A cross-cultural study of the use and comprehension of color words: English vs Mandinka

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It has been extensively documented that people often use color adjectives redundantly. However, this tendency is modulated by a number of factors, including the lexical category of the noun (e.g., people may refer to a single dress as 'the yellow dress', but would not refer to a single banana as 'the yellow banana' [1-4]). Adjective position also affects color over-specification, with prenominal adjectives being used redundantly more often than postnominal adjectives [4-7]. On the comprehension side, contrastive inferences may be derived pragmatically for prenominal adjectives [1,2], but not for postnominal ones [8]. **Here we extended this line of research in a cross-cultural direction to address three questions: (Q1) Would speakers from a non-industrialized society with a reduced color vocabulary also use color words redundantly to refer to clothes, but not to fruits with predictable colors? (Q2) Does the tendency to use color adjectives redundantly with some lexical categories affect the processing of color words accordingly? (Q3) Can contrastive inferences be derived on the basis of adjective position for postnominal adjectives?** (i.e. on a syntactic, rather than a pragmatic basis).

Positive responses to Q1-Q3 were obtained from a reference-production task and an eye-tracking task with native speakers of English (MIT) and Mandinka (a Mande language spoken in The Gambia, West Africa). **EXP1/Q1**: Participants (n=31+31) requested a target from a series of displays of clothes or fruits, in a block design (see Fig.1). An LMER model of Over-specification with Language (English, Mandinka) and Lexical Category (Clothes, Fruits) as FE and maximal RE structure revealed a main effect of Language (β=-8.467, SE=2.736, p<.002), with more redundant modification observed in English (prenominal) than in Mandinka (postnominal) (replicating [4-6]). There was also a main effect of Lexical Category (β=-9.350, SE=2.781, p<.001), with color being used to refer to clothes but not to fruits (also replicating [1,3,4]).

EXP2/Q2: Participants (n=30+30) were presented with displays containing a pair of clothes or fruits and another two objects of the other category, in two colors (see Fig.2) and had to click on two of the objects following twice color-modified instructions such as 'The orange dates and the black shoes.' When the first NP referred to a member of a pair, processing of the second NP revealed the relative expectation that color would be used contrastively again (e.g., that 'black' referred to the other dates, rather than the shoes). An LME model of Percentages of Fixations on the Competitor (e.g., the black dates) during the NP2 window with Language and Lexical Category as FE and maximal RE structure revealed a main effect of Lexical Category (β=8.344, SE=2.925, p<.017), with more fixations on the Fruit competitor than the Clothes competitor. These results confirm that speakers of both languages expected color to be used contrastively for fruits more than for clothes. It is remarkable that Language did not have a significant effect or interaction, since Mandinka speakers processed the noun *before* the adjective ("The dates orange and the shoes black") and were therefore fixating on the contrast (the black dates) ahead of processing the second noun ("the shoes"; Fig.2). This suggests a **strong expectation that color be used contrastively, possibly because that is how color is used most frequently in Mandinka**.

EXP2/Q3: A prenominal adjective may distinguish two objects of the same kind, revealing a contrastive inference (e.g., in hearing 'The black…', participants would fixate on the grapes, not the sandals; see Fig.3) [1,2]. However, this form of pragmatic reasoning is not possible in languages with postnominal modification [8]. Interestingly, some of those languages (including Mandinka, and several Romance languages) use nominalized adjectives to refer to another object of the same kind ("The grapes black and the red"). Thus, **the second adjective in 'The black grapes and the red ones' is temporarily ambiguous in English, yet the same construction in Mandinka should elicit a contrastive inference *triggered by the syntactic position of the adjective***. An LME model of Percentage of Fixations on the Competitor with Language as FE and maximal RE structure showed a significant main effect (β=-6.685, SE=1.958, p<.002), **revealing, for the first time, a contrastive inference that is syntactic – rather than pragmatic.**

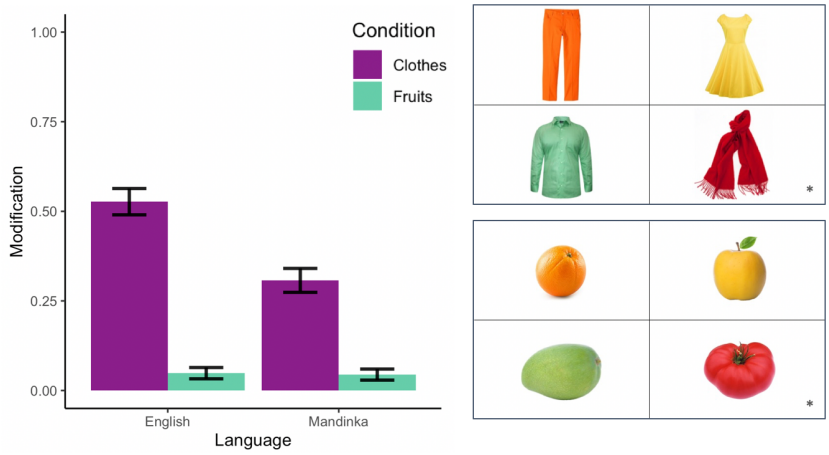

Fig.1: Proportion of redundant color adjectives by language and lexical category, with sample displays. **Unlike English, Mandinka has postnominal modification and only 6 color adjectives (black, green, orange, red, white and yellow).**

