



## Research report

# Proper name anomia with preserved lexical and semantic knowledge after left anterior temporal lesion: A two-way convergence defect

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## ABSTRACT

This article describes the case of a patient who, following herpes simplex encephalitis (HSE), retained the ability to access rich conceptual semantic information for familiar people whom he was no longer able to name. Moreover, this patient presented the very rare combination of name production and name comprehension deficits for different categories of proper names (persons and acronyms). Indeed, besides his difficulty to retrieve proper names, SL presented a severe deficit in understanding and identifying them. However, he was still able to recognize proper names on familiarity decision, demonstrating that name forms themselves were intact. We interpret SL's deficit as a rare form of *two-way lexico-semantic disconnection*, in which intact lexical knowledge is disconnected from semantic knowledge and face units. We suggest that this disconnection reflects the role of the left anterior temporal lobe in binding together different types of knowledge and supports the classical convergence-zones framework (e.g., Damasio, 1989) rather than the amodal semantic hub theory (e.g., Patterson, Nestor, & Rogers, 2007).

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## 1. Introduction

There is now considerable evidence in the literature that proper names can be selectively impaired after acquired brain damage (e.g., Carney & Temple, 1993; Fery, Vincent, & Brédart,

1995; Harris & Kay, 1995; Hittmair-Delazer, Denes, Semenza, & Mantovan, 1994; Lucchelli & De Renzi, 1992; McKenna & Warrington, 1980; Saetti, Marangolo, De Renzi, Rinaldi, & Lattanzi, 1999; Semenza & Zettin, 1988, 1989; Shallice & Kartsounis, 1993; Miceli et al., 2000). This disorder has been

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referred to as ‘proper name anomia’ and can be defined as the inability to retrieve proper names, mainly names of people but also sometimes names of places, monuments or brands, with intact ability of retrieving common names, and that cannot be explained by a general language or memory impairment. The reverse dissociation, common noun anomia without proper name anomia, was also described, providing evidence of a double dissociation between common and proper name retrieval (Lyons, Hanley, & Kay, 2002; Martins & Farrajota, 2007).

While proper name anomia generally involves people's names and other proper names, some rare cases demonstrated that people's names can be affected selectively, in the absence of impairment in naming places (e.g., Carney & Temple, 1993; Cohen, Bolgert, Timsit, & Chermann, 1994; Fery et al., 1995; Lucchelli, Muggia, & Spinnler, 1997; Reinkemeier, Markowitsch, Rauch, & Kessler, 1997; Verstichel, Cohen, & Crochet, 1996), monuments (Fery et al., 1995; Lucchelli et al., 1997; Verstichel et al., 1996) or brands (Lucchelli et al., 1997). However, Hanley and Kay (1998) suggested that the extension of the impairment to other proper name categories correlates with its severity and that selective people's names' anomia is observed only in the less severe cases.

Proper name anomia usually appears in the context of a cerebral infarct, in particular in the territory of the left middle cerebral artery (e.g., Crutch & Warrington, 2004; Kay & Hanley, 2002; McKenna & Warrington, 1980), the left posterior communicating artery (e.g., Hanley, 1995; Saetti et al., 1999) or the left thalamus (e.g., Cohen et al., 1994; Lucchelli & De Renzi, 1992; Lucchelli et al., 1997; Moreaud, Pellat, Chamallet, Carbonnel, & Brennen, 1995). The other two main causes are tumor resection surgery (e.g., Bi et al., 2011; Flude, Ellis, & Kay, 1989; Hittmair-Delazer et al., 1994) and herpes simplex encephalitis (HSE) (e.g., Geva, Moscovitch, & Leach, 1997). The damaged cerebral territories are always located in the left hemisphere and spread mainly in the temporal structures. They generally encompass the anterior temporal lobe, the middle temporal lobe, the parahippocampal gyrus and the thalamus (e.g., Bi et al., 2011; Cohen et al., 1994; Damasio, Tranel, Grabowski, Adolphs, & Damasio, 2004; Fukatsu, Fujii, Tsukiura, Yamadori, & Otsuki, 1999; Saetti et al., 1999; Shallice & Kartsounis, 1993).

In this study, we explored a new case of proper name anomia, SL, following HSE. Since his neurological ailment, SL complains about persistent word production and comprehension difficulties for names of persons, places, acronyms and some infrequent common nouns.

### 1.1. Varieties of proper name anomia

From the neuropsychological as well as philosophical points of view, proper names are considered as “pure referring expressions” (Kripke, 1980), in the sense that they carry no sense and do not rely – or little if any – on sets of attributes. While common nouns refer to categories and entail a description of the entity they designate, proper names essentially refer to individuals and have an arbitrary relation with their references. As a consequence, the link proper names have with their reference might be particularly fragile.

In his recent reviews of twenty years of publications on cases of selective anomia, Semenza (2006; 2009) identified four varieties of proper name anomia. (1) *Anomia in accessing the phonological lexicon* is characterized by the disconnection between an intact phonological lexicon and an intact individual semantic system. (2) *Anomia due to loss of semantic information* is defined by a degradation of the individual semantics and the labels themselves. (3) *In the isolation of information about individual entities profile*, the individual semantic system is disconnected from the face units and person definitions, but still connected with people's name. (4) Finally, in *prosopnomia* only face units are disconnected from the phonological lexicon.

Although this classification seems exhaustive, it is reasonable to ask whether we could not observe another type of proper name anomia. For example, Verstichel et al. (1996) published an interesting case of a patient presenting combined production and comprehension deficits for people names. DEL was unable to retrieve the names of familiar people on presentation of their face or on verbal definition, while he had the preserved ability to provide rich and accurate biographical information on people he could not name. Moreover, while the output lexicon was intact, the patient presented a severe deficit in understanding people's names.

Semenza's taxonomy was concerned with patients who have only problems in retrieval. It might be useful, however, to add to this taxonomy also patients, like Verstichel's et al. and SL, who have a bi-directional deficit, showing additional problems in comprehension. For that purpose, we extensively investigated SL's recognition, comprehension and production of different categories of proper names, on verbal and visual input. We will present the results of 20 experiments that will allow us to define SL's cognitive profile and to determine the nature of his proper name anomia. To guide our investigations, we developed our experiments around four questions:

1. Is SL's deficit specific to people's names or does it spread to multiple categories of abstract and meaningless labels?
2. Did SL retain the ability to access specific and distinctive conceptual semantic information for the unique entities he is no longer able to name?
3. If biographical knowledge of people is intact, are these pieces of semantic information equally accessible on face and name confrontation?
4. Is the naming deficit due to a loss of verbal labels themselves or to a disconnection between labels and other individual knowledge?

### 1.2. Anterior temporal lobe and proper names

Existing empirical studies on proper names mainly state that proper name processing essentially takes place in the left hemisphere, mostly at the level of the anterior part of the infero-temporal lobe. The crucial role of the left temporal pole in proper name retrieval was indeed demonstrated in event-related potential (e.g., Proverbio, Lilli, Semenza, & Zani, 2001), neuroimaging (e.g., Damasio, Grabowski, Tranel, Hichwa, & Damasio, 1996; Damasio, Tranel, Grabowski,

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