order to eliminate or, at least, to reduce this bias in the present study, very explicit instructions were given to the participants, specifying that the focus of the study was on the voluntary search for information and not on the spontaneous retrieval of information that might pop into the mind when searching for a name.

Another possible explanation for the curious contrast observed between studies focusing on the reported frequency of use of name retrieval strategies and those focusing on the objective usefulness of such strategies could be an inadequacy in people's metacognitive knowledge regarding how to resolve a retrieval failure. Assuming that the perceived effectiveness of a strategy impacts its frequency of use – indeed, it does not seem very useful to resort to a strategy that you perceive as inefficient – it is possible that people had some misconceptions about the greater usefulness of semantic information, in comparison with phonological information. As a result, they may have relied less often on strategies involving

searching for phonological information as compared to semantic information. However, if this is true, how might such an erroneous metacognitive belief have been formed?

According to several very influential theories in the metacognitive domain (e.g. Koriat, 1993; Nelson & Narens, 1990; Unkelbach & Greifeneder, 2013; Van Overschelde, 2008), metacognitive knowledge is formed through the continuous monitoring of one's own cognitive functioning. However, as the result of one's own mental activities is not always directly accessible, individuals frequently rely on proximal cues to infer whether a specific cognitive operation has been successful, and this may sometimes lead to errors or, at least, to approximations of judgment (Koriat, 1993, 2007). Interestingly, studies conducted both inside and outside of the memory domain have recently shown that one particular cue that is frequently used to estimate whether a strategy has been successful to solve a problem is the ease with which this strategy is implemented (e.g. Geurten & Lemaire, 2017; Rabinowitz & McAuley, 2014). Within this framework, one may thus assume that if people rely less often on phonological strategies than on semantic strategies to resolve a name retrieval failure, it is because they believe phonological information to be less useful than semantic information Such a belief possibly results from the fact that phonological strategies are perceived as much more difficult to implement than semantic strategies. Interestingly, this assumption is also consistent with the region of proximal learning hypothesis proposed by Metcalfe (2002). According to this metacognitive model, participants will pursue the easiest strategies that target retrieval of information, or information with the smallest distance from what have already been retrieved.

In this context, the aims of the first study were (a) to determine whether participants truly use phonological strategies less often than semantic/contextual strategies to resolve name retrieval failures and (b) to investigate whether the relationship between the reported frequency of use of a given strategy and its perceived efficacy (usefulness) could be mediated

by its perceived ease of use. In order to evaluate these predictions, besides the frequency of use, participants were invited to rate the ease of use and the perceived effectiveness of seven presented strategies. These strategies were selected from previous studies of people's spontaneous strategies for resolving name retrieval failures (Cohen & Faulkner, 1986; Finley & Sharp, 1989; Reason & Lucas, 1984; Yarmey, 1973). Given that difficulties in proper name retrieval are more frequently experienced by middle-aged (Klajevic & Erramupze, 2018; 2019) and older people (Burke, MacKay, Worthley, & Wade, 1991; James, 2006) than by young people, it was decided to recruit participants aged 40 and over, in order to maximize the opportunity of encountering participants who experienced name retrieval failures.

Study 1

Method

Participants. The minimum sample size necessary to evaluate a medium size effect for both paths with a power of 0.8 at an alpha level of .05 was 71 for a bias-corrected bootstrap of mediation test (Fritz & MacKinnon, 2007). Consequently, 71 volunteers (46 females, 25 males) were recruited to participate in the study. Participants were aged between 40 and 66 (M = 52.96; SD = 7.12). Data from four additional persons were collected but not included in the analyses because those participants reported a history of a neurological condition. Participants were recruited from among the authors' own acquaintances (e.g. colleagues, neighbours, or friends) and by word-of-mouth. The participants' average educational level, as measured by the number of years of study completed to achieve their highest qualification, was 16.62 (SD = 2.84). Participants were screened using the following yes/no question "Are you sometimes momentarily unable to retrieve the name of a person whose name you are sure you know?" All the participants answered positively to this question. This study was

approved by the Ethics Committee of the Faculty of Psychology, Speech and Language Therapy, and Education of the University of Liège. All participants gave their written informed consent prior to participation. The study was conducted in French with native French-speaking participants.

Procedure. Participants were informed that the aim of the study was to explore the strategies they used to resolve naming failures (for the complete survey prompt, see Supplementary Appendix 1), and they were first of all presented with the following list of possible strategies:

a) I search for further biographical information about the person, such as her/his profession or nationality, or the people associated with her/him

b) I search for the context in which I usually encounter the person (e.g. at work, on TV, in magazines, in the gym, on the internet, etc.)

c) I search for the first or the last sound of the target name

d) I search for the first or the last letter of the target name

e) I try to find the number of syllables in the target name

f) I search for names that sound similar to the target name

g) If the person is not present in the situation, I try to form a mental image of her/him

h) I use another kind of strategy

Participants were explicitly instructed to focus on information that they voluntarily searched for to help resolve a naming failure and to ignore information coming spontaneously to mind without a voluntary search. The experimenter explained that, for each strategy, the participant would have to estimate the frequency of use, the ease of use (an easy strategy was defined as a strategy that does not require much mental effort, while a difficult one does), and

its effectiveness (an effective strategy was defined as a strategy that allows the retrieval of the target name, while an ineffective one does not). Participants then started to fill out a questionnaire under the supervision of the experimenter. Each of the strategies mentioned above was re-presented one by one in the following form:

I search for further biographical information about the person, such as her/his profession or nationality, or the people associated with her/him

Please estimate how often you use this strategy from the following reference points:

0% = I never use this strategy 100% = I use this strategy every time

Response: %

Please estimate how much this strategy is (or would be if you do not use it) easy to use from the following reference points:

0% = Not easy at all (very effortful) 100% = Very easy (not effortful at all)

Response: %

Please estimate how much this strategy is (or would be if you do not use it) effective from the following reference points:

0% = It never works 100% = It works every time I use it

Response: %

The same three instructions were given for all the strategies. In addition to the seven proposed strategies, participants had the opportunity to describe any other strategies they used. Finally, regarding strategies “c” and “d”, participants were asked to specify whether they usually ran through the alphabet when searching for the first or the last sound/letter. Usually, participants took about 20 min to complete the whole questionnaire.

