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van de Weijer, Joost; van de Weijer, Jeroen; Beili, Yan

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Joost van de Weijer [1], *Jeroen van de Weijer* [2], *Yan Beili* [2]

[1] Center for Languages and Literature, Lund University, Sweden
[2] Shanghai International Studies University, Shanghai, China
vdweijer@ling.lu.se, jeroen.van.de.weijer@gmail.com, belly0903@126.com

Abstract

In a series of three experiments, we investigated whether proper names (like *John*, *Anna*, *Henry*) are more easily identifiable in spoken language than common nouns. In the first two experiments, participants listened to utterances in an unfamiliar language, and had to guess which of two words was a name. In the third experiment, listeners had to select whether a missing word in a spoken sentence was a name or a noun. Together, the results of the three experiments indicated that 1) names may be acoustically distinct from nouns; 2) this distinction interacts with the word's position in the sentence; and 3) the information is probably not in the word's context, but in the word itself.

Index Terms: proper nouns, names, common nouns

1. Introduction

Proper names (PNs) constitute a substantial part of the mental lexicon, and, in many ways, are distinct from regular common nouns (CNs). In the field of morphosyntax, PNs are distinct in that they are usually not preceded by articles and are not inflected, at least in many languages. Semantically, PNs are unlike CNs in that they have so-called token reference, rather than type reference. In other words, a PN usually refers to a person (town, place) specifically, whereas a CN more often refers to a category of objects (*table*, *horse*, *child*). Phonologically, the prosodic shape of PNs has been shown to be distinct from that of CNs, at least in English [1]. Psycholinguistically, CNs have also shown to be a qualitatively different class in that tip-of-the-tongue phenomena are significantly more common for PNs than for CNs [2]. Electrophysiologically, it has been shown that PNs elicit larger N1 and P2 responses than CNs [3]. Finally, clinical studies with aphasics have shown that patients can be selectively impaired in the production or comprehension of PNs [4,5].

These facts indicate that CNs constitute a class of their own in languages. They exist in all languages, and are among the first words that children acquire [6], which could either be due to their special characteristics, or it could, in fact, cause them. CNs form a dynamic class to which new members are added continuously across a lifetime. Nonetheless, little is known about their phonetic characteristics.

In this paper, we present the results of three phonetic perception experiments in which we tried to establish whether there are certain phonetic features which make PNs more prominent or different, and therefore more easily identifiable than CNs. In Experiments 1 and 2 we tested the hypothesis that CNs are phonetically distinct from PNs. For this purpose, listeners had to identify PNs in utterances in an unknown language. Since we found preliminary support for the hypothesis tested in the first two experiments, we ran a third experiment, in which we tested the hypothesis that the acoustic information is located in the context of the noun, rather than in the noun itself. For this purpose, listeners had to guess whether the missing word in a series of utterances was either a PN or a CN.

2. Experiments

2.1. Experiment 1

The purpose of the first experiment was to investigate whether listeners could differentiate between PNs and CNs in a language that was unfamiliar to them.

2.1.1. Design, material and participants

The first experiment was a forced-choice listening task. Non-native speakers were asked to listen to a set of 60 Korean sentences that had a PN or a CN in either subject position or object position. The PNs and CNs were matched in syllable length. Most of them were disyllabic.

All utterances had the same syntactic structure, consisting of subject-particle-object-particle-verb. Two example sentences are given in the table below. The PNs are indicated by shading.

Table 1: Example sentences from Experiment 1

subject		object		verb
no-in	eun	Woo-Chan	eul	bu-reo-wo-han-da
An old man envies Woo-Chan.				
Yong-Gu	neun	ak-gi	reul	yeon-ju-han-da
Yong-Gu plays the instrument.				

All sentences were presented using the speech editing program Praat [7]. A transcription of the utterance was displayed in roman alphabet on a computer screen. The two target words between which the participants had to choose were given below the sentence. The spoken utterances were presented over headphones at a comfortable listening level. Participants responded by clicking on one of the two target words, and, subsequently, by marking the confidence in their answer on a five-point scale. The order of the presentation was randomized. Participants were instructed to listen carefully, and if they wished, they could listen to an utterance up to five times. As a control against bias in the experimental materials, we ran two versions of the experiment, one with sound, and one without sound. The silent version was identical to that with sound, except for small adjustments to the instructions.

We expected an overall higher proportion of correct identification for the responses to the stimuli *with* the sound than *without* the sound. While we did not have any particular a priori expectations as to whether the sound effect would be the same for the target words in subject position or in object position, we did not exclude the possibility that this might be the case, and also included a possible interaction effect of sound by position in the analysis. While the primary results of

the experiments were the proportions of overall correct responses, we also looked at confidence ratings. Our expectations for confidence ratings paralleled those for error rates, that is, higher confidence for stimuli with sound than without sound, and a possibility of interaction of sound and position.

