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Personally Familiar Proper Names Are Relatively Successfully Processed in the Human Right Hemisphere; or, the Missing Link

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Responding to our abstract in *Brain and Language* (Ohnesorge & Van Lancker, 1999), which proposed that famous proper nouns are successfully processed in both cerebral hemispheres, Schweinberger, Landgrebe, Mohr, and Kaufmann (2001) claimed that the ''link'' between personal names and the right hemisphere is ''illusory.'' Ohnesorge and Van Lancker (2001) further described six experimental studies in which LVF/RH recognition of famous proper nouns was influenced by task conditions and stimulus familiarity. Here presenting two more experiments performed to explore the refutation presented by Schweinberger et al., this article confirms an ability of the right hemisphere to recognize famous proper nouns and explains why appropriate stimulus development and task conditions are essential in furthering our understanding of the role of the right hemisphere in processing personal relevance.

Key Words: split visual fields; lexical processing; hemispheric specialization; proper nouns; personal relevance.

We appreciate this opportunity to engage in a dialogue with our colleagues S. Schweinberger, A. Landgrebe, B. Mohr, and J. Kaufmann and to offer our reasons why their elegant experiments, presented as a refutation of our previous conference paper, yielded results different from ours. In our opinion, it is generally true that negative results have not been given the light of day often enough in behavioral research. In one example, if people had sooner published their data contradictory to the popular notion that a right hemisphere is specialized for a putative affective component of language, we might have been spared many years of unfortunate bandwagon effect. In the current case, Schweinberger et al. (2001) based their refutation on our previous presentation at the Academy of Aphasia, which appeared as an abstract (Ohnesorge & Van Lancker, 1999); the complete article (Ohnesorge & Van Lancker, 2001) appeared after submission of their article to *Brain and Language*, so that in their refutation, our colleagues from Scotland and Germany did not have the benefit of the larger view or knowledge of the broader range of methods and stimuli

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we used to obtain our results. Their article describes two experiments, the second of which utilizes proper noun stimuli. The first experiment displayed words and nonwords in a lexical decision task, not a familiarity judgement; the finding was the usual right visual field (RVF) performance on words. The second experiment found poorer performance in left visual field/right hemisphere (LVF/RH) for famous compared to nonfamous names and compared to right visual field/left hemisphere (RVF/LH) performance. Their finding of equal performance in both visual half-fields for unknown nouns, in their interpretation, led to the conclusion that the left hemisphere (LH) is specialized for famous but not unknown names. Our published article, to which Schweinberger et al. (2001), to our knowledge, did not have access, describes six experiments exploring a range of questions, utilizing a variety of tasks, to probe the role of the right hemisphere (RH) in the recognition of proper nouns.

On a general note, the tradition of result replication, so common and prolific at an earlier time in experimental psychology, has faded somewhat, possibly due to the greater heterogeneity of neurolinguistic and neuropsychological questions and testing environments. In principle, we welcome the practice of an attempt at replication. However, it is customary to refute a research claim with a fairly direct replication of the basic experimental design and stimuli used in the prior study. While the experimental data presented by Schweinberger et al. (2001) do indeed allow a different perspective on the relative abilities of the hemispheres with regard to famous and nonfamous proper nouns from that expressed in Ohnesorge and Van Lancker (1999, 2001), it is not the case that they have replicated our design; rather, they have altered fundamental aspects of our stimulus selection, subject selection, stimulus presentation, and response sequence. For example, they presented their proper name stimuli in a lexically unnatural ''stacked fashion,'' one atop another, and in all capital letters. They required subjects to respond under time pressure. They required recognition to occur in a relatively noisy perceptual environment by presenting strings of lexical characters in the visual field contralateral to the critical stimuli and they used considerably longer stimulus exposure times. Observers responded with both hands on each trial of the experiment. Each of these manipulations seem likely to have influenced the results; we suspect that some of them may have had greater impact on the more fragile, context-dependent language ability of the RH than on the more robust, stable, and verbally initiating LH.