Results

Frequency of use, perceived effectiveness and perceived ease of use of strategies to resolve naming failures.

Descriptive data concerning the frequency of use, the perceived effectiveness and the perceived ease of use of each name retrieval strategy are shown on Figure 1.

A one-way repeated measures ANOVA was conducted on the frequency of use of each strategy. The assumption of sphericity was violated (Mauchly's test, $p < .05$), and the Greenhouse-Geisser sphericity correction was therefore applied. The analysis showed that the frequency of use was significantly different across strategies ($F(3.24, 226.77) = 17.01$, $p < .001$; $\eta^2 = .196$). Post-hoc comparisons (Holm tests) indicated that the search for context was more frequently used than any other strategy (all ps $< .001$). Hereafter, we report the size (Cohen's d) of any significant effect, as well as the size of non-significant effects, with a $d > 0.20$. The effect sizes for the comparisons between the context search and the other strategies were, respectively, 0.70 (semantic search), 0.72 (sound search), 0.87 (letter search), and 0.62 (similar names search). No significant difference was found between the semantic search on the one hand, and the first/last sound search (although a small size effect was present: $d = 0.22$), and the search for similar sounding names, on the other hand. The first/last letter search was less frequent than the search for similar names ($p < .01$; $d = 0.41$) and the semantic search ($p < .05$; $d = 0.34$) but not than the first/last sound search.

Another one-way ANOVA was carried out on the scores of estimated effectiveness. Again, the assumption of sphericity was violated (Mauchly's test, $p < .05$) and the Greenhouse-Geisser correction was applied. This analysis showed that the frequency of use was significantly different across strategies ($F(2.96, 207.31) = 6.96$, $p < .001$; $\eta^2 = .090$). Post-hoc

Holm tests indicated that participants judged the context search to be more effective than any other strategy (all *p*s <.05; *d*s for the comparisons between the context search and the other strategies were, respectively, 0.35 (semantic search), 0.48 (sound search), 0.64 (letter search), and 0.36 (search for similar names)). No significant difference was found between the semantic search, on the one hand, and the first/last sound search, the first/last letter search (although there was a small size effect: $d = 0.32$), and the search for similar names, on the other hand.

Finally, a third one-way ANOVA was carried out on the scores of estimated ease of use. The assumption of sphericity was again violated (Mauchly's test, $p < .05$) and the Greenhouse-Geisser correction was applied. This analysis showed that the frequency of use was significantly different across strategies ($F(3.38, 236.27) = 31.07$, $p < .001$; $\eta^2 = .307$). Post-hoc Holm tests indicated that participants considered that the context search was easier to use than any other strategy (all *p*s <.001; *d*s for the comparisons between the context search and the other strategies were, respectively, 0.93 (sound search), 1.06 (letter search), 0.67 (search for similar names)), except for the semantic search. The semantic search was considered easier than the sound search ($p <.001$; $d = 0.74$), the letter search ($p < 001$; $d = 0.76$) and the search for similar names ($p < .01$; $d = .39$). The search for the first/last sound was not rated differently from the search for the first/last letter, but was rated as less easy than the search for similar names ($p < .05$; $d = 0.32$). All the statistical analyses reported above were conducted using JASP 11.1.

Reported use of the strategy of searching for the number of syllables in the target name in order to resolve a retrieval failure was relatively infrequent, and the values shown in Table 1 might even overestimate the actual frequency of use of this strategy. Indeed, at the debriefing, several participants spontaneously reported considering that they applied this strategy when they merely classified a name as being a long or a short one, rather than searching for the

number of syllables per se. In such a condition, data on the search for the number of syllables were not submitted to inferential statistical analyses.

Mediation analyses for contextual, semantic, phonological and orthographic strategies to resolve naming failures.

In order to test the mediating influence of the perceived ease of a name retrieval strategy on the relationship between the perceived effectiveness of a strategy and its frequency of use, we used a bias-corrected bootstrap mediation analysis (Preacher & Hayes, 2008) on each retrieval strategy. These analyses were conducted using the process module of SPSS version 25 (IBM corp. 2017). Due to the large number of analyses performed, the *p* value was corrected using the Benjamini-Hochberg procedure (false discovery rate of .05). The highest significant *p*-value that was also smaller than the critical value was .043.

Semantic search. First, the mediating influence of the perceived ease of the semantic strategy on the relationship between its reported effectiveness and its frequency of use was explored. A significant effect of participants' perceived effectiveness of the semantic strategy on the frequency of its use was revealed, $\beta = .44$, $p = .005$, $R^2 = .11$ (path [c]). However, no significant relationship was found between the perceived effectiveness of this strategy and its perceived ease, $\beta = .16$, $p = .21$, $R^2 = .02$ (path [a]), or between the perceived ease and the frequency of use, $\beta = .26$, $p = .078$, $R^2 = .06$ (path [b]), thereby proscribing the use of a mediation analysis.

Context search. The mediating influence of the perceived ease of the context retrieval strategy on the relationship between its perceived effectiveness and its frequency of use was examined. The results revealed that the frequency of use of the context retrieval strategy was significantly predicted by its perceived effectiveness (path [c]), $\beta = .42$, $p = .003$, $R^2 = .12$.

Similarly, the perceived effectiveness of the strategy was found to predict its reported ease (path [a]), $\beta = .22$, $p = .029$, $R^2 = .07$. However, no significant relationship was found between the perceived ease of the strategy and its frequency of use (path [b]), $\beta = .04$, $p = .82$, $R^2 = .01$, proscribing the use of a mediation analysis.

