



Review article

The cognitive psychology and neuroscience of naming people



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ABSTRACT

The use of proper names enables us to designate entities, including people, at a very specific level of categorization: the unique entity or the individual. The paper presents a general overview of psychological/cognitive and neuroscientific studies that have compared the production of proper names, in particular people's names, with the production of common nouns during the last thirty years. The search for specific brain correlates of proper naming included single-case and group studies of patients with brain lesions, and studies utilizing functional neuroimaging or brain electrical stimulation with healthy participants. These studies have led neuroscientists to hypothesize that the recall of proper names involves a rather complex network including mainly left frontal and temporal regions. Behavioural evidence supports the view that proper names are more difficult to recall than common names, and scientists have proposed different explanations for this relative difficulty. Finally, several new directions for future research are proposed to improve our understanding of both cognitive processes and their brain correlates involved during proper name recall.

1. Introduction

Naming familiar people is a linguistic ability that is fundamental in human everyday social life. Using personal names is a frequent way to refer to individuals. Personal names are commonly used to call or to greet people, to hold their attention during a conversation, or to refer to people absent from the conversation (see Cohen, 1994; Enfield and Stivers, 2007). Although most of us are usually able to name others, it may happen that we fail to recall someone's name at the right moment (for recent reviews see Brédart, 2016; Hanley, 2014), or even, that we call someone by the wrong name (Brédart and Dardenne, 2015; Deffler et al., 2016; Griffin and Wangerman, 2013). Such everyday life difficulties can be very uncomfortable for the person who is unable to retrieve the name, but also for the person whose name is not recalled.

In fact, by saying that personal names (i.e., first names or surnames) are particularly prone to retrieval failures, cognitive psychologists could mean two different things. In some studies, the given meaning was that people's names were harder to retrieve than conceptual biographical information describing these people, such as their occupation or their nationality (for influential models, see Bruce and Young, 1986; Burton and Bruce, 1992; Young and Burton, 1999; for a synthesis, see Hanley, 2011a). Hence these studies were designed to compare access to conceptual knowledge with access to lexical knowledge. In another (largely independent) set of studies, the given meaning was that proper names were more difficult to retrieve compared with other categories of words such as common nouns. These studies were designed to compare

lexical access to nouns with lexical access to proper names. The present paper will focus on the latter set of studies, which were aimed at explaining why lexical access to proper names is more difficult than lexical access to common nouns.

In addition to these psychological/cognitive studies, neuroscientists have investigated the neural basis of lexical access to proper names and found that naming unique entities does not recruit exactly the same brain areas as naming categories of entities. The present paper presents these two lines of research, which have mostly been conducted in parallel, and have not strongly influenced each other (with a few notable exceptions, see Semenza, 2006, 2009). The paper is organized as follows. First, the linguistic function of proper names is defined. Second, the investigation of the neural correlates of proper name recall will be addressed. Third, the behavioural evidence for the particular difficulty of retrieving proper names will be examined. Fourth, different hypotheses formulated to explain the relative difficulty of proper name recall will be presented. At that point, the relationship between the function of proper names and their semantic status will be discussed. Finally, some future directions of research will be proposed, some of them integrating psychological and neuroscientific approaches.

2. The linguistic function of proper names

Despite debates among philosophers of language and linguists with respect to the semantic status of proper names (e.g., *descriptivist theory* vs *causal theory of reference* and *direct reference theory*; for a concise

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presentation see Cumming, 2016), there is a general agreement among authors on the primary function of proper names. The linguistic function of proper names is to designate individual entities, whereas common nouns refer to any one of a class of beings or things (Merriam-Webster dictionary; see also the set of definitions reported in Valentine et al., 1996; for a historical review, see Anderson, 2007). Others have formulated things a little differently. They contend that proper names designate semantically unique entities, i.e., entities “normally processed at a conceptual level so specific that the entity is in a class with no other members” (Grabowski et al., 2001). Such unique entities may be persons, animals, stars, geographical entities such as countries, towns, rivers, mountains, islands, but also unique man-made objects such as buildings, ships, airplanes or locomotives (for an overview of the diversity of proper names, see Hough, 2016). In the present paper, we will mainly focus on the retrieval of personal names, given the importance of such names in human social interactions.

Some authors have speculated that the ability to name unique entities could have had an adaptive advantage at some point in human evolution (Semenza, 2006, 2009). The ability to categorize surrounding entities and to name them with generic but precise words such as “tigers” or “swamps” would certainly have been helpful, for example, to warn con-specifics of impending danger. In addition, the ability to call by a proper name individual entities (‘X’ is a dangerous man, ‘Y’ is a dangerous place) might have served to refine these warnings, for example, by enabling reference to absent people. As Semenza (2006, p. 891) stated, “Those humans gifted with a neural system that more efficiently and unambiguously sustained designating categories as well as designating individual entities might indeed have better survived natural selection.” It is unfortunately difficult to find direct evidence for or against this evolutionary hypothesis. Nevertheless, there is evidence that the function of designating individual entities is associated with specific brain areas. Before presenting and discussing the psychological research showing that the production of proper names is accompanied by more retrieval failures than the production of common nouns, brain research on proper name processing will first be addressed.

