Situating language production within the matrix of human cognition: The state of the art in language production research

Matthew Goldrick a; Albert Costa b; Niels O. Schiller c

a Department of Linguistics, Northwestern University, Evanston, Il, USA
b Department Psicologia Bàsica, Universitat de Barcelona, Barcelona, Spain
c Leiden Institute for Brain and Cognition, Universiteit Leiden, Leiden, the Netherlands

First Published on: 28 February 2008

To cite this Article: Goldrick, Matthew, Costa, Albert and Schiller, Niels O. (2008) 'Situating language production within the matrix of human cognition: The state of the art in language production research', Language and Cognitive Processes, 23:4, 489 — 494

To link to this article: DOI: 10.1080/01690960801920024
URL: http://dx.doi.org/10.1080/01690960801920024

PLEASE SCROLL DOWN FOR ARTICLE
Situating language production within the matrix of human cognition: The state of the art in language production research

Matthew Goldrick
Department of Linguistics, Northwestern University, Evanston, IL, USA

Albert Costa
Department Psicologia Bàsica, Universitat de Barcelona, Barcelona, Spain

Niels O. Schiller
Leiden Institute for Brain and Cognition, Universiteit Leiden, Leiden, the Netherlands

A summary of recent work in language production is presented, focusing on the Third International Workshop on Language Production (Chicago, USA, August 2006). The articles included in this special issue focus on three overlapping themes: language production in dialogue (Arnold; Costa, Pickering, & Sorace); multilingual language production (Costa et al.; Abutalebi & Green); and control processes in production (Abutalebi & Green; Dell, Oppenheim, & Kittredge). Points of convergence and divergence between these contributions are discussed.

This special issue on language production contains three selected papers based on presentations on the Third International Workshop on Language Production, hosted by Northwestern University on its campus in Chicago,

Correspondence should be addressed to Matthew Goldrick, Department of Linguistics, Northwestern University, 2016 Sheridan Road, Evanston, IL60208, USA.
E-mail: matt-goldrick@northwestern.edu

The Third International Workshop on Language Production, which was held 13–15 August 2006, was sponsored by the Cognitive Science Program at Northwestern University, the Northwestern Institute on Complex Systems, and the Northwestern University Department of Linguistics. In addition to the authors, the scientific committee consisted of F.-Xavier Alario (CNRS and Université de Provence, France) Victor S. Ferreira (University of California, San Diego, USA), and Zenzi M. Griffin (Georgia Institute of Technology, USA).

© 2008 Psychology Press, an imprint of the Taylor & Francis Group, an Informa business
http://www.psypress.com/lcp DOI: 10.1080/01690960801920024
Illinois (USA) in August 2006. This is the first North American venue for the conference, which was previously held in Marseille in 2004 (Alario, Costa, Ferreira, & Pickering, 2006; see the articles in Language and Cognitive Processes, volume 21, issues 7/8) and Maastricht in 2005 (Schiller, Ferreira, & Alario, 2007; see the articles in Language and Cognitive Processes, volume 22, issue 8). The paper by Costa, Pickering, and Sorace was selected from the contributions to this second workshop in Maastricht (note: Victor S. Ferreira was the action editor for this contribution).

These papers build on and enhance the integrative approach exemplified by contributions to the previous special issues. A hallmark of this series of workshops is to bring together researchers that utilise a variety of methodologies across a wide range of processing domains to address critical issues in models of language production. Echoing this diverse range of research interests and techniques, the papers in each of the special issues attempt to integrate findings and models across domains and methodologies. The papers in this issue deploy this approach to tackle three overlapping issues: language production in dialogue; production in the context of multiple languages; and control at multiple levels of language processing. Below, we briefly introduce the contributions and discuss points of connection between them.

The first paper introduces the theme of language production in dialogue. Arnold (2008) reviews the production of referential expressions. Languages afford a variety of linguistic forms to refer to the same object. For example, we can refer to the evil robot from the future or more simply just the robot or an even more reduced form such as it. (Note that in addition to changes to lexical items, the articulatory/acoustic properties of forms can also be modified – for example, de-accenting, reducing duration, or using reduced allophonic variants of component sounds; see e.g., Aylett & Turk, 2006.) Accounts of how speakers choose among these options have often assumed an active speaker (who selects among various options) and a relatively passive listener (who simply attempts to parse whatever form is uttered). Arnold’s paper enriches this theoretical landscape by proposing that listeners dynamically allocate their attention based on their expectations regarding which entities in the discourse the speaker will refer to – expectations which are in part informed by knowledge of the processing demands of the production system. This expectancy hypothesis allows us to understand how the hearer might take advantage of the rich information in the speech signal regarding the speaker’s internal processing state (e.g., the relative difficulty the speaker is having in accessing different forms). In the context of this hypothesis, she reviews the interplay of speaker- and addressee-oriented processes in referential communication.

Continuing the theme of production in dialogue, the second paper by Costa, Pickering, and Sorace (2008) examines the demands of conversation
in the context of multilingual language processing. Current models of
dialogue have focused on those involving two native speakers (e.g., Pickering
& Garrod, 2004). Costa et al. explore the issues that arise when extending
these models to a new processing domain – interactions involving a non-
native language (where one or both interlocutors are participating in the
conversation by using a second language). Echoing Arnold’s emphasis on the
active role of both speaker and hearer, Costa et al. discuss the issues faced by
both native and non-native participants in such conversations. In this
context, they outline a number of empirical studies to further illuminate the
cognitive processes involved in these communicative situations.

