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BACKGROUND

From the second year of life, typically-developed (TD) children have the ability to form word-word associations based on semantic, associative (Arias-Trejo & Plunkett, 2010), and perceptual lexical properties (Johnson, McQueen, & Huettig, 2006). This ability has been linked to an efficient processing of language (Meyer & Schvaneveldt, 1971).

However, in children with Down syndrome (DS), the ability to associate words has not been examined, given the difficulties that they have in lexical production (Galeote et al., 2011) and particularly with their neuropsychological profile (Dierssen, 2012).

MAIN GOAL

Inquire about the lexical organization in children with DS. Specifically, their ability to establish associative, semantic and perceptual word-word relationships.

PARTICIPANTS

Table 1. Mean and standard deviation of DS and TD participants

Group	Number of participants	Mental age	Chronological age
Down syndrome	23	3.61 (1.29)	10.28 (6.20) *
Typically Development	23	3.87 (1.38)	3.60 (1.31)

Note: All participants had no vision or hearing problems (according to a screening evaluation), no neuropsychological disorders (parental report).

MATERIALS

The Mental age of two groups (DS and TD) were obtained by a short version (Sattler, 2010) of the Wechsler Intelligence Scale (Wechsler, 2003).

EXPERIMENTAL DESIGN

Three experiments were performed: **Semantic, Associative and Perceptual**.

Priming tasks with 10 trials: 5 Related and 5 Unrelated in each experiment.