In this response, we review the several features of the experimental design in Schweinberger et al. (2001) that are likely to account for the differences between the results obtained in our respective studies and the different conclusions reached about the ability of the RH to successfully process famous proper nouns. First, and probably most importantly, the proper noun stimuli were selected by the experimenters rather than elicited from a cohort of the experimental subjects. The single reported criterion for selection of the well-known celebrities used in the study was length of the names: both first name and surname had to be four to seven characters long. Second, Schweinberger et al. utilized fewer stimuli: 64 compared to our set of 100. A smaller stimulus set gives greater weight to individual items in the familiar category that are less familiar or unfamiliar to some subjects. Relatively few subjects (n = 16 compared to our n = 170) participated and their mean age was 23.9; average age of the experimenters was not provided. Education and occupational background of the participants was also not given, but presumably, differences exist regarding these variables between the subjects and the researchers. Who were the famous names—politicians, rock stars, movie idols, comedians, sports figures? These demographic and selectional factors are crucially important in personal familiarity research.

In our studies, elicitation procedures for obtaining lists of proper and common nouns were utilized extensively, surveying 139 informants of known age, occupation,

and education. Proper names and two-word common nouns were culled from these surveys, matched for syllable and character length, and presented in horizontal format. Whenever the comparison stimuli were unknown proper nouns (rather than two-word common nouns), stimuli were presented in title case (capital letters in initial position, lowercase elsewhere). The experimental stimuli were then presented to persons matched in age, education, and occupation to the informant group.

The value of utilizing stimuli identified as familiar by the subjects themselves was demonstrated by one of the analyses in the Ohnesorge and Van Lancker (2001) study. This occurred in Experiment Four, in which a significant effect was seen only when familiarity ratings on the proper names were obtained and subjects' performance results were reanalyzed using only stimuli in the top 70% of familiarity (leading to two analyses, 4a and 4b). This effort was motivated by a vicissitude of academic life: The stimuli were originally obtained from college students in the Los Angeles area before one of the authors (D.V.L.) moved to Northfield (MN), where the study was carried out, testing students from Carleton College and St. Olaf College. In exit-interviewing the Northfield subjects, it was discovered that, despite the similarity of the Northfield participants in age, occupation, and education to the California informants, the geographic difference was not negligible. To our surprise, none of the midwestern students that we interviewed, for example, had ever heard of Patty Hearst (a well-known West Coast celebrity and one of our test items). It was this observation that led us to reanalyze results in Experiment Four using only the stimuli that were rated as highly familiar by the Northfield subjects themselves. The difference in results between 4a and 4b analyses of Experiments Four were so clear that we decided to develop new, locally familiar stimuli for the last two experiments. These differences significantly affected our performance results across the six different experiments and led to the RH hypothesis we proposed.

There is a further suggestion that insufficient or inconsistent familiarity with may be a confounding factor in Schweinburger et al. (2001): The relatively low accuracies on the famous proper nouns compared to the unfamiliar proper nouns. These authors themselves mention previous findings that personal name recognition is high for names of low frequency (citing Valentine, Bredart, Lawson, & Ward, 1991), and yet, even given the relatively long exposure times (150 ms), which should have made the task easier than in our studies (using exposure durations of 67, 80, 93, and 106 ms), accuracies for the identification of their famous proper nouns are lower than for their unfamiliar stimuli. (For convenience of the reader, the accuracy data from Schweinberger et al., 2001, are presented in Fig. 1.)

In all of our experimental assays, including the two new studies reported here, whatever the exposure or task, accuracies on famous proper nouns were higher, usually significantly higher, than accuracies for common nouns or unknown proper nouns.

Another source of evidence that degree of familiarity is an important ingredient to consider in probing RH proper nouns ability comes from task differences utilized in Ohnesorge and Van Lancker (2001). In Experiments Two and Three, processing in the RH was less apparent when subjects responded by identifying the stimuli as animate or inanimate (common nouns), male or female (famous proper nouns), than in Experiment 1, when (using the same stimuli) the response categories ''famous proper nouns'' versus ''common nouns'' were used. The most compelling contrast, favoring the RH's ability to process famous proper nouns, appears in Experiments Five and Six, which utilized famous stimuli derived from local subjects' lists, which had been obtained from a survey accompanied by familiarity ratings. The stimuli rated most highly as familiar were selected for that experiment, and they resulted in the smallest differences between LH and RH performance on famous proper nouns.

