Initial object naming is determined by recognition effects rather than lexical effects

Margit Scheibel (Heinrich Heine University Duesseldorf) and Peter Indefrey (Heinrich Heine University Duesseldorf; Donders Institute for Brain, Cognition, and Behaviour, Nijmegen; Max Planck Institute for Psycholinguistics, Nijmegen)
scheibel@uni-duesseldorf.de

A reliable finding in blocked-cyclic naming experiments is a semantic interference effect in repetition cycles, but a semantic facilitation effect in the first cycle (e.g. Belke et al. 2005). The early semantic facilitation is differently explained in the literature, e.g. by a semantic priming effect that initially outweighs lexical interference effects (Damian & Als 2005) or by a response strategy based on the awareness of the target category that enhances top-down the lexical retrieval (Belke 2017). However, nearly all current accounts attribute the facilitation in the first cycle to processes inherent to the lexicalization process.

In the present study, we tested the hypothesis that the facilitation effect originates at a pre-lexical processing stage, the visual recognition (see Aristei et al. 2011, Abdel Rahman & Melinger 2007 for a similar suggestion). It is assumed that the time advantage in the first cycle of homogeneous blocks originates from an improved feature matching procedure of perceived features with stored shape representations that permits faster object identification. Such a hypothesis predicts that facilitation effects should be sensitive to perceptual manipulations even if the semantic relatedness of the targets is unaffected. We used the following variables to manipulate the recognition difficulty only: a) Category Type: We contrasted visually consistent categories (VCC) and visually variable categories (VVC; matched for lemma frequency and length), presuming the object discrimination to be more difficult for the former than the latter. And b) Precision Level: We presented the pictures in precise and blurred versions, presuming the degree of certainty in object identification to be lower for the blurred than the precise pictures. To test whether the underlying mechanism of facilitation is a top-down effect based on a-priori knowledge (APK) – as proposed by Belke (2017), though for a lexical effect –, we presented the pictures in three different APK-conditions: semantic APK (employing the category word), perceptual APK (employing a picture of the mean category shape) and no APK.

We conducted a non-cyclic picture naming experiment with 36 normalized, monochrome line drawings of common objects belonging to 6 VCC and 6 VVC. The to-be-named line drawings were presented in categorially heterogenous blocks only, but either with the category name (semantic APK), the mean category shape (perceptual APK) or with no a-priori information (no APK) at the beginning of each trial (see example stimuli in Table 1).

Preliminary results (52 out of 54 subjects, see Fig. 1) revealed that APK facilitated naming, but more for VCC than VVC, indicating that APK is more helpful, the more difficult the object discrimination. Moreover, the facilitation of perceptual APK was consistently larger than that of semantic APK, indicating that the top-down mechanism operates on a perceptual level in the main. The analyses per Category Type yielded a trend for an interaction between APK Type and Precision Level for VVC ($p = .06$), though in all precision levels the difference between perceptual and no APK was significant (all $p < .001$), whereas the difference between semantic and no APK was not. This demonstrated that a pure semantic mechanism cannot account for the facilitation. We argue instead that the top-down mechanism reduced the number of shapes considered as potential target-shapes, whereby the feature matching procedure became improved and accelerated. For VCC, we observed that the difference between perceptual and no APK was significant in all precision levels (all $p < .001$), as well as the difference between semantic and no APK (all $p < .001$). These findings suggest that the mean shape of VCC could be visualized based on the category names such that a similar, but weaker top-down effect was also available in semantic APK conditions. Our finding of a larger perceptual APK effect for VCC than VVC suggests that perceptual priming also contributed to facilitation effects.

In sum, our results provide evidence that facilitations in first object naming are independent from blocked-cyclic naming paradigms and they seem to have a perceptual origin. The findings can be explained by an early top-down effect on object recognition, which is potentially enhanced by perceptual priming. The results can contribute to a better understanding of the interaction between visual and lexical processing in word production.

Table 1. Example Stimuli (English translations of the German names in italics).

Category Type	Category Name	Mean Category Shape	Example Item (precise version)
VVC	Gebäude *building*		 Kirche *church*
VCC	Vogel *bird*		 Taube *pigeon*

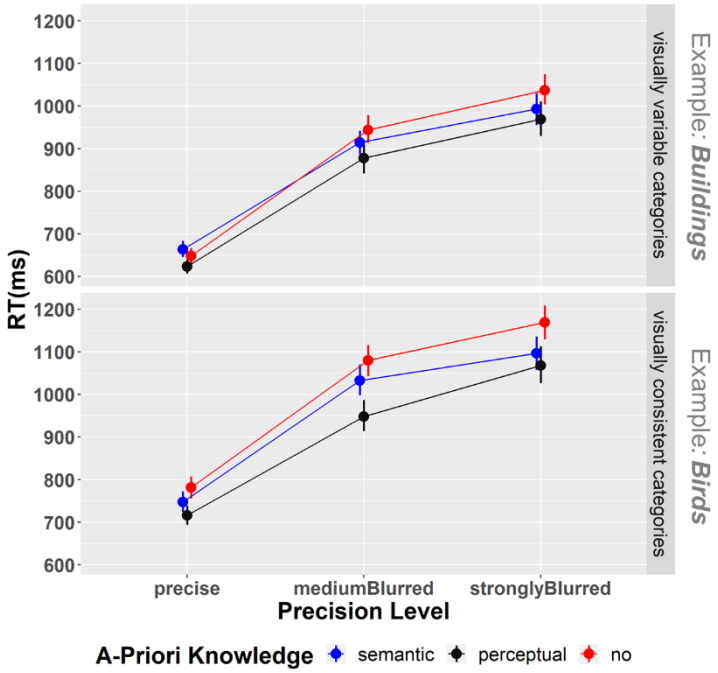

Figure 1. Mean picture naming latencies as a function of Category Type, APK-Type and Precision Level (preliminary results of 52 out of 54 subjects).

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