Search for the first/last sound. The mediation model and the significant path coefficients are shown in Figure 1. The results revealed a significant effect of the perceived effectiveness of the sound retrieval strategy on its frequency of use (path [c]), as well as on its perceived ease (path [a]), confirming that participants who found the strategy useful were more likely to find it easy and to use it frequently. Furthermore, the results also showed a significant effect of the perceived ease on the frequency of use score (path [b]), suggesting that participants who judged the strategy as easy were more likely to use it often. A bias-corrected bootstrap confidence interval for the indirect effect (path [ab]), based on 1,000 bootstrap samples, was entirely above zero ($\beta = .33$; 95% CI [0.13, 0.64]), indicating that the influence of the perceived effectiveness of the sound retrieval strategy on its frequency of use was mediated by the perceived ease of this strategy. However, this mediation effect was only partial. In fact, evidence was found that perceived effectiveness still affected the frequency of use independently of its effect on presumed mediated influence (path [c']).

< Figure 1 >

Search for the first/last letter. The mediation model and the path coefficients are shown in Figure 2. The results of the simple regression analyses revealed a significant effect of the perceived effectiveness on both the frequency of use (path [c]) and the reported ease (path [a]), suggesting that when participants perceived the letter retrieval strategy as useful, they also perceived it as easy and used it more frequently. Furthermore, the results showed a significant effect of the perceived ease of the strategy on the frequency of use (path [b]), confirming that participants who perceived the letter strategy as easy were more likely to use

it frequently. A bias-corrected bootstrap confidence interval for the indirect effect (path [ab]), based on 1,000 bootstrap samples, was entirely above zero (β = .36; 95% CI [0.13, 0.63]), indicating that the influence of the perceived effectiveness on the frequency of use was mediated by the perceived ease of the strategy. However, this mediation effect was only partial. In fact, evidence was found that the perceived effectiveness still affected the frequency of use independently of its effect on presumed mediated influence (path [c']).

< Figure 2 >

Search for similar names. The mediating influence of the perceived ease of the retrieval of a similar name on the relationship between the perceived effectiveness of this strategy and its frequency of use was examined. The mediation model and path coefficients are shown in Figure 3. The results revealed a significant effect of the perceived effectiveness of the strategy on both its frequency of use (path [c]) and its perceived ease (path [a]), suggesting that participants who perceived the strategy as useful were more likely to find it easy and to use it frequently. Furthermore, the results also showed a significant relationship between the perceived ease and the frequency of use (path [b]), confirming that participants who saw the strategy as easy to use were more likely to use it often. A bias-corrected bootstrap confidence interval for the indirect effect (path [ab]), based on 1,000 bootstrap samples, was entirely above zero (β = .28; 95% CI [0.07, 0.56]), indicating that the influence of the perceived effectiveness of the strategy on its frequency of use was mediated by its perceived ease. Once again, however, this mediation effect was only partial. In fact, evidence was found that the perceived effectiveness still affected the frequency of use independently of its effect on presumed mediated influence (path [c']).

< Figure 3 >

Other strategies to resolve naming failures.

Participants were also asked whether, in the specific case where the target person was absent when the name retrieval failure occurred, they would voluntarily form a mental image of the target person's face to help resolve the naming failure. Present data show that participants used such a strategy in about a half of the cases (see Table 1). In addition, the mediation model and the significant path coefficients for the face retrieval strategy were computed (see Figure 4). The results revealed a significant effect of the perceived effectiveness of that strategy on its frequency of use (path [c]), as well as on its perceived ease (path [a]), indicating that participants who found the strategy useful were more likely to find it easy and to use it frequently. Furthermore, the results also showed a significant effect of the perceived ease on the frequency of use (path [b]), revealing that participants who judged the strategy as easy were more likely to use it often. A bias-corrected bootstrap confidence interval for the indirect effect (path [ab]), based on 1,000 bootstrap samples, was entirely above zero (β = .20; 95% CI [0.03, 0.49]), indicating that the influence of the perceived effectiveness of the face retrieval strategy on its frequency of use was mediated by its perceived ease. However, this mediation effect was only partial: the perceived effectiveness still affected the frequency of use independently of its indirect effect through perceived ease (path [c']).

< Figure 4 >

Participants also had the opportunity to describe other kinds of strategies they used when a name retrieval failure occurred. Twenty-two of the 71 participants (31%) reported using no other strategy. For 17 participants (24%), the other "strategy" consisted of stopping any attempt at retrieving the name, and instead simply waiting. Twenty-seven participants (38%) reported using an external aid (asking someone else or searching on the Internet). Only 8 participants (11%) reported a specific other internal strategy: 3 participants reported trying to visualize the target name (for instance, seeing the name on a book cover or seeing their own

hand writing the name), 2 reported trying to retrieve the name just before sleeping, and finally 3 participants reported using purely idiosyncratic strategies. Finally, pertaining to the strategy of running through the alphabet when searching for the first letter or the first sound of a name, 15 participants reported doing so with letters and 10 with sounds.

Discussion

The first point was to examine whether participants would still report using phonological strategies less frequently than semantic/contextual strategies to resolve name retrieval failures after having been explicitly instructed to focus on a voluntary search for information. Present results indicate that context retrieval was used significantly more often to resolve a name retrieval failure than any other strategy, and that the size of the effects varied from medium to large depending on the comparison. However, contrary to previous studies, the use of the semantic strategy was not clearly dominant in comparison with phonological and orthographical strategies. Participants reported using the semantic search significantly more often than the orthographic strategy (i.e. searching for the first or last letter of the target name) but the size of the effect was small (d = 0.34). In addition, the use of the semantic search was not significantly more frequent than the use of phonological strategies (searching for the first/last sound and searching for similar-sounding names), although a small size effect (d = 0.22) was observed when the semantic search was compared with the first/last sound search.