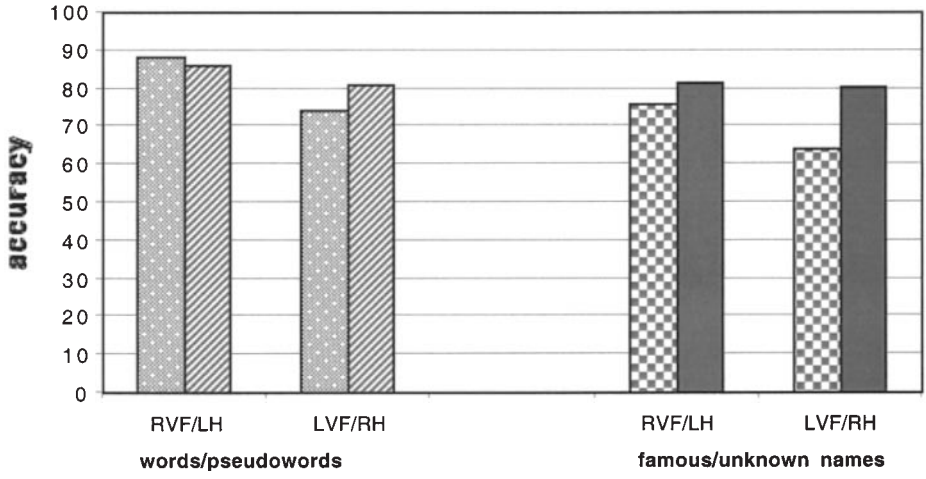

FIG. 1. Accuracy results for Schweinberger et al. (2001) studies using words/nonwords and famous/nonfamous names at 150-ms exposure utilizing a competing stimulus of visual noise (a row of X's).

These cumulative results suggested that task, subject pool constituency, and stimuli all had subtle roles to play in the laterality effects, and that RH involvement was engaged most reliably in association with (1) tasks that most efficiently engaged a ''set'' requiring the categorization of famous-familiar and (2) stimuli that were produced by the subjects' cohort and were rated as highly familiar by those informants.

As mentioned above, the stimulus presentation format used in Schweinberger et al. (2001) may also have worked against the possibility of eliciting a familiarity response. The written, visual stimuli were presented in first and second names in two horizontal rows, while ours were presented in one horizontal row, the positioning normally encountered. This is an important factor given the motivation underlying our study. If, as we hypothesized, personal familiarity is a quality underlying RH performance, it is not surprising that this uncommon visual presentation would be less or nonengaging of the response. Further, Schweinberger et al. (2001) presented names in capital letters, also less commonly encountered, while in our Experiments Four–Six, stimuli were presented in title case, which more closely matches the format in which these stimuli are typically encountered. From the point of view of models of brain function, the widely cited distinction in processing style between the hemispheres (e.g., Bradshaw & Nettleton, 1983) might be taken into account in this aspect of stimulus design in that the configurational or parallel processing associated with the RH would likely require a fairly high degree of similarity between presentation format of the stimulus and cognitive representations for recognition to occur.

We were unsure how to evaluate another difference in the Schweinberger et al. (2001) study design, the use of visual noise (a series of X's) in the nontarget visual field. To examine the possibility that use of visual masking on the nonpresentation side of the visual half field might have influenced the results, and to replicate the longer presentation times, we performed two experiments comparing recognition of locally obtained famous proper nouns and unknown proper nouns (those of Experiment Five and Six in Ohnesorge & Van Lancker, 2001). While the alteration of so many critical experimental parameters largely obviated any analogy between Schweinburger et al. (2001) and our published article (Ohnesorge & Van Lancker, 2001), the attentional control included in their design was an interesting feature which bore further investigation. We conducted a repeat assay of Experiment Six from

Ohnesorge and Van Lancker (2001) with the addition of competition stimuli like those used by Schweinburger et al. (2001).

EXPERIMENT 1

Methods

Participants. Twenty-one females and 12 males ($n = 33$) ranging in age from 18 to 20 years participated in the study for extra credit in a course in introductory psychology. All were right-handed and either had normal vision or were wearing their corrective lenses.

Stimuli. The stimulus set from Appendix D of Ohnesorge and Van Lancker (2001), consisted of 100 famous proper nouns elicited from and rated by local informants who were age- and education-matched to the participants, and 100 unknown proper nouns taken from the Minneapolis phone book. Using information about the role of personal relevance in the selection of ''famous'' names, we replaced four of the stimuli that had local relevance for the participants in our previous studies (Northfield, MN) with stimuli of local relevance for the students participating in the current studies who reside in St. Peter (MN). Unknown and famous proper nouns were presented horizontally in title case. A row of X's of the same number of characters as the critical stimulus was presented in the contralateral visual field.

Apparatus. The experiment was designed and conducted using PsyScope, an experiment authoring program (Cohen, MacWhinney, Flatt, & Provost, 1993), running on Macintosh PowerPC computers.