An interesting point of contrast between the first two contributions
concerns the nature of the mechanisms that allow interlocutors to effectively
communicate with one another. Costa et al.’s (2008) discussion is framed
within the context of Pickering and Garrod’s (2004) interactive alignment
account, which places considerable weight on automatic, passive mechan-
isms such as priming (i.e., enhanced activation of representations at various
levels of cognitive processing). In contrast, Arnold (2008) places more
emphasis on active mechanisms – for example, those that allow listeners to
generate expectations about upcoming productions. Note that along this
dimension these accounts primarily differ in terms of which mechanisms/
strategies they emphasise – both assume that passive and active mechanisms
play important roles in language processing in dialogue. For example, Costa
et al. argue that in non-native dialogues strategic alignment processes that do
not solely depend on automatic alignment may make a large contribution to
communication. This may make distinguishing these perspectives quite
difficult. A more specific point of contrast concerns the extent to which
purely formal/structural information is utilised by listeners. As noted by
Arnold, her account emphasises enhancement of perceptual processing of
references to entities (the things expressions refer to); in contrast, accounts
based on structural priming assume there should be enhanced access to
particular linguistic forms and structures. This may provide a more fruitful
basis for further empirical work contrasting the interactive alignment and
expectancy hypotheses.

The final two papers turn away from dialogue to the third issue of this
volume – how individual speakers control production. First, continuing the
multilingualism theme, Abutalebi and Green (2008) examine how speakers
control the language in which they produce an utterance (e.g., if one is a
Spanish/English bilingual, does one refer to a particular picture in an
experimental trial as vampire or vampiro?). As reviewed by Abutalebi and
Green, there are a number of competing theories of the cognitive mechan-
isms involved in control; they argue that none of these provides a
comprehensive account of the behavioural data. The aim of their contribu-
tion is to integrate findings from cognitive neuroscience to help constrain
and inform psycholinguistic accounts. They situate language control within the more general context of task switching – where participants must switch between different stimulus-response sets. Functional neuroimaging and neuropsychological studies of task switching are used to frame the discussion of results from language switching studies. On the basis of these findings, they sketch a model of bilingual control that integrates both cognitive and neurobiological mechanisms.

Dell, Oppenheim, and Kittredge (2008) conclude the special issue by examining issues of control in lexical access. A great deal of work in speech production has examined these questions in the context of the production of single words. The previous two special issues provide ample evidence of this type of work (e.g., Gumnior, Bölte, & Zwitserlood, 2006; Kuipers, La Heij, & Costa, 2006; La Heij, Starreveld, & Kuipers, 2007; Roelofs, 2007a,b; Schiller & Caramazza, 2006). Dell et al. build on this rich body of work with single utterances to develop an account of lexical selection in the context of syntagmatic competition – that is, the activation of non-target words due to their presence within the production context. They examine syntagmatic activation driven by the sentential context (e.g., while accessing robot in the sentence of The evil robot chased the humans, words such as chased and humans become active) as well as activation driven by previous productions (e.g., while accessing robot in a series of a picture naming trials vampire, rocket, robot, spider, ..., words such as vampire and rocket may become active). Extending models of lexical selection based on single word data, they propose (and simulate) a dynamic control mechanism that offers an account of a number of findings from both neurologically impaired and neurologically intact speakers.

In formulating their theories of control, the contributions by Abutalebi and Green (2008) and Dell et al. (2008) both invoke prefrontal areas that appear to be involved in the selection among alternative response options (see Ganushchak & Schiller, 2008, for RT and ERP evidence from semantic blocking effects in picture naming consistent with Dell et al.’s claim). However, they propose two rather different mechanisms to realise this selection process. Abutalebi and Green assume that these regions inhibit the activation of non-target language representations – in line with their general emphasis on the importance of inhibitory mechanisms. In contrast, Dell et al. assume that competition between response options is resolved via an amplification mechanism (which boosts activation levels until a difference threshold is reached). Both papers agree that there is a need for competition among alternative response – the question is whether this competition is resolved by inhibition of non-target responses or simply by selection or boosting of the target response. This contrast echoes persistent debate in both the single word production (e.g., Finkbeiner & Caramazza, 2006a,b; La Heij, Kuipers, & Starreveld, 2006; Mahon, Costa, Peterson, Vargas, &
Caramazza, 2007) and language selection (see Abutalebi & Green, 2008, for discussion) literatures. Hopefully, the integrative approaches adopted by these authors will in time help to resolve such issues. Theory development may be greatly advanced by using neurobiological data to constrain hypothesised mechanisms (as advocated by Abutalebi and Green) and/or using computational techniques to more precisely specify such mechanisms (as illustrated by Dell et al.).

Dell et al. (2008) conclude their contribution by challenging theories to place production ‘within the matrix of human cognition’ – to connect core processes such as lexical access to other language-related as well as more general cognitive processes. This special issue represents important steps in this direction. By considering production in processing domains outside of the traditional focus of production theories (dialogue, multilingualism), and by situating core production processes within more the context of more general cognitive and neural mechanisms (control), these papers help to situate production theories within a broader context. Work such as this will enrich not only language production research but also enhance our broader understanding of the cognitive and neural mechanisms underlying a range of complex behaviours.

REFERENCES