With respect to the perceived effectiveness of the name retrieval strategies, the context search was considered as more effective than any other strategy. However, no significant difference was found between the semantic search and the phonological or orthographic strategies. By contrast, with respect to ease of use, the semantic search was rated as significantly easier than

the phonological and orthographic strategies. The context search was judged as easier than any other strategies, except for the semantic search.

Although showing a less perfect clear distinction between context/semantic search strategies and phonologic/orthographic search strategies than in previous studies, our data still suggest that participants more often search for contextual/semantic information than for phonological/orthographic information while the former have been experimentally shown to be less effective to overcome name recall failures than the former (e.g. Hanley and Cowell, 1988; White, Abrams, & Frame, 2013). Nevertheless, the mediation analyses conducted in the present study to explore the factors that may influence the frequency of use of various name retrieval strategies could shed an interesting light on the apparent incongruity of people's behaviour. Indeed, our results reveal that perceived effectiveness is a major predictor of frequency of use for both context/semantic search strategies and phonologic/orthographic search strategies. However, for the phonological/orthographic strategies, this relationship also appears to be partially mediated by perceived ease. This finding is important because it indicates that the likelihood of a phonological or orthographic strategy being implemented will depend on participants' beliefs about the ease of use of this strategy. Specifically, a phonological/orthographic strategy that is perceived as useful will be less likely to be used frequently if the implementation of this strategy is also perceived as being difficult. Overall, it appears that the cost-benefit balance between what participants expect to gain in using phonological and orthographic strategies (not much) and what they expect to consume in terms of cognitive resources (quite a lot) does not favour the frequent use of these strategies. Importantly, this mediation effect was not found for strategies involving a context or semantic search, since the perceived ease of these strategies was not related to their frequency of use. One explanation for these results could be found in the high level of perceived ease that was associated with these two strategies (mean = 72% and 67%). Indeed, one could presume that

when the perceived ease of a strategy reaches a sufficient level, it is no longer a factor that prevents or favours the use of the strategy. In that case, only the perceived effectiveness of the strategy comes into play. These results, however, have to be interpreted with caution. Indeed, the survey procedure used in the present experiment does not allow to establish a clear temporal precedence between frequency, effectiveness and ease of use and, thus, does not enable precise interpretation in terms of causal relationship (Shrout, 2011). Moreover, it is important to note that if mediation analyses provided interesting explanations regarding the reason why one participant might use some strategies more often than another participant, they do not indicate why one participant use a specific type of strategies more often than another type of strategies.

As mentioned above, previous studies have shown that providing phonological or orthographic information to participants does help them to resolve retrieval failures (e.g. Hanley and Cowell, 1988; White, Abrams, & Frame, 2013). However, it is possible that, when a retrieval failure occurs, retrieving phonological or orthographic information by oneself, i.e. without receiving it from an external source, is objectively too difficult and is therefore experienced as pointless to try. In order to test this hypothesis, Experiment 2 was devised such that participants would be engaged in a face naming task, a kind of task known to elicit name retrieval failures (Brédart, 1993, Hanley & Cowell, 1988; Yarmey, 1973), using a procedure that would actually require them to *generate* by themselves the cues that should help resolve the retrieval failures. Specifically, in the event of name retrieval failure, participants would be instructed to try retrieving phonological information for half of the cases and to try retrieving semantic information for the other half. Our aim was to examine (a) to what extent participants would be able to retrieve by themselves, respectively, correct phonological and semantic information, and (b) whether the rate of resolution of retrieval failures would be higher following a retrieval of partial phonological information compared

with no retrieval of partial phonological information, in the same way as externally provided phonological information is helpful in resolving retrieval failures.

Study 2

Method

Participants. The minimum sample size necessary to evaluate a medium size effect of 0.5 with a power of 0.8 at an alpha level of 0.05 for a two-tailed matched pairs comparison was 34 (G*Power 3.1; Faul, Erdfelder, Lang, & Buchner, 2007). Hence, 34 (25 females, 9 males) were recruited to participate in the study. Participants were aged between 40 and 64 (M = 50.91; SD = 6.92). The sample included 33 participants from Study 1, who agreed also to participate in Study 2, plus one additional participant. The participants' average educational level was 17.50 (SD = 2.83). This study was approved by the Ethics Committee of the Faculty of Psychology, Speech and Language Therapy, and Education of the University of Liège. All participants gave their written informed consent prior to participation.

Materials and procedure. Pictures of faces of famous people, including actors, singers, sports people and politicians, were randomly presented on a computer screen at a distance of approximately 60 cm from the participants (for a complete the list of the celebrities whose faces were presented, see Supplementary Appendix 3) . Each face was surrounded by a closely fitting oval template, in order to obscure as much of the clothing and background as possible. Faces subtended horizontal visual angles of approximately 7 degrees. Random presentation was generated by the Open Sesame 3.1 software, but the experimenter monitored the presentation of the stimuli by pressing the space bar.

Participants were instructed that they were going to see faces of famous people from different fields and of various degrees of fame, and that their task was to name these faces. When participants did not name a face within 5 sec following its presentation on the screen, they

were asked whether they could identify the person or not. In the case of a “no” response, the next stimulus was presented. In the case of a “yes” response, they were asked whether they knew the target person’s name. If the participants thought they simply did not know the target name, the next stimulus was presented. On the other hand, if the participants thought they did know the name but were unable to retrieve it at that moment **(name retrieval failure)**, the experimenter invited them to recall biographical information about the target person (semantic search) for 7 trials. For 7 other trials involving a name retrieval failure, the participants were asked to search and recall any piece of phonological information, such as the first sound, the last sound or any other sound in the name (phonological search). Semantic or phonological instructions were alternated randomly across the trials. When the participants started to recall semantic information following phonological instructions, they were reminded to search for phonological information.