Procedure. Participants signed consent forms and received instructions both orally and by reading them from the computer monitor. As in our previous studies the instructions stressed accuracy, but not response time. Following the instructions, participants initiated a practice session of 20 trials. After the practice session they completed the 200 experimental trials. Subjects were debriefed and thanked.

The stimulus presentation sequence was as follows. A fixation cross was presented centrally until participants pressed the spacebar to initiate the trial. Following a 300-ms interval, the target stimulus and control stimulus were then presented for 106 ms, one to each visual field. These were presented such that the center of each stimulus fell at a lateral eccentricity of 4° of visual angle from the point of central fixation, one to each visual field. Following the presentation, subjects responded by pressing one of two marked keys to respond ''famous'' and the other to respond ''nonfamous.'' The hand with which subjects responded ''famous'' was counterbalanced between subjects. After completing the experiment subjects were debriefed and thanked.

Results

The percentage correct for each condition was calculated and submitted to a repeated-measures analysis of variance (ANOVA). The effect of Hemisphere was not significant [$F(1, 32) = 2.77$, $MSE = .021$, p = .11]. The effect of Notoriety was significant [$F(1, 32) = 14.69$, MSE = .021, $p < .05$], reflecting the greater accuracies on famous than nonfamous names. The interaction of Hemisphere and Notoriety was not significant [$F(1, 32) = 2.69$, $MSE = .012$, $p = .11$]. The mean percentages correct are plotted in Fig. 2.

Discussion and Further Analysis

Changing the stimulus presentation to include a competition stimulus in the field contralateral to the target stimulus did indeed alter the results of our study such that the ability of the RH to recognize or report that a presented stimulus was famous dropped appreciably compared to performance in five of six studies in Ohnesorge and Van Lancker (2001), while performance in the LH for that judgement was not greatly affected. Thus, the difference between hemispheres for the famous stimuli was large compared to the analogous comparison between nonfamous stimuli. However, inspection of Fig. 2 reveals that although performance on famous items in the RH was impaired, so was performance for nonfamous items in the LH. A single *df* comparison between these conditions in this current experiment revealed that the 6% advantage for the LVF/RH, with 64% for RH proper noun recognition vs 58% for LH common

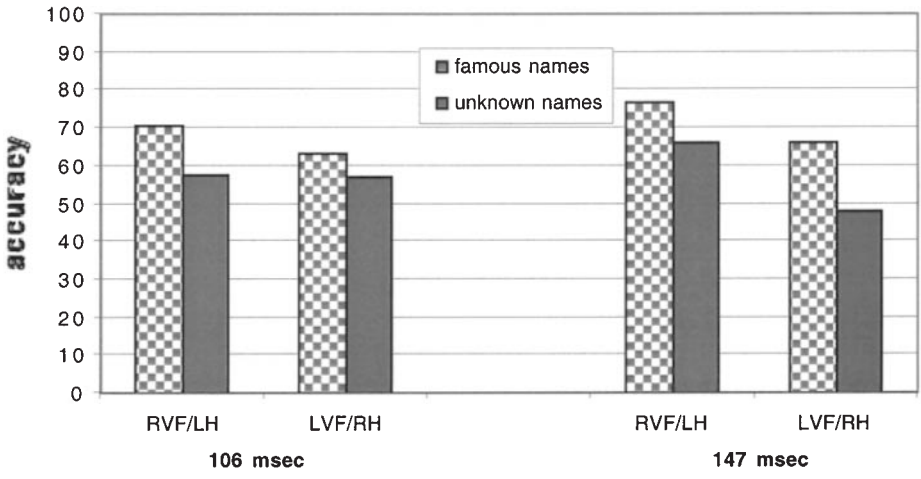

FIG. 2. Accuracy results for studies using famous/nonfamous names at 106- and 147-ms exposures utilizing a competing stimulus of visual noise (a row of X's).

noun recognition, was significant [$F(1, 32) = 4.29$, $MSE = .012$, $p < .05$]. Further, the comparison of nonfamous stimuli by hemisphere revealed similar levels of performance (a similar finding to that in Schweinberger et al.). The 1% advantage for the LH did not reach statistical significance [$F(1, 32) = .15$, $MSE = .012$, $p > .05$]. Overall, the concurrent presentation of the competition stimulus to the contralateral hemisphere made the task considerably more difficult for participants in two of the four conditions (nonfamous stimuli in the LH and famous stimuli in the RH), leaving performance in the other two conditions largely unaltered.