2.1.2. Results

A total of 88 listeners participated in Experiment 1, 45 of whom did the experiment with sound, 43 without the sound. Their mean age was 34.5 years, and they had various native languages (Danish, French, German, Hungarian, Macedonian, Polish, Romanian, and Swedish). As part of the requirements for participation in the experiment, none of them had active or passive knowledge of Korean. Two participants were excluded from the analysis for lack of variation in their responses: they selected the subject words and gave the same confidence rating for all items.

The proportions of correct responses are given in Table 2. As suggested by the proportions, there were only minor differences between the sound and the silent versions of the experiment, but there was a general tendency that words in subject position were classified correctly more often than words in object position. As for the confidence ratings, there were only minor difference as well. Contrary to expectations, the average confidence ratings were somewhat higher in the silent condition than in condition with sound.

Table 2: Results of Experiment 1. Figures represent proportions of correct responses and average confidence ratings, respectively.

	object	subject
sound	0.526 – 2.40	0.667 – 2.44
silent	0.557 – 2.57	0.655 – 2.54

The results were analysed using multilevel regression models, with target-word position (subject or object) and experimental version (sound or silent) as the main predictors, including their interaction, and participant and item as random factors. For the proportions of correct responses (binomial model), the results indicated no significant difference between the two experimental versions ($EST = –0.039$, $SE = 0.098$, $z = –0.400$, $p = 0.689$). However, the observed proportion of correct responses for the target words in subject position was significantly higher than in the object position ($EST = 0.560$, $SE = 0.163$, $z = 3.446$, $p = 0.001$). The interaction was not significant ($EST = 0.189$, $SE = 0.119$, $z = 1.579$, $p = 0.114$). For the confidence ratings, the difference between the experimental versions was not significant ($EST = –0.129$, $SE = 0.197$, $t = –0.658$, $p = 0.511$), nor was the difference between target words in subject or object position ($EST = 0.003$, $SE = 0.034$, $t = 0.090$, $p = 0.928$), nor was the interaction of the two predictors ($EST = 0.067$, $SE = 0.043$, $t = 1.535$, $p = 0.125$).

2.1.3. Discussion of Experiment 1

The results of Experiment 1 showed no clear indication that PNs are acoustically distinct from CNs, at least not a difference that listeners could hear. We found no difference between the two experimental versions. We did find a difference, at least for the correct responses, between the two positions, but since this difference existed in both experimental versions it is likely that there was some bias in the stimuli that made the target words in subject position more easily recognizable as PNs than the target words in object position. We would like to emphasize once again that the participants reported no knowledge of Korean before they participated in the experiment, but, naturally, it is not possible to rule out completely the possibility that they had some passive knowledge of the language. Especially names might have resembled those of football players, actors, or exchange students.

2.2. Experiment 2

Given the response bias that was not primarily due to one of the experimental factors in Experiment 1, we ran another version of the same experiment, this time with Swedish stimulus material, which was presented to Chinese participants.

2.2.1. Design, Material and Participants

The stimulus utterances were similar to those in Experiment 1 in that they all had the same syntactic structure of subject-verb-object, and the PN was either in subject position or in object position. We tried to match the PNs with the CNs to an even larger degree than in Experiment 1. Most of the test items were disyllabic, but a few were monosyllabic. In order to avoid potential cues that the participants might use to guess which of the two target words was the PN, the second syllables of the target words were matched so that the PNs ended in much the same way as the CNs. Furthermore, we avoided very common names (such as *Björn, Anna, Frida*) so that any familiarity of the names in the experiment was reduced to a minimum. Given the stricter criteria on the stimulus material, there were fewer items in Experiment 2 than in Experiment 1: 19 utterances had the PN in subject position, 16 in object position, yielding a total of 35 items. Table 3 shows two examples of utterances used in Experiment 2.

Tabel 3: Example sentences from Experiment 2

subject	verb	object
flickan	slår	Hervor
The girl beats Hervor.		
Östen	väljer	siffror
Östen chooses numbers.		

The utterances were presented to a group of speakers of Chinese who had no knowledge of Swedish. The experimental procedure and design were the same as in Experiment 1. The sentences were presented in their original orthography to the participants. The instructions were given in Chinese. In the instructions, we emphasized, even more strongly than in Experiment 1, that the participants needed to listen carefully before making their judgement. Our expectations were the same as those for Experiment 1.