If the participants were able to retrieve the correct name within 20 sec following the instruction to search for either semantic or phonological information, the name retrieval was considered as resolved. If they were unable to retrieve the name within this lapse of time, the retrieval failure was considered as unresolved. In the absence of resolution, the experimenter produced the target name and asked the participants to sincerely indicate whether this name was the one they had been unable to retrieve. The trial was considered as a name retrieval failure only if the searched name was the one produced by the experimenter. The presentation of faces continued until 14 trials involving a name retrieval failure had occurred (this number of trials was determined on the basis of a preliminary study). In practice, the number of presented faces varied from 28 to 96, depending on the performance of the participant. The number of presented faces per participant was positively correlated with the number of faces correctly named within 5 sec ($r = 0.623$, $p < .0001$), but not with the number of unidentified faces ($r = 0.122$, $p = .490$). This suggests that the variation in the number of presented faces

was more likely due to the fact that some participants were more able to recall target names than others rather than to the fact that some participants knew the identity of a lesser number of targets.

Results and discussion

First, the effect of instructions was assessed using a 2 (Type of instruction) X 2 (Type of information recalled) for repeated measures on both factors. There was a significant main effect of the type of instruction: the proportion of trials associated with the recall of either semantic or phonological information was higher following semantic instructions compared with phonological instructions, $F(1,33) = 7.827$, $p < .01$, $\eta^2 = 0.192$. There was also a main effect of the type of information: globally, the proportion of trials associated with the recall of semantic information was higher than that of trials associated with the recall of phonological information, $F(1,33) = 116.792$, $p < .0001$, partial $\eta^2 = 0.780$. The analysis also revealed a significant interaction, $F(1,33) = 39.919$, $p < .0001$, partial $\eta^2 = 0.547$. Three paired sample *t*-tests were used as post-hoc analyses, their associated *p* value being corrected using the Benjamini-Hochberg procedure (false discovery rate of .05). These tests showed that semantic information was recalled in a higher proportion of trials following semantic instructions than following phonological instructions, $t(33) = 5.707$, $p < .001$, $d = 0.979$, see Table 1 for descriptive results. Conversely, phonological information was recalled in a higher proportion of trials following phonological instructions than when following semantic instructions, $t(33) = 3.169$, $p < .01$, $d = 0.543$; for descriptive data, see Table 1. These results indicate that the type of instructions effectively oriented the participants' search for information.

< Table 1>

However, as analyzing the global proportion of trials associated with recalled information did not allow to test whether successful recall of information depends on the type of instruction

and the type of information (semantic vs. phonological) participants are able to retrieve on a trial-by-trial basis, an additional mixed-effects modelling (binary logistic regression) was also conducted using SPSS (version 25) to further investigate our previous results. Trials were modelled as level 1 units and participants as level 2 units. Subjects and items were modelled as crossed random effects. More specifically, the model included random intercepts for both subject and item, and by-subject random slopes. The dependent variable represent whether participants successfully recalled information. The type of information recalled on each trial was added as first-level predictor, the type of instruction given as second-level predictor, and the Type of information × Type of instruction cross-level interaction was also added to investigate potential instruction-related differences in the relationship between successful recall of information and the type of information recalled. The two main effect estimates were conditional upon set default values so, in the model, the main effect of one variable represented its effect when the other was at its default value. The default value for type of instruction was “semantic instruction”. The default value for the type of information was “semantic information”. This mixed-effects analysis included trials of name retrieval failure as level 1 units (n=476) and participants as level 2 units (n=34). The probabilities of recall estimated by the model can be found in Table 2. The results revealed that the effect of the type of instruction was not significant, β=1.33, *SE*=0.66, p=.071. However, the effect of the type of information, β=11.25, *SE*=3.05, p<.001, and the type of information × type of instruction interaction, β=7.96, *SE*=1.84, p<.001, were significant. Follow-up mixed-effects analyses for each type of instruction revealed that the recall of semantic information was a significant predictor of successful recall after receiving both semantic β=6.25, *SE*=1.77, p<.001, and phonological instruction, β=4.02, *SE*=1.59, p=.012, but the recalled of phonological information only predicted successful recall after receiving phonological instruction, β=1.43, *SE*=0.72, p=.048. Globally, the results of the mixed-effects modelling

appear to confirm the finding of the ANOVA conducted on the proportion of trials on which information was recalled, except that the effect of instruction was not found here. Critically, however, the type of information x type of instruction interaction was still significant, revealing that the relationship between recalling semantic information and successful recall did not appear to be as affected as the relationship between recalling phonological information and successful recall by the type of instruction provided. Specifically, the recall of phonological information only influenced the participant's successful recall of information after phonological instruction while the recall of semantic information influenced successful recall after receiving both type of instructions. Importantly, one should note that the absence of significant influence of recalling phonological information on the probability of successful recall after receiving semantic instructions should be interpreted with cautions. Indeed, due to the low proportion of trials with semantic instructions where phonological information was recalled, it is quite possible that our analysis was not powerful enough to detect this effect.

< Table 2 >

The first aim of this second study was to examine to what extent participants were able to retrieve by themselves correct phonological and semantic information, respectively. Following semantic search instructions, participants almost always recalled correct semantic information (see Table 1). The rare cases when semantic information was not provided consisted of a name recall occurring just after the 5-second time limit. By contrast, following phonological search instructions, the proportions of trials during which participants were able to recall correct phonological information were much lower, $t(33) = 11.899$, $p < .0001$, $d = 2.041$. Therefore, the results show that retrieving even partial phonological information is objectively difficult for people experiencing a name retrieval failure.

In addition, the proportions of resolution following semantic and phonological instructions were compared. A paired samples t-test indicated that the proportion of resolution of retrieval

failures was not significantly higher following phonological search instructions (M = 0.286, SD = 0.211) than following semantic search instructions (M = 0.261, SD = 0.176), $t(33)$ = 0.536, p = 0.619, d = 0.106.