3. The brain correlates of naming unique entities

Brain researchers have investigated whether, at some point, proper names and common nouns followed different pathways in the brain. The study of the brain correlates of proper name processing has been primarily aimed at determining whether it is reflected in the “neural reality” that proper names are used to denote unique entities, while common nouns are used to refer to categories (Semenza, 2009). Note that, here, the question at hand was not primarily focused on the issue of the relative difficulty of proper name processing (but see Semenza, 2006). The question was, rather, to establish whether common nouns and proper names serving two different functions, respectively categorization and individuation, are processed by at least partially independent neural systems (Semenza, 2006, 2009).

3.1. Double dissociation between the production of common nouns and proper names

A first approach consisted of describing patients with anomia and searching for a double dissociation between the production of nouns and the production of proper names. Establishing such a double dissociation was considered as a first step indicating that brain mechanisms processing common nouns and proper names are separate (e.g., Semenza, 2009). Since the 1980s, neuropsychologists have been searching for evidence of a double dissociation between the production of proper names, on the one hand, and the production of common nouns and adjectives on the other hand. Several patients have been described with an impaired production of proper names (in the context of a preserved semantic processing without impairment of proper name comprehension) associated with a preserved production of common

nouns and adjectives. Some of these patients showed a proper name anomia, which affected all the tested kinds of proper names, such as personal names, but also geographical names, such as the names of cities, countries, rivers or mountains (e.g., Harris and Kay, 1995; Otsuka et al., 2005; Semenza and Zettin, 1988, 1989) or even titles of pieces of music (Semenza and Zettin, 1989). On the other hand, other patients showed a more specific impairment of the production of people’s names (e.g., Cohen et al., 1994; Fery et al., 1995; Lucchelli and De Renzi, 1992; McKenna and Warrington, 1980; Reinkemeier et al., 1997). However, a neat case of a patient with the opposite pattern, i.e., an impaired production of common nouns and adjectives associated with a preserved production of proper names was harder to find (for discussions, see Brédart et al., 1997; Semenza, 2006). Nevertheless, Martins and Farrajota (2007) described two patients with a reversed pattern of impairment of name retrieval. Patient ACB presented an aphasic disorder with impaired object naming but a spared recall of proper names, while Patient JFJ showed normal language abilities and semantic knowledge about people, but a marked anomia for people’s names. These cases, examined with the same testing procedure, provided the first clear evidence of a double dissociation between the lexical access to proper names and common nouns.

3.2. Lesion studies

A first study included a sample of 127 patients with focal brain lesions in the left or the right hemisphere without general intelligence impairment and showing no difficulty attending to or perceiving the visual stimuli presented (Damasio et al., 1996). All participating patients had a left hemisphere language dominance, and patients with severe aphasia were excluded. Fifty-five normal control participants matched to patients on age, education, and gender distribution were also included in the study. The participants’ task was to name pictures of persons, animals, tools, fruits/vegetables, and musical instruments. Among this large sample of patients, 13 showed an impaired person naming ability. A neuroanatomical analysis of the lesion overlap in these 13 patients indicated that the highest regions of overlap were in the left temporal pole (LTP). A follow-up study was conducted with an expanded sample of 139 patients with unilateral brain damage who were of normal intelligence and had no difficulty attending to or perceiving the stimuli (Damasio et al., 2004). All these patients also had a left hemisphere language dominance and no severe aphasia. Again, 55 normal healthy participants matched on age, education, and gender distribution took part in the study. The participants’ task was the same as in the preceding study. Thirty-nine patients showed impaired person naming abilities. Neuroanatomical analyses based on magnetic resonance data showed a concentration of lesions associated with an impairment of person naming in the LTP region only. In a further study, Tranel (2006; see also Tranel, 2009) compared 11 patients with LTP lesions, 10 patients with right temporal (RTP) lesions and 90 healthy control participants in a famous person naming task. Results showed that patients with LTP lesions exhibited a much lower person naming performance (58.1% of correctly recognized people) than did patients with RTP lesions (89.8%) or than did controls (85.0%). In addition, this study showed that the performance of patients with lesions to the LTP was lower in a famous landmark naming task (60.9%) than that of patients with lesions to the RTP (89.6%) and of patients with left-hemisphere lesions outside the temporal pole area (82.2%); these landmarks were either unique buildings (e.g., the Golden Gate Bridge) or natural sites (e.g., the Niagara Falls).

Moreover, patients with LTP lesions ($n = 18$) also showed a deficit in naming famous people from hearing their voices (only 66.2% of the recognized voices were correctly named) in comparison with neurologically normal participants (95.1%, $n = 20$) and with patients with right hemisphere lesions (86.6%, $n = 18$), although the performance of these three groups was very similar in a voice recognition task (Waldron et al., 2014). The results of this study are important because

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