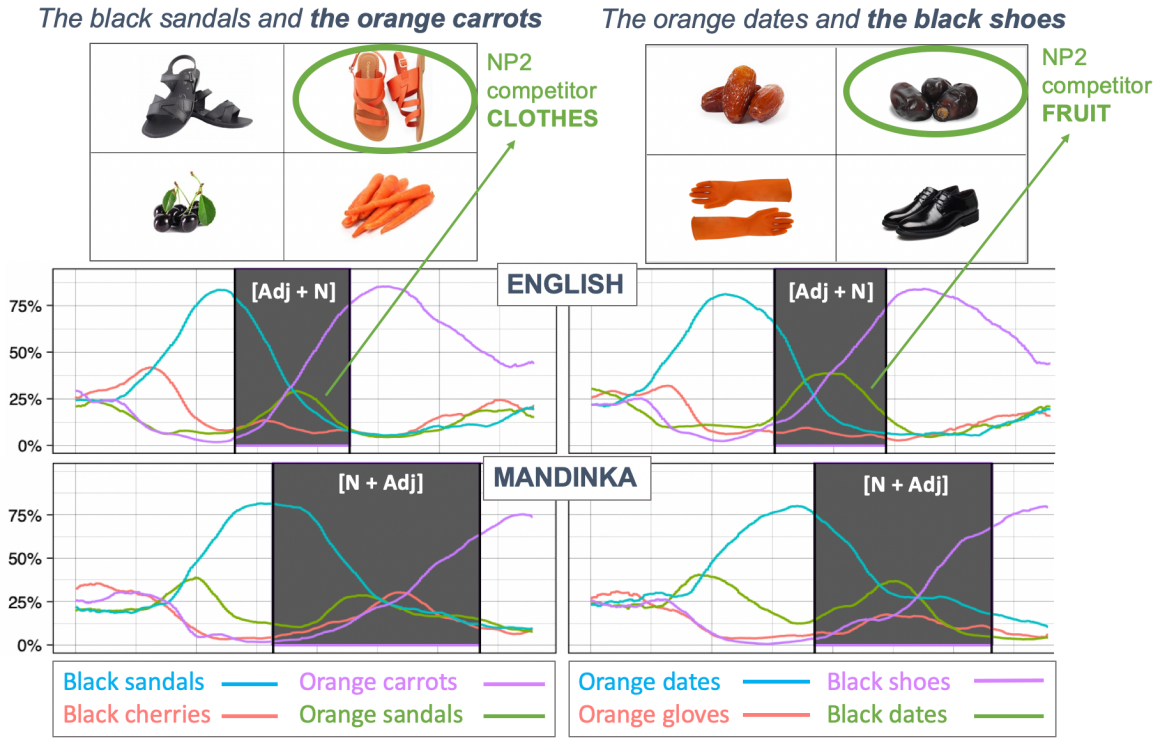

Fig 2: Sample displays and average percentage of fixations on the four objects over time.

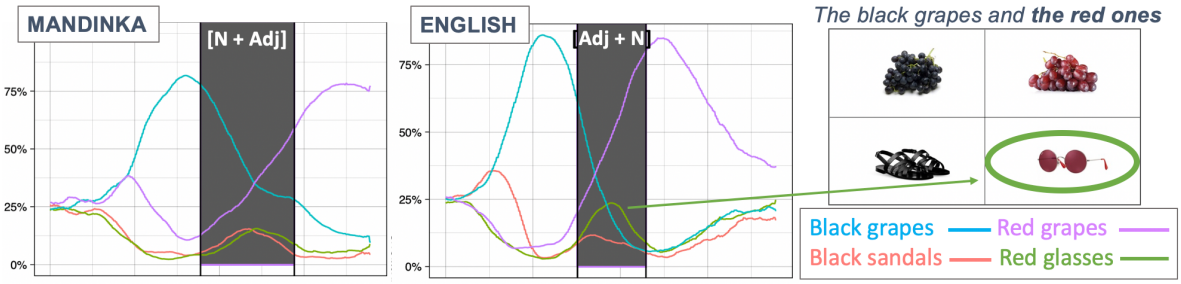

Fig. 3: Average percentage of fixations on the four objects over time and sample display.

References **[1]** Sedivy, 2003. *J Psycholinguistic Research* **[2]** Sedivy, 2005. MIT Press (Ch.17) **[3]** Tarenskeen, Broersma & Geurts, 2015. *Frontiers in Psychology* **[4]** Rubio-Fernandez, 2016. *Frontiers in Psychology* **[5]** Rubio-Fernandez, 2019. *Cognitive Science* **[6]** Rubio-Fernandez, Mollica & Jara-Ettinger, 2020. *JEP:G* **[7]** Wu & Gibson, 2021. *Cognitive Science* **[8]** Rubio-Fernandez & Jara-Ettinger, 2020. *PNAS.*