With respect to the second point of investigation, after receiving phonological instructions, the rates of resolution of retrieval failures with and without retrieval of partial phonological information were compared. The proportions of resolution were not significantly more frequent following the recall of partial phonological information (M = 0.299, SD = 0.369) than when no partial phonological information was recalled (M = 0.268, SD = 0.238), paired samples $t(33)$ = 0.470, p = 0.641, Cohen's d = 0.081. Unfortunately, interpreting this result is difficult. Indeed, the absence of intervening partial phonology is ambiguous and could correspond to two completely different psychological states. This situation may arise when a name is so inaccessible that no phonology at all can be retrieved, but it may also occur when a name is quickly retrieved after the retrieval instructions have been given.

In order to investigate aspect further, a deeper analysis of the type of retrieved partial phonology was undertaken. This analysis showed that retrieved partial information could be grouped into two categories: (a) retrieval of the first name and (b) retrieval of isolated phonemes of the first name and/or the surname. The retrieval of the first name was followed by a failure resolution in about 47% of cases (9 out of 19 occurrences), while the retrieval of isolated phonemes was followed by a failure resolution in only 22.5% of cases (9 out of 40 occurrences). Taking the observations as the random factor, a Fisher Exact Test was applied. Results of this test showed that the difference between these two proportions just failed to reach statistical significance (p = 0.0525; one tailed test) but that it revealed a small to medium effect size (Phi = 0.25). All the statistical analyses reported above in this section were conducted using JASP 11.1.

General discussion

The primary aim of this study was to better document the apparent inconsistencies appearing in the literature regarding strategies used to resolve name retrieval failure (Brédart, 2018). An examination of this literature reveals a discrepancy between the type of information people report searching for when they try to resolve name retrieval failures (i.e. semantic/contextual information) and the information that have been experimentally shown to favour name retrieval (i.e. phonological/orthographic information). The results of Experiment 1 of the present study revealed that participants reported using phonological/orthographic strategies less often than contextual strategies to resolve name retrieval failures. We also found that the reported frequency of use of a given strategy was predicted by its perceived efficacy and that the relationship between frequency and effectiveness was mediated by the perceived ease of phonological/orthographic strategies, but not of semantic/contextual strategies. This suggests that for perceived efficacy to influence people's reliance on phonological/orthographic strategies, these strategies must also be perceived as easy. On the other hand, perceived ease does not appear to influence the frequency of use of semantic/contextual strategies, probably because these strategies are perceived as so easy that difficulty is no longer an impediment to their use. In Experiment 2, instructions to retrieve phonological information did not appear to be more helpful than instructions to retrieve semantic information, with respect to the resolution of experimentally-induced name failures. In addition, we found that participants almost always retrieved semantic information after being instructed to search for semantic cues but that, in more than half of the trials, they were unable to retrieve phonological information after being instructed to search for phonological cues.

Taken together, the results of our two experiments seem to indicate that the retrieval of phonological information is both subjectively and objectively more difficult than the retrieval of semantic information. Given the number of studies in the literature showing that searching

for phonological information in memory is more reliant upon executive function than is searching for semantic information (e.g. Troyer et al., 1997), this finding is hardly surprising. Moreover, in Experiment 2, the frequency with which participants retrieved semantic information after being instructed to search for phonological information suggests that, when it comes to name retrieval, searching for semantic information could be more automatic than searching for phonological information. If that is the case, it means that, before searching for phonological information, participants would have to inhibit the semantic information that naturally comes to mind, making the retrieval of phonological information even more resource consuming.

A more detailed examination of the data suggests that a higher rate of resolved name failures tends to be observed when a sufficient amount of phonological information is generated (i.e. the first name) than when more partial phonological information about the first name and/or the surname is retrieved. This is quite consistent with results reported in cueing or priming studies. In the Hanley and Cowell (1988) study, the phonological cues included multiple pieces of orthographic information: the first letter of the first name and the surname and the number of letters in the first name and the surname were presented together. In the White et al. (2013) study, priming was effective when the first name was used as the prime, but not when only the first syllable of the first name served as the prime. Given the difficulty experienced by our participants when they had to search for that kind of information, however, such a rich phonological retrieval is quite unlikely to occur, at least not without external help. Overall, in the present study, the successful retrieval of the first name occurred only 8 percent of the time in trials for which participants were instructed to search for phonological information.

Before concluding, two limitations of the present studies must be mentioned. First, due to our sampling procedure, in both studies, the samples mainly included highly educated people.

Replicating these studies with more representative samples of participants would surely be useful. Secondly, although Study 2 was designed to understand better results from Study 1, there is a difference between name retrieval failures investigated in the two studies. In Study 2, name retrieval failures occurred in a context of face naming. Name retrieval failures investigated in Study 1 were likely to occur in a wider range of contexts including situation where the person to be named was not present. Future research is needed to determine to what extent these differences pertaining to the context of name retrieval failures are important.

From a theoretical perspective, our findings are consistent with the metacognitive postulate according to which various pieces of information are consulted and weighed by participants before they decide how to regulate their own performance (Koriat, 1993, 2007). Specifically, studies have revealed that individuals rely not only on the objective efficacy of a strategy, but also on the ease with which it can be implemented, in order to determine whether that strategy should be used to support their cognitive operations (Geurten & Lemaire, 2018; Rabinowitz & McAuley, 2014). In the case of name retrieval failures, much as the retrieval of specific classes of phonological information could slightly increase the likelihood of resolving memory failures, the fact remains that access to that kind of information is experienced as being difficult. When massive investment leads to marginal reward, the cost-benefit calculation is not in favour of the frequent use of a given strategy, and this explains why phonological strategies are used less frequently than semantic strategies.

Conflict of interest: The authors declare no conflict of interest.

Open Practices Statement: Data and materials for the experiments reported here are available from the corresponding author on reasonable request. None of the experiments was preregistered.

