The processing of focus: perception, comprehension and production

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Linguistic focus indicates that alternatives are relevant to the interpretation of an utterance [1,2]. Felicitous use of focus requires various linguistic abilities, e.g., perceiving prosodic focus marking, understanding pragmatic and semantic uses of focus, and producing focus with distinct prosodic patterns. Here we ask (a) whether individuals differ in these abilities and (b) whether individuals' ability to perceive, comprehend and produce focus correlate with one another. We presented a series of exploratory studies to investigate focus processing in tasks that involve the different abilities above. We found large differences in individuals' performance. Individuals who are better at perceiving prosodic focus marking are also better at deriving specific interpretational effects of focus. However, we did not find a relation between individuals' ability to perceive and interpret focus and their ability to realize focus prosodically.

40 native German participants (mean age: 23; range: 18-31; 37 females) were tested in three tasks: a speech perception task, an inference task, and a dialogue reading task. All experimental materials were in German. Given that we are primarily interested in correlations between the tasks, we will first introduce all three tasks, then we will jointly discuss the results.

Exp.1 Perception task: Exp.1 was a completion task. One example item is given in Fig.1. Participants heard the target utterance (a question) and four possible answers. They had to select the answer that fit the question best. The target utterances were of the form *This is a [color] [shape]*? [color] or [shape] was marked by LH* accents in contrastive conditions and unmarked in the non-contrastive condition. The four answers differed in terms of which constituent was contrastively focused. If participants interpret the prosodic marking in the target utterances as a bid for confirmation, the best fitting answer is the one where the accented constituent corresponds to a corrective interpretation. **Exp.2 Inference task:** Exp.2 was based on [3]. One example item is given in Fig.2. Participants listened to auditory discourses and had to indicate if a statement about the mentioned alternative was true or false for that discourse. We manipulated the presence/ absence of the exclusive particle 'only'. In Fig.2, if participants negate over the focus alternative (i.e., the designer) and its corresponding object, they should judge the statement as false. Discourses without focus particles (bare H*) were included as a control condition. **Exp.3 Dialogue reading task**: Exp.3 was a production study to investigate participants' ability to pronounce focused and non-focused elements differently. Participants read out loud a dialogue that primed them to use prosodic focus to correct information. The intended focus constituents were analysed in terms of various prosodic properties. If participants make distinct prosodic realizations for focused constituents, the use of F0 curve, duration, and intensity should differ from their non-focused counterparts.

For Exp.1, a mixed effects logistic regression (LMER) was conducted to predict responses based on condition. The percentages of focus-sensitive responses were significantly higher in contrastive conditions than in the non-contrastive condition (color: β=0.37, p<.001; object: β=0.33, p<.001). For Exp.2, a LMER was conducted to predict responses based on condition ('only' vs. bare H*). The percentage of

pragmatic responses (rejecting the alternative) was significantly higher in the 'only' condition than in the control condition (β=0.67, p=.02). For Exp.3, the means of various acoustic measurements are shown in Table 1. We conducted, for each measurement, a LMER to predict that measure based on context type (contrastive vs. non-contrastive). Compared to non-contrastive contexts, critical words in contrastive contexts were produced with higher F0 peak and higher average F0 together with greater intensity. In all three experiments, we found significant individual differences in participants' performance. Correlation analyses were conducted to examine the relations between tasks. As shown in Fig.3, participants' performance in the inference task and the perception task were significantly correlated to one another (r=.35, p=.03). But we fail to find a significant correlation between participants' performance in the dialogue reading task and their performance in the other tasks (all rs < .01).

Those, while the ability to correctly interpret focus presupposes successful perception of focus, perception and production of focus are less strongly linked, in contrast to perception-production links observed in other areas of linguistics [e.g., 4]. Further research is clearly needed to better understand the contribution of different linguistic abilities to individuals' processing of focus.

Question	This is a [red]$_F$ triangle?	
Answers	a. A [blue]$_F$ triangle	b. A blue [triangle]$_F$
	c. A [blue]$_F$ square	d. A red triangle

Fig. 1 Example item of Exp.1; the correct response in the example is (a)

[Discourse] The manager and the designer were talking at the party. *Only* the manager drank wine. [Critical statement] The designer drank wine.

Fig. 2 Example item of Exp. 2

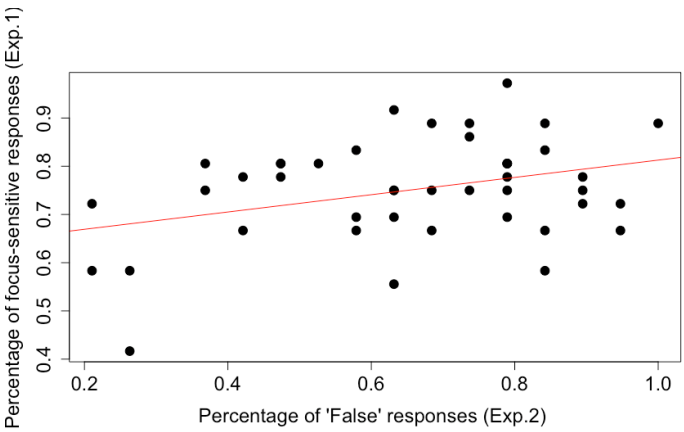

Fig.3 Positive correlation between focus perception and comprehension

Context	Maxf0 (hz)	Minf0 (hz)	Excursion size (st)	Meanf0 (hz)	Mean intensity (dB)	Duration (ms)
No contrast	242.41	168.06	6.07	203.47	65.48	348.73
Contrast	261.14	176.65	6.60	219.93	70.06	376.30

Table 1 Dialogue reading task

[1] Krifka, M. (2008). Basic notions of information structure. Acta Linguistica Hungarica 55(3-4). [2] Rooth, M. (1985). Association with Focus. [3] Gotzner, N., & Spalek, K. (2014) Proceedings of the Formal & Experimental Pragmatics Workshop. [4] Perkell, J. et al. (2004) The Journal of the Acoustical Society of America 116.