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Project

Individual and cross-linguistic differences in sentences planning

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Abstract

While it is widely agreed upon that language production is incremental, the issues of how far ahead speakers plan the upcoming sentence is far from settled. These discrepancies have led some researchers (including ourselves) to suggest that the scope of planning is not architecturally incremental but under strategic control (Ferreira & Swets, 2002, Swets et al., 2007; Wagner et al. 2010; Fuchs et al., 2013; Petrone et al., 2011).

In this project, we investigate the flexibility of speech planning by examining cognitive factors that influence the scope of language production in French. The data will be compared with German and American English data. By examining variance in planning scope as a function of both cross-linguistic differences and individual differences (due to, e.g., working memory capacity or processing speed factors), we will be able to address important theoretical issues regarding the cognitive vs. linguistic factors that underlie the scope of speech planning. In particular, we will address three different types of research questions:

1) Which levels of sentence planning specifically are subject to such variation due to individual differences?

2) Are some languages more "incremental" than others? If so, at which levels of representation does variation occur?

3) Does variation in planning scope among individual speakers of the same language exceed variation across different languages?

Although some previous research (Janssen, Alario & Caramazza, 2008; Brown-Schmidt & Konopka, 2008, Christiansen & Ferreira, 2005; see Jaeger & Norcliffe, 2009, for a review) has investigated differences in incremental planning between languages, and our collaboration team has investigated individual differences, no previous research on the flexibility of planning scope has ever simultaneously compared planning scope differences among various languages to planning scope differences among individuals of the same language community. For this purpose, we will examine speech planning tendencies at multiple levels of representation among speakers of different languages as they describe equivalent stimuli. From these spoken descriptions, we will measure speakers' scope of planning using a wide

range of tools that are complementarily distributed across our research team, such as eye-tracking data (Swets et al., 2013, in press) , acoustic parameters of planning (Fuchs et al., 2013; Petrone et al., 2011) and score for individuals' cognitive skills. All variables will be correlated.

The corpus for American English has been already collected and partial results are reported in Swets (2013). We are currently running the same experiment in Berlin and Aix. The experiment includes two tasks: a production task, in which the eyes' movements of participants are monitored while describing a series of three objects appearing on the computer screen. Participants are asked to describe those pictures to a partner. The pictures depict three objects that were "moving" in relation to each other. In a control condition, the three objects are all different types, so that a target description for the partner could quite reasonably be something like "The box moves below the chair and the wheel moves above the chair." In the experimental condition, there are two objects of the same type that would ideally be distinguished from each other early during the speaker's description. For example, if there were two boxes, with one of them featuring a radioactive symbol, an ideal description for the partner might be something like "The ordinary box moves below the chair and the radioactive box moves above the chair." Such a sentence shows evidence of better planning than a sentence that begins by simply calling the first box "The box". We expect that speakers with more working memory capacity and/or speed of processing will be more likely to look ahead to the final object in the picture, as measured by eye movements. Second, we expect them to use that visually collected information and integrate it early on in their utterance plans. Prosodically, this will result in higher speech rate, less prosodic breaks and dysfluences. We will also measure individual speakers' working memory and processing speed using materials that are translated closely across the multiple languages (Daneman & Carpenter, 1980; Swets et al., 2007). If speaker-specific differences are larger than cross-linguistic ones, we should expect that planning strategies will be the same in speakers with similar WM capacity/speed of processing, regardeless of whether their native language has an independent effect

Publications

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Fiche-résumé contribution CREx

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RAPP-1

Rôle de la mémoire dans la planification de la prosodie chez les patients atteints de la sclérose en plaques

Investigateurs : C. Petrone (LPL), B. Swets (Grand Valley State University, USA), A. Ghio (LPL)

Durée : 2 semaines ***– passations prévues en 2017***

Contribution : adaptation d'une manip avec enregistrement de la parole simultané à l'eye-tracking ; préparation du traitement semi-automatique des données récoltées

Objectif : *étudier l'impact des troubles de la mémoire de travail chez les personnes souffrant de sclérose en plaques sur la production de la parole à l'aide d'une expérience d'oculométrie (cette étude fait partie de l'ANR RAPP dirigée par C. Petrone http://www.lpl-aix.fr/~petrone/projectf.html)*

Paradigme – L'expérience a été originellement définie par B. Swets pour des études antérieures, réalisée avec le système d'oculomètre EyeLink. En parallèle des mouvements oculaires, la réponse orale des participants en fonction de la stimulation visuelle jouée à l'écran est enregistrée. Cette expérience a été transposée sur le système d'eye-tracker Tobii du CEP au LPL. Pour ce faire, le logiciel OpenSesame (http://osdoc.cogsci.nl/) a été installé sur le PC contrôlant Tobii. Certains scripts Python du logiciel ont été débogués pour permettre effectivement l'enregistrement des données de Tobii. Un microphone associé à un amplificateur-numériseur a été installé. L'expérience a enfin été programmée sur OpenSesame, identique à l'expérience originelle. Ce dispositif sera redéployé à partir de Janvier 2017 pour effectuer les passations auprès des patients atteints de sclérose en plaques au Centre de Résonance Magnétique Biologique et Médicale de l'hôpital de la Timone.