However congenial the match between these data and our previous conclusions about RH recognition of highly familiar proper nouns, it is true that the addition of perceptual noise nearly reversed the pattern of interaction upon which our interpretation rests. We made a further change by increasing the duration for which the stimuli were presented. This was motivated by two considerations. First, if the inclusion of perceptual noise interfered with performance through a reduction in the rate of information extraction, presenting the stimuli for a longer period of time ought to compensate, reproducing the previous pattern of results. Second, the data from Schweinberger et al. (2001) were collected at a presentation duration of 150 ms, and by more closely approximating their presentation parameters we could evaluate the fit between their critique and our results. For the second experiment we retained the use of the concurrently presented competition stimulus but increased the duration of the stimulus presentation to 147 ms.

Experiment 2

Methods

Participants. Thirteen females and five males ($n = 18$) ranging in age from 18 to 20 years participated in the study for extra credit in a course in Introductory Psychology. All were right handed and either had normal vision or were wearing corrective lenses.

Stimuli. The stimuli were the same as those used in the previous study.

Procedure. All aspects of the presentation sequence were identical to the previous study except that the presentation duration was increased from 106 milliseconds to 147 milliseconds.

Results

The percentage correct for each condition was calculated and submitted to a repeated-measures analysis of variance (ANOVA). All effects reached statistical sig-

nificance. The effect of Hemisphere was significant [$F(1, 17) = 21.63$, $MSE = .016$, $p < .05$]. The effect of Notoriety was also significant [$F(1, 17) = 42.85$, $MSE = .009$, $p < .05$]. The interaction of Hemisphere and Notoriety was significant [$F(1, 17) = 5.32$, $MSE = .005$, $p < .05$]. The data can be viewed in Fig. 2.

Discussion and Further Analysis

The results of Experiment 2 were again supportive of the RH claims we previously proposed. However, the addition of the control condition used in Schweinberger et al. (2001) does seem to allow the LH to perform overall better than the right. Despite increasing the time available for stimulus encoding from 106 to 147 ms, the performance of the LVF/RH did not reach equivalence with that of the RVF/LH on the famous proper noun task. The single *df* comparison of Famous stimuli by Hemisphere revealed a significant difference [$F(1, 17) = 15.5$, $MSE = .005$, $p < .05$]. Overall, the major impact of increasing presentation duration, in addition to increasing accuracies overall, was to allow better performance on nonfamous items by the LH. The comparison of famous proper nouns in the LVF/RH with nonfamous proper nouns in the RVF/LH was no longer significant [$F(1, 17) = .17$, $MSE = .005$, $p > .05$], and the comparison of nonfamous proper nouns by hemisphere was significant [$F(1, 17) = 51.9$, $MSE = .005$, $p < .05$].

In this study, the expected performance for unknown nouns was found (better performance in the RVF/LH). We are not sure how to evaluate the Schweinberger et al. result of equal laterality performance for unknown proper nouns. This result also occurred in Study 1, the more difficult condition reported above (106-ms exposure with X's as a visual challenge), in which we found depression of unknown nouns in RVF/LH presentations along with depression of proper nouns in the LVF/RH.

CONCLUSION

Because of limitations and differences in the implementation of the experiments, as well as errors in conception and design, the subtle responses of the RH to certain types of verbal stimuli were simply not elicited by Schweinburger et al. (2001). We are not sure why the use of visual competitive noise lowered the performance of both hemispheres on words or names. In the Schweinberger et al. study, this scenario was presumably not aided by presenting the stimuli in stacked capital letters. We offer the speculative possibility that this added complexity interfered more with the linguistically fragile RH than with the more robustly verbal LH. It is further possible that time pressure and use of both fingers also simultaneously favored the LH, which has long been known to be an initiator in verbal tasks. It is well known that as leader in verbal behavior, LH performance will override that of the RH unless conditions are very carefully constructed. This has been seen in split-brain studies, visual half-field studies, and dichotic listening. For example, in a dichotic listening of famous voice recognition by Kreiman and Van Lancker (1988), despite a strong finding for RH processing of familiar voices obtained in studies of brain damaged patients (Van Lancker & Canter, 1982; Van Lancker, Kreiman, & Cummings, 1989; Van Lancker & Kreiman, 1986; Van Lancker, Cummings, Kreiman, & Dobkin, 1988), only a relative (not an absolute) right ear advantage was found for familiar voices. In that study, in which words spoken by famous persons were presented simultaneously to left and right ears, subjects performed familiar voice recognition and word identification on the same stimuli. Analysis of performance results and interviews with the subjects strongly indicated that the linguistic, lexical meaning was more salient; the voice information more subtle; and, whether concurrently or in conse-