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p (S / S Instr)	0.941 (0.176)
p (S / Ph Instr)	0.622 (0.285)
p (Ph / Ph Instr)	0.454 (0.184)
p (Ph / S Instr)	0.324 (0.229)

Table 1: Proportions of trials involving the recall of semantic and phonological information as a function of the type of instruction given. p (S / S Instr) = n trials during which semantic information was recalled following instructions to retrieve semantic information / 7; p (S / Ph Instr) = n trials during which semantic information was recalled following instructions to retrieve phonological information / 7; p (Ph / Ph Instr) = n trials during which phonological information was recalled following instructions to retrieve phonological information / 7; n (Ph / S instr) = nrials during which phonological information was retrieved following instructions to retrieve phonological information / 7. Note that 7 = n of S Instr = n of Ph Instr.

p (S / S Instr)	0.345
p (S / Ph Instr)	0.187
p (Ph / Ph Instr)	0.084
p (Ph / S Instr)	0.021
p (S+Ph / S Instr)	0.135
p (S+Ph / Ph Instr)	0.137

Table 2: Recall probabilities of information estimated by the mixed-level model on an item-by-item basis (n=476) as a function of the type of information recalled and the type of instruction given. S / S Instr = Recall probability estimated when semantic information was recalled following instructions to retrieve semantic information; S / Ph Instr = Recall probability estimated when semantic information was recalled following instructions to retrieve phonological information; Ph / Ph Instr = Recall probability estimated when phonological information was recalled following instructions to retrieve phonological information; Ph / S instr = Recall probability estimated when phonological information was retrieved following instructions to retrieve phonological information. S+Ph / S Instr = Recall probability estimated when both semantic and phonological information was recalled following instructions to retrieve semantic information; S+Ph / Ph instr = Recall probability estimated when both semantic and phonological information was retrieved following instructions to retrieve phonological information.