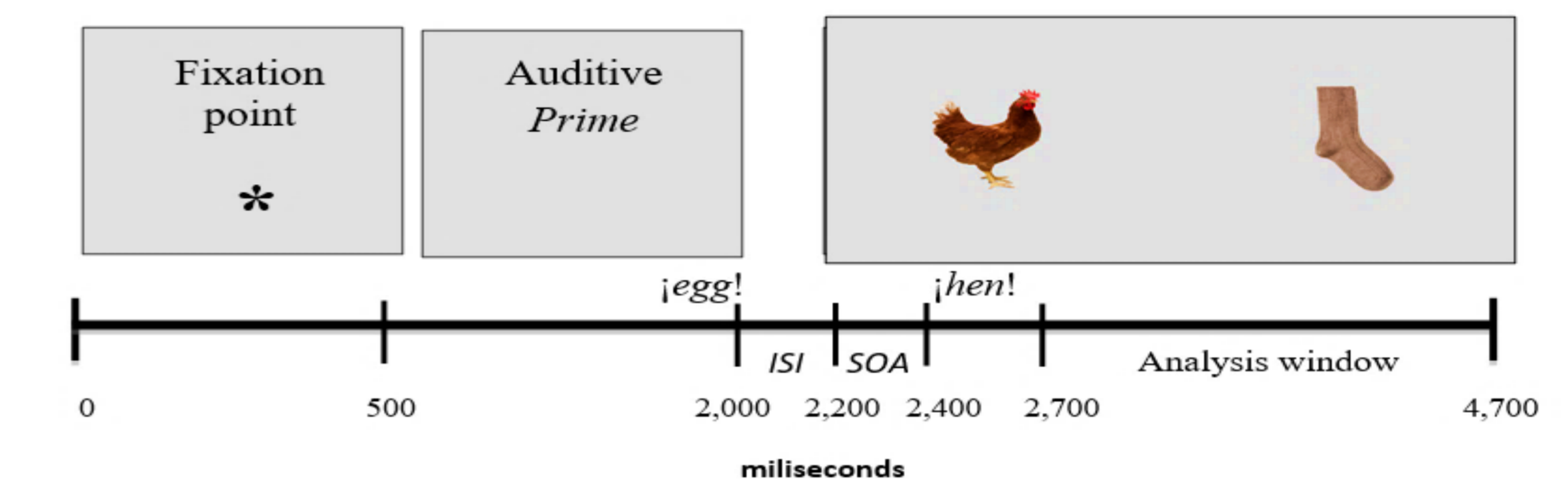


Figure 1. Example of an Associate Related trial

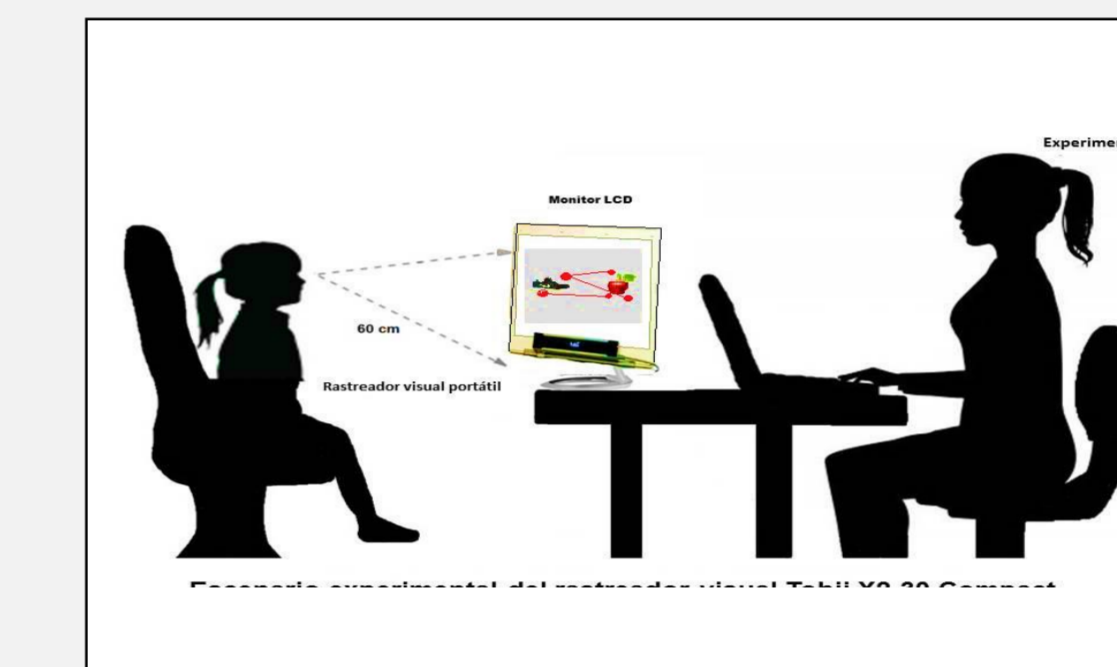


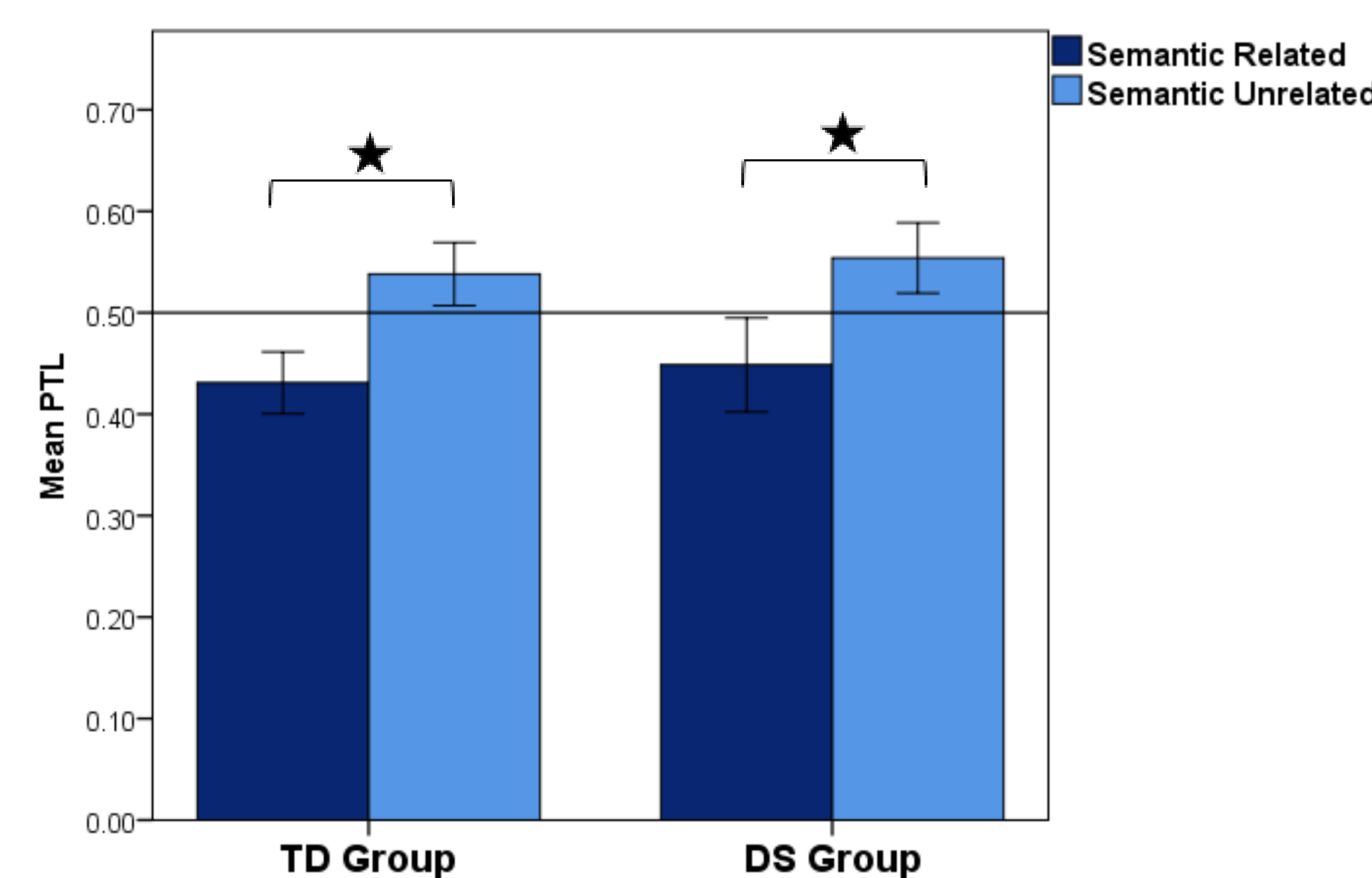
Figure 2. Experimental scenery: Eye-Tracker Tobii X2-30

RESULTS

Measure: Mean Proportion of Target Looking (PTL) is the time of attention to the target divided between the sum of the attention time to the target and the distractor.

Statistical Analysis: A 2 x 2 mixed ANOVA with Condition (REL and UNREL) as within-subject factor and Group (TD and DS) as between-subject factor were performed in each experiment.

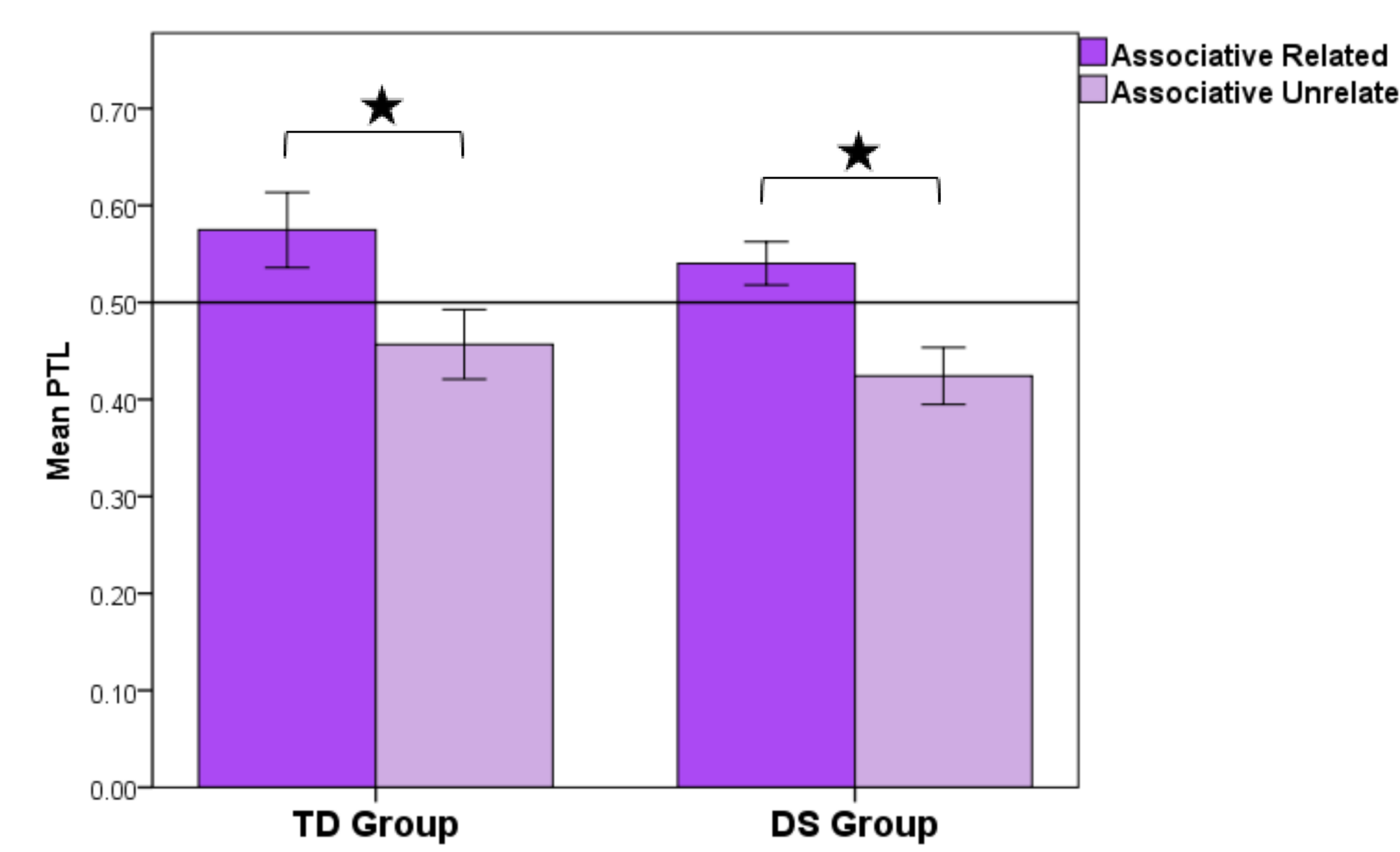
Figure 3. Mean PTL of Semantic Experiment



Barras de error: +/- 1 SE

Condition	Prime	Target	Distractor
Semantic Related	fresa [strawberry]	manzana [apple]	tenis (tenis)
Semantic Unrelated	carro [car]	manzana [apple]	tenis (tenis)

