

We are going to present the immediate and delayed effects of phonological and orthographic cues on spoken naming in six brain-damaged participants with chronic aphasia using a case-series design (Howard, 2003). All participants had word-retrieval deficits in conversation and picture naming. Both effects of a single application and of multiple applications of cues and pictures (short-training phase: three sessions) were assessed.

The aim of the study was to examine the relationship between the effects of phonological and orthographic cues and the underlying functional impairments in the patients and to interpret the underlying mechanisms of effectiveness of the different types of prompts in a neurolinguistic word-processing model (Patterson & Shewell, 1987).

Research plan and methodology

Prior to the start of the treatment study, the language processing abilities of each participant were assessed in detail (using, for example selected assessments from PALPA, Kay et al., 1992) so that specific cue-effects could be interpreted with regard to underlying functional deficit(s) (cf. Best et al., 2002).

Pre-assessment of spoken picture naming

Participants were required to attempt to name a set of 224 pictures of objects, which comprised the complete set of treatment and control stimuli. In order to control for stability of naming performance prior to treatment, a multiple baseline-design was used.

Treatment of spoken picture naming

The set of 224 stimuli were divided into matched subsets of stimuli: 112 items that received treatment and 112 controls that received no treatment (see below for further details of stimuli). Of the treated items, half received phonological cues and half orthographic cues. The treatment occurred over two phases of three sessions each. Half of the items were treated in the first phase and half in the second phase.

Post-assessments

All items were named again following treatment to determine any lasting effects of treatment. Effects of treatment were measured in the end of each training session (15-20 min. after facilitation of picture naming), and 24 hours after the end of each training phase. In addition, with three participants, a follow-up test was conducted one week after the end of treatment.

Stimuli

The whole item set consisted of 224 black-and-white line drawings. All pictures were presented to a group of 16 language unimpaired adults for spoken naming in order to control the set for name agreement (mean 95.2 %, sd. 0.1).

We classified the target words as irregular, ambiguous, or regular according to regularity of *letter-sound-conversion* for the initial letter. Effects of this parameter (OPC-regularity) on orthographic cueing and spoken naming in general were investigated.

Irregular: the most frequent pronunciation of the first letter in isolation did not correspond to the first sound of the word (for example the first *letter-sound* conversion in KNIFE is /k/ but the initial phoneme is /n/).

Regular: the sound of the initial letter always corresponded to the first sound of the word (for example bottle, B > /b/).

Ambiguous: the most frequent pronunciation of the initial letter of the word corresponds to the first sound of the word, but other correspondences exist (e.g. “cat”, C > /k/ but in ceiling, church, C does not correspond to /k/).

The whole item-set was divided into 8 sets of 28 items each (see table 1). The sets were matched individually for each participant, considering pre-treatment accuracy of spoken picture naming as well as word frequency (Baayen et al., 1995), word length, animacy, and articulatory complexity. The latter factors can be significant predictors of word retrieval in aphasic patients (Nickels & Howard, 1995). Furthermore, the different sets were matched according to OPC-regularity.

<Table 1>

For each participant, two sets were treated using phonological cues (the first sound in the word; phonological 1 & phonological 2), another two sets were treated using orthographic cues (the first letter in the word, orthographic 1 & orthographic 2), and four sets consisted of untreated control pictures.

Half of the control pictures ('seen' controls) were presented as often as the treated pictures (Sets: Control seen 1 and 2) – ie they were presented for naming with no additional cues during the therapy sessions. The other 'unseen' control-sets (Sets: Control unseen 1 and Control unseen 2) were only presented in the pre-assessment and in the post-assessment (24 hrs after facilitation).

Both phonological (initial sound of target word: wav-files) and orthographic cues (initial letter of target word: bmp-files) were prepared. Furthermore, cues and target pictures were implemented into a PC-based programme (Universal Data Acquisition Program (UDAP), Zierdt, 1998-2005).

Treatment

In both the phonological and the orthographic treatment condition, the initial segment of the target word was presented immediately before the target picture. The picture remained on the screen for 6 seconds. Within the orthographic cue-condition, the initial grapheme was presented immediately before the target picture, within the phonological cue-condition, the initial phoneme was presented once and the target picture remained on the screen for 6 seconds. If a picture could not be named by a patient within this time frame, no further help or feedback was given, and the next picture (in combination with a cue) was presented for naming. Similarly, in the control condition, each picture was presented for spoken naming with a time out of 6 seconds. No cue or feedback was given here.

Preliminary results

This is an ongoing study and results of four of the six participants are currently available. In two participants, the orthographic cue-condition was superior to the phonological cue-condition. In both patients, the orthographic cue effects were still present 20 min. and 1 day after presentation of the cues. In contrast, the phonological cues did not produce any effects in these cases.

Various authors have proposed that orthographic cues are especially effective in patients with preserved sublexical transcoding abilities for written material (e.g. Best et al., 2002). However, it turned out that pseudoword reading and transcoding of single letters was severely impaired in both participants. One possible conclusion is that orthographic cues can also become effective by reliance on a direct-lexical processing mechanism.

The other two participants improved both with cued and with uncued pictures that were presented as frequently as the cued pictures (seen control pictures). Following this, no specific cue effects were present in these patients but repeated attempts to name a picture over several sessions resulted in an improvement. This improvement was item-specific

because the patients did not improve with a second control set which was only presented once before and once after the whole facilitation phase (unseen control set). This improvement could either be the result of using a combination of different self-cueing strategies or an example of improved word retrieval from repeated attempts at recall (see also Nickels, 2002, Rapp et al., 2005).

The influence of OPC-regularity of first letter-sound-conversion on orthographic cueing and spoken naming in general will be discussed.

Table 1: Stimulus-sets and method

| N224 (whole set) | | | | | | | |
|--------------------------------|---|--------------------------------|------------------------------|--------------------------------|---|--------------------------------|-----------------------------|
| Set A (N112) | | | | Set B (N112) | | | |
| Set A (N56): cued TREATMENT | | Set A (N56): uncued CONTROL | | Set B (N56): cued TREATMENT | | Set B (N56): uncued CONTROL | |
| Phonological1 (N28) | Orthographic1 (N28) irreg.: N7 ambig.: N7 reg.: N14 | Control seen 1 (N28) | Control unseen 1 (N28) | Phonological2 (N28) | Orthographic2 (N28) irreg.: N7 ambig.: N7 reg.: N14 | Control seen2 (N28) | Control unseen2 (N28) |

References

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