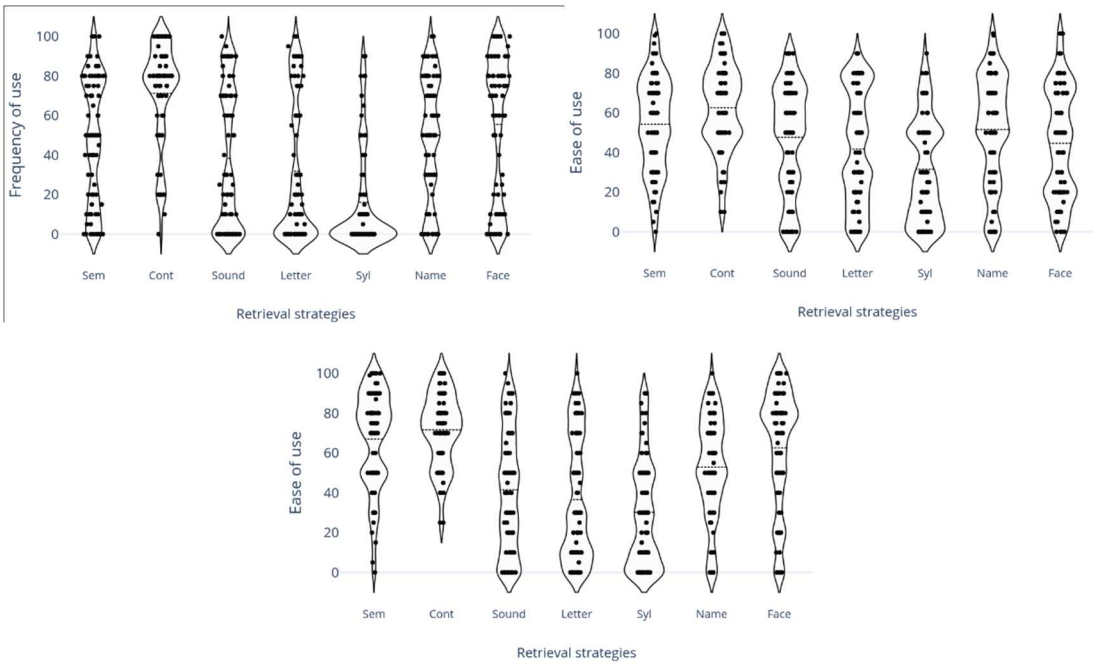

Figure 1

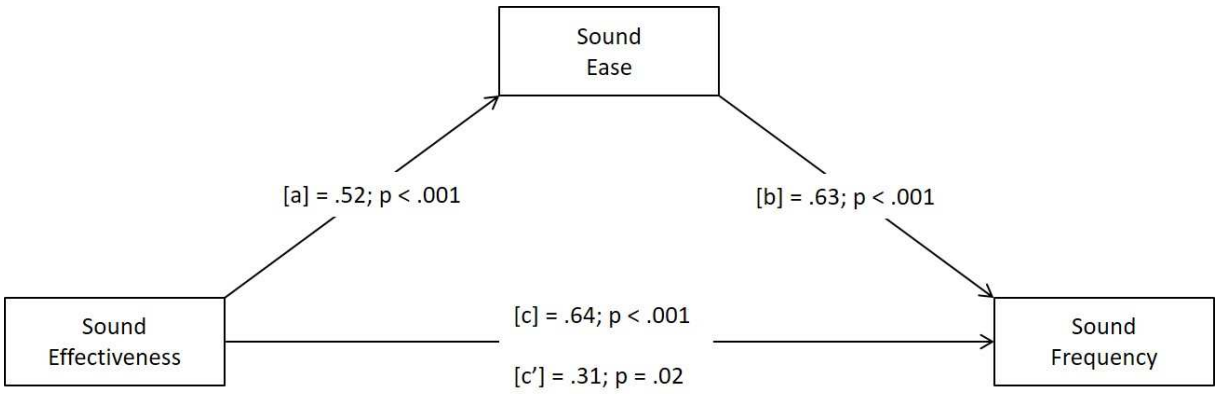

Figure 2

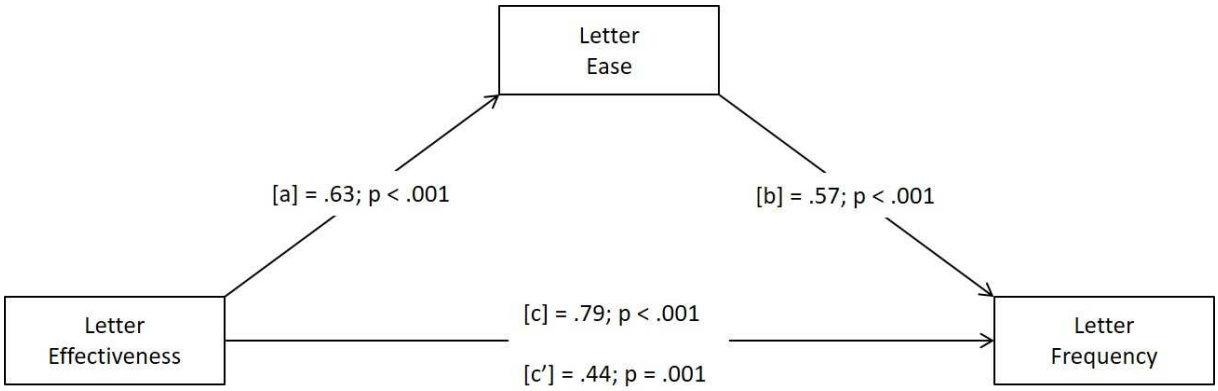

Figure 3

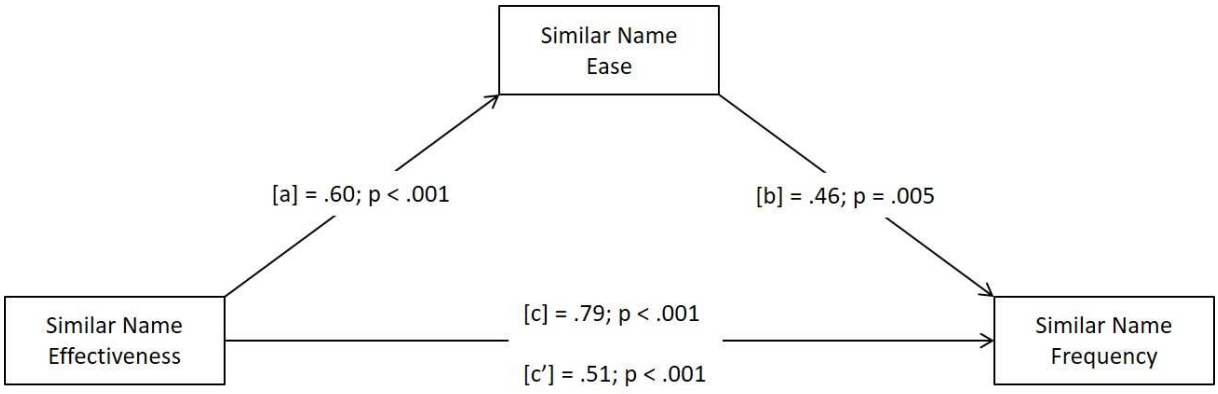

Figure 4

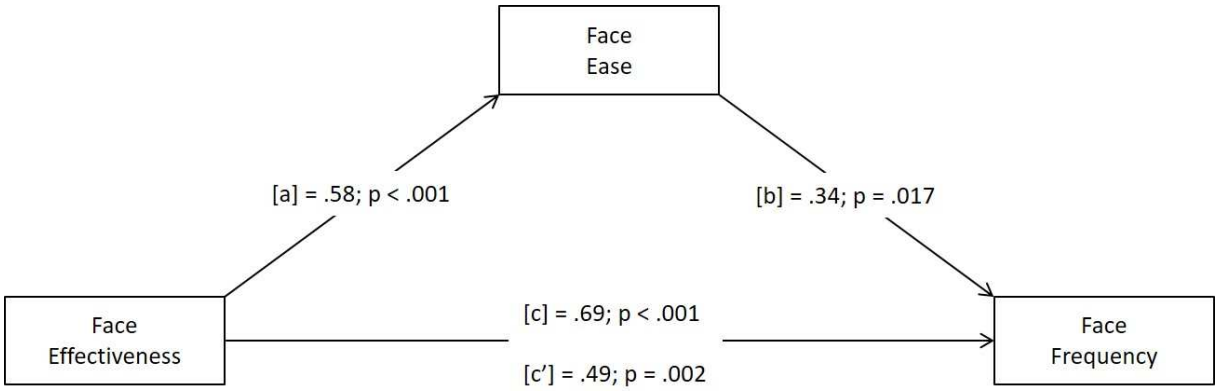
Face
Ease
[a] = .58; p < .001
[b] = .34; p = .017
Face
Effectiveness
[c] = .69; p < .001
[c'] = .49; p = .002
Face
Frequency

Figure 5

Figure captions

Figure 1: Dispersion and individual scores of frequency of use (left panel), effectiveness (right panel) and ease of the strategy used (bottom panel) for the different type of strategies (semantic, contextual, sound, letter, syllable, similar name, and face).

Figure 2: Path coefficients of the mediation model for the name retrieval strategy involving the search for the first/last sound, including frequency of use as the independent variable, perceived effectiveness as the dependent variable, and perceived ease as the mediator

Figure 3: Path coefficients of the mediation model for the name retrieval strategy involving the search for the first/last letter, including frequency of use as the independent variable, perceived effectiveness as the dependent variable, and perceived ease as the mediator

Figure 4: Path coefficients of the mediation model for the name retrieval strategy involving the search for a similar name, including frequency of use as the independent variable, perceived effectiveness as the dependent variable, and perceived ease as the mediator

Figure 5: Path coefficients of the mediation model for the face imaging name retrieval strategy, including frequency of use as the independent variable, perceived effectiveness as the dependent variable, and perceived ease as the mediator