2.2.2. Results, Experiment 2

A total of 46 participants were tested in Experiment 2. Half of them did the experiment with sound, and the other half did the experiment without sound. Table 4 gives an overview of the results of the second experiment.

Table 4: Results of Experiment 2. Figures represent proportions of correct responses and average confidence ratings, respectively.

	object	subject
sound	0.427 – 3.42	0.533 – 3.53
silent	0.505 – 3.64	0.499 – 3.43

Interestingly, the results showed a tendency towards a larger proportion of correct responses to the stimuli with sound when the PNs were in the subject position, and a lower proportion of correct responses to the stimuli with sound when the PNs were in the object position. The confidence ratings paralleled this tendency, although, or so it seems by looking at the results, to a weaker extent. It is also interesting to observe that the average confidence ratings were higher by approximately one point for the Chinese participants compared to the participants from Experiment 1. Finally, the proportions of correct responses for the PNs in subject and object positions were minimally different in the silent version. This last observation suggests that we succeeded in our effort of making the PNs as similar to the CNs as possible.

Like in Experiment 1, the results were analyzed using multilevel regression models. For the correct responses we found no significant first-order effect of experimental version ($EST = -0.114$, $SE = 0.150$, $z = -0.762$, $p = 0.446$) nor of position ($EST = 0.259$, $SE = 0.324$, $z = 0.799$, $p = 0.424$). However the observed interaction was significant ($EST = 0.551$, $SE = 0.217$, $z = 2.541$, $p = 0.011$). For the confidence ratings, none of the effects was significant (experimental version: $EST = -0.159$, $SE = 0.167$, $t = -0.95$, $p = 0.341$; position: $EST = -0.052$, $SE = 0.069$, $t = -0.76$, $p = 0.448$; interaction: $EST = 0.122$, $SE = 0.081$, $t = 1.50$, $p = 0.133$).

2.2.3. Discussion of Experiment 2

The results of Experiment 2 were more promising than those of Experiment 1, even though they were not quite as we predicted. We found higher proportions of correct responses for the stimuli with sound, but only for the PNs in subject position. For the PNs in object position we actually found lower proportions of correct responses when presented with sound. We interpret these results as follows. Most importantly, the participants who did the sound version of the experiment did not perform at chance level in this experiment. This indicates that listeners must have had an implicit representation 'what a CN sounds like, and what a PN sounds like'. Unfortunately, however, the participants made significantly more correct guesses for the PNs in subject position, and significantly fewer correct guesses for the PNs in object position. It might also have been the case, therefore, that the participants had an implicit expectation that a PN is more likely in subject position than in object position, and consequently they more often selected the subject word rather than the object word, resulting in the pattern shown in Table 4. This issue needs to be resolved through further experimentation in the future.

2.3. Experiment 3

The results of Experiment 2 indicated that acoustic information whether a noun is a CN or a PN may exist. Experiment 3 was ran to locate potential acoustic cues indicating PNs. If PNs figure more prominently in spoken language than CNs, is the reason because of information in the noun itself, or is it because of information in the context of the noun? A preliminary answer to this question was given by Müller and Kutas [3], who measured electrophysiological responses to CNs and PNs. They observed larger N1 and P2 amplitudes for PNs at 125 ms after word onset, well before the offsets of the words. Since the target words in their study were always in the beginning of the test utterances, this finding suggests that acoustic characteristics typical for PNs are located in the words rather than in their context. We attempted to confirm Müller and Kutas' observation in the third experiment. In this experiment, we used a gating task, that is, we presented short carrier sentences from which the last word had been cut out. We hypothesized that if acoustic information is in the context of the target words, then participants should be able to guess whether the missing word at the end of the sentences was a PN or a CN.

2.3.1. Design, Material and Participants, Experiment 3

Experiment 3 was carried out with Swedish materials and listeners. The missing target words were embedded in one of two carrier sentences, either a statement *'Det här är en bild på ...'* (*This is a picture of ...*) or a question *'Vad tycker du om ...?'* (*What do you think about ...?*). The target words were all disyllabic, and each PN was matched with a CN so that both started with the same syllable onset. This was done in order to maximally reduce possible coarticulation effects from the last word in the carrier sentence to the beginning of the target word. Two example sentences are shown in Table 5.

Table 5: Example sentences from Experiment 3

statement	Det här är en bild på liljor / Lisa.
	This is a picture of lilies / Lisa.
question	Vad tycker du om rumba / Rudolf?
	What do you think about rumba / Rudolf?

We constructed a list of 60 pairs of target words (e.g., *lilies* and *Lisa*). Each PN and its matched CN was combined with both a question and a statement carrier sentence, yielding a total of 240 test sentences in total. These sentences were used to create four versions of the experiment consisting of 60 items each, so that each combination occurred only once for a participant.

The sentences were all read by a native speaker who was not aware of the experimental purpose. She read the sentences while looking at pictures of the target words (faces for the PNs, objects for the CNs), and was asked to read as lively as she could, imagining that there was a listener in the room whom she addressed directly.

The target words were cut out of the sentences, and subjected to an acoustic analysis. Figure 1 shows the average pitch contours of the questions and the statements combined with the PNs and the CNs. The contours suggest at the same time a clear distinction between the questions and the statements, as well as great similarity within the two utterance types.

Figure 1: Average pitch contours of the items in Experiment 3.
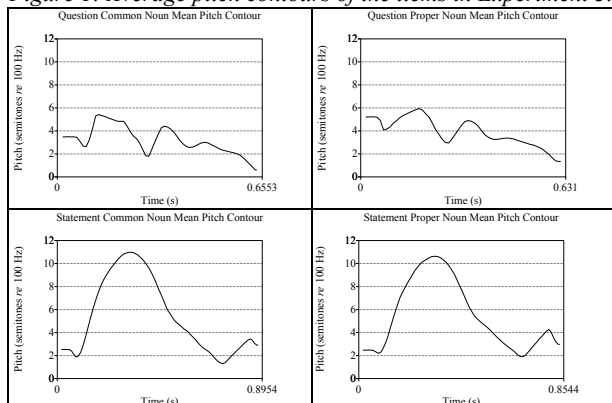
The materials were presented to the participants using the speech-editing program Praat. Below each sentence the two alternatives were given, and the participants responded by clicking on the word they thought was missing. Just like in Experiments 1 and 2, they also marked how confident they were on a scale from 1 to 5.

We expected that, if there was information about the missing word in its context, the participants would perform more accurately than chance.

2.3.2. Results

44 native speakers of Swedish participated in Experiment 3. There were three experimental items for which all participants selected the PN. It was decided that the CN for these items was an unlikely (though not impossible) completion of these sentences, and, consequently, these items were discarded from the analysis. The proportions of correct answers were 0.500 for the statements, and 0.495 for the questions. The respective average confidence ratings were 3.09 and 2.86.

In other words, the overall proportions correct hardly deviated from chance, and there was only a minor difference between the proportions of correct responses for the statements and the questions. The overall confidence ratings, though, were higher for the statements than for the questions. The statistical analysis confirmed these observations. For the proportions of correct responses, the intercept representing guessing was not significantly different from zero ($EST = -0.025$, $SE = 0.072$, $z = -0.347$, $p = 0.729$), nor was the difference between the statements and the questions ($EST = 0.012$, $SE = 0.102$, $z = 0.116$, $p = 0.908$). Nevertheless, the difference in confidence ratings between the questions and the statements was significant ($EST = 0.221$, $SE = 0.034$, $t = 6.394$, $p = 0.000$).

2.3.3. Discussion Experiment 3

The results of Experiment 3 do not provide evidence that acoustic information distinguishing PNs from CNs is in the context of the nouns. This result is consistent with the observations reported by Müller and Kutas [3], who found differences in N1 and P2 amplitudes already before the offset of the target words.

3. Discussion

The results of the experiments described in this paper suggest that phonetic characteristics typical for PNs may exist, and that listeners appear to be aware of them. The results also suggest that these characteristics are located in the PNs themselves, rather than in their context.

4. Acknowledgements

5. References

[1] Cutler, A., McQueen, J. and Robinson, K. (1990). Elizabeth and John: Sound patterns of men's and women's names. Journal of Linguistics, 26, 471–482.

[2] Cohen, G. and Burke, D. (1993). Memory for proper names: A review. Memory, 1, 249–263.

[3] Müller, H. and Kutas, M. (1996). What's in a name? Electrophysiological differences between spoken nouns, proper names and one's own name. NeuroReport, 8, 221–225.

[4] Warrington, E. and Clegg, F. (1993). Selective preservation of place names in an aphasic patient. Memory, 1, 281–288.

[5] Goodglass, H. and Wingfield, A. (1993). Selective preservation of a lexical category in aphasia. Dissociations in comprehension of body parts and geographical place names following brain lesion. Memory, 1, 313–328.

[6] Mandel, D. Jusczyk, P. and Pisoni D. (1995). Infants' recognition of the sound patterns of their own names. Psychological Science, 6, 315–318.

[7] Boersma, P. and Weenink, D. (2011). Praat: doing phonetics by computer [Computer program]. Version 5.2.15, retrieved 12 February 2011 from http://www.praat.org/.