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Final Report

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The topic of the research projected that I conducted in Bulgaria was "Psycholinguistic Investigation of Processing Principles in Bulgarian". My host on the Bulgarian end was Dr. Krassimira Petrova, Assistant Professor at the Department of Slavic Languages at the Sofia University.

Supported by the IREX STR grant for three weeks, we have conducted three psycholinguistic experiments, two with college-age adult speakers and one with children. We tested how Bulgarian adults processed ambiguous relative clauses (RC), and how Bulgarian four-to-six-year-old children develop processing strategies.

The research site for the two adult experiments was the Department of Slavic Languages at the Sofia University. Seventy-two undergraduate students participated in Experiment 1 which was a paper-and-pencil questionnaire. It consisted of 54 sentences, 16 of which contained RC ambiguity of the type *Maria listened to the assistant of the director who was demanding*. Participants typically took about 20 minutes to fill out the questionnaire in which they indicated their preferences for one of the two possible interpretations of such sentences. Two factors were manipulated in this experiment: the length of the RC (short vs. long), and the word order (canonical vs. scrambled). The results indicate that in contrast to English, Bulgarian belongs to the majority of languages where the preference for the RC *who was demanding* is to attach 'high' (59% in total), that is, to modify the first noun, *the assistant*. This finding adds Bulgarian to constantly growing list of languages that have been studied in an attempt to investigate universality of processing principles proposed in the current theory of sentence processing. We also found that our Bulgarian data provide some initial support for the Implicit Prosody Hypothesis (Fodor, 1998) since there was a significant

main effect of the RC length factor: short RCs attach lower (54% preference for high attachment) while long RCs are more likely to attach higher (63%). However, the word order seemed not to have any effect on attachment preferences: prosodic constraints in Bulgarian are stronger than structural ones and thus can affect ambiguity resolution.

Experiment 2 was designed to test novel materials using the same RC attachment ambiguity. Semantically charged complex noun phrases like '*the assistant of the director*' were replaced with abstract geometric shapes that presumably do not carry any pragmatic baggage, e.g., *Which color is the tip of the triangle that has an umbrella in the middle?* Sixty-nine undergraduate students participated in this experiment which was run with the help of DMDX experimental data collection program (Forster and Forster, 1990). Participants viewed 21 pairs of pictures, nine of which were ambiguous; for example, an ambiguous pair would be a triangle that contained the umbrella in one picture, and the tip of the triangle in the other picture. Participants' choice of color indicated their preference for attaching the ambiguous RC either as the modifier of the higher noun, *the tip*, or the lower noun, *the triangle*. The results of Experiment 2 were in stark contrast to Experiment 1: this time, the participants overwhelmingly preferred to attach the ambiguous RC low (75% low preference). We found new evidence that high attachment preferences may be overridden not just by prosody (as Experiment 1 demonstrates) but also by strong visual context. Thus, Bulgarian patterns with German for which we previously had discovered that such a clash between the language-specific general preference and visual context is resolved in favor of visual complexity.

Our final experiment, Experiment 3, was conducted with 33 Bulgarian-speaking children, ages 4;0—7;2. These children attended summer camps in four different places: State Preschool and Kindergarten (SPK) #15 '*Chuchuliga*', SPK #38 '*Dora Gabe*', SPK #71 '*Schastie*', and SPK #11 '*Mickie Mouse*'. The children successfully participated in the experiment, were cooperative and responsive, and seemed to enjoy playing on the computer. We found that although the children demonstrated the pattern of low preference similar to the adults it was weaker (41%), with higher percent of errors (23%) (naming the

color of the triangle instead of the tip). It was obvious that visual complexity exerts even a heavier toll on children than on adults (it was not feasible to test the children on the current version of Experiment 1). Our findings with the children provide new data for the rapidly growing area in experimental psycholinguistics, development of on-line processing strategies in children. Recent advances in technology are just beginning to allow us to test hypotheses from on-line processing research on adults with children, and our Bulgarian data will be received with interest by the community of language acquisition researchers.

The reversed pattern of preferences between Experiments 1 and 2 calls for a new hypothesis that needs to be tested experimentally. Is it possible that it is the modality in which the stimuli are presented could create pressure to attach the RC one way or the other? The stimuli were in the written form for Experiment 1, and in the spoken form for Experiment 2. We can hypothesize that the spoken stimuli create pressure to attach low due to limitations of the working memory capacity (the articulatory loop). In order to test this hypothesis we plan to replicate Experiments 1 and 2 by reversing the modalities: conducting Experiment 1 with the spoken stimuli, and Experiment 2 with the written stimuli. If our idea is on the right track, we should expect to see the preference for high attachment to decrease in Experiment 1 and increase in Experiment 2 resulting in an interaction between preferences and modality choice. We propose to apply for new funding to allow us to conduct these experiments in the near future.

Finally, our research project has also fulfilled our educational and career advancement goals. The students at the Faculty of Slavic Studies at the Sofia University were very enthusiastic about learning about experimental psycholinguistics boosting the enrollment for Dr. Petrova's undergraduate psycholinguistics course in the fall 2002. It also allowed Dr. Petrova and I to have established a productive collaborative relationship that we hope will grow into an ongoing cross-linguistic Russian-Bulgarian psycholinguistic research program in the future.