quence, the performance of the LH on the verbal information was more prominent. Further pilot testing utilizing a task requiring voice recognition ability only, thereby establishing a ''set,'' showed a greater potential of obtaining the predicted left ear advantage for familiar voice recognition. This type of relative difference was seen in the replication studies reported here: Accuracies in the LVF/RH for proper nouns, although lower than those in the LH, were higher than accuracies for common nouns in the RVF/LH.

Conceptually, the notion of personal familiarity was neither fully understood nor adequately exploited in the Schweinberger et al. (2001) study. Such conceptual weakness is betrayed in an early comment in the article that ''names are more arbitrary than common nouns, in that they do not by themselves indicate semantic properties of their referent.'' This is an odd remark, distorting the notion of the arbitrariness of the linguistic sign in an unusual manner. In fact, the opposite is more arguably the case: To the person familiar with them, familiar proper nouns have more semantic properties than common nouns. Known proper nouns have a unique referent, with a dense set of distinctive properties and features, whereas common nouns cover a generic range, with concomitantly vaguer semantic properties. In contrast to the conceptual view of Schweinberger et al. (2001), we hold that familiar-intimate and familiar-famous proper nouns have strong and intense emotional, contextual, historical, biographical, iconic, imagistic, and auditory associations, which serve as semantic properties, and which, in addition, make famous proper nouns prime candidates for RH processing. It is only through designing an experiment that accommodates and exploits these principles that the RH ability will be seen.

In the Schweinberger study, lower levels of accuracy for famous than for unknown stimuli, a relatively small set of familiar proper names, selection of names by the experimenters, and the small number of subjects all converge on the possibility that enough of the famous names used by Schweinberger et al. (2001) were not well known to their subjects. This is always a serious consideration in personal familiarity research: great effort and care must be taken to ensure maximum likelihood that the subjects will be personally familiar with the stimuli. It is obvious that any notable individual differences in this all important parameter will undermine the meaningfulness of the results. We are claiming that the ability of the RH to process familiar proper nouns is based on, contingent on, and explained by personal familiarity. Personal familiarity is a separable neuropsychological parameter that underlies much of perceptual and cognitive processing in the RH (Van Lancker, 1991).

To test our rejection of their refutation, we suggest that Schweinberger et al. (2001) try one or more of the following: obtain familiarity ratings from their experimental subjects, or a cohort of their subjects, and reanalyze the data using only names that have been highly rated; test a second group chosen for previously obtained high familiarity ratings to a corresponding subset of their famous proper noun stimuli; elicit famous names from informants representative of a new cohort to be tested; and then obtain ratings when the familiarity testing is finished.

We do not discern any particular benefit to the use of visual noise in the contralateral visual field. By adding difficulty, this condition probably merely requires longer stimulus exposure times, and there is a remote possibility that the graphologic noise interferes more with RH than with LH facility with verbal material. The latency data, probably unreliable and nonprobative in a setting such as this, also did not appear to contribute additional information.

Finally, our claim, based on the split visual field results, was not for a specialized, in the sense of exclusive, ability of the RH to process famous names. In the abstract (Ohnesorge & Van Lancker, 1999), we explicitly offer two conclusions from those studies: Famous proper nouns are differently cerebrally represented from common

nouns and both hemispheres process proper nouns. Our subsequent studies examining this question showed that the RH, given the correct conditions, could process familiar proper nouns either as well as the LH or (in the relative condition) as well as the LH processed unknown proper nouns. As explained extensively in the Ohnesorge and Van Lancker (2001) article, broader sources of evidence indicate that both hemispheres process familiar proper nouns, but they do so in different ways.

Proper nouns are longer, more phonologically complex, and more infrequent than verbal material previously considered as compatible with RH function. It is to be expected that the LH processes familiar proper nouns, as it does any verbal material, however lengthy or complex. The surprising and new observation is that the RH, so long believed to be inferior at long and complex verbal stimuli, has a discernible facility for processing famous, in comparison to unknown, proper nouns. We submit that this is so because famous proper nouns are verbal labels in a constellation of personally relevant phenomena. It requires a carefully designed experimental link to access the more subtle and esoteric RH function, a link which Schweinberger et al. missed.

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