Prétraitement – Pour faciliter le traitement des données combinées eye-tracking et parole, des scripts sont en préparation, notamment afin d'effectuer une segmentation automatique de la parole enregistrée dans les fichiers audio à l'aide du logiciel SPPAS (http://www.sppas.org/). L'objectif est de déterminer le temps de réaction, entre la visualisation de l'image à l'écran par le participant et sa réponse orale.

Diffusion – Les publications éventuelles seront communiquées ultérieurement, suivant l'avancée du projet (passation à partir de Janvier 2017 au plus tôt). Le partage des scripts sera réalisé sur le GitHub institutionnel BLRI une fois l'ensemble finalisé.

Figure 1 : dispositif mis en place et testé au CEP (LPL), avec enregistrement microphone + eye-tracker Tobii

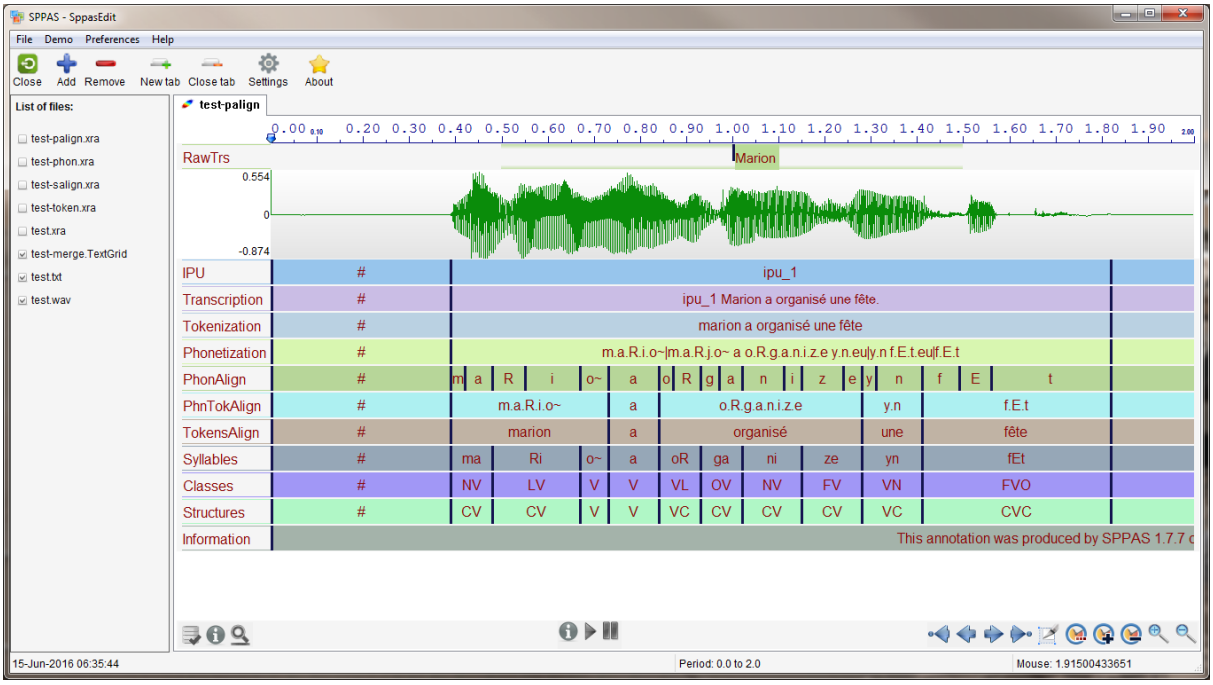

Figure 2 : exemple de segmentation automatique de la parole réalisée par le logiciel SPPAS. L'objectif est de créer des scripts pour permettre la segmentation automatique de l'ensemble des jeux de données qui seront enregistrées à partir de Janvier 2017, puis de compiler les résultats avec les données d'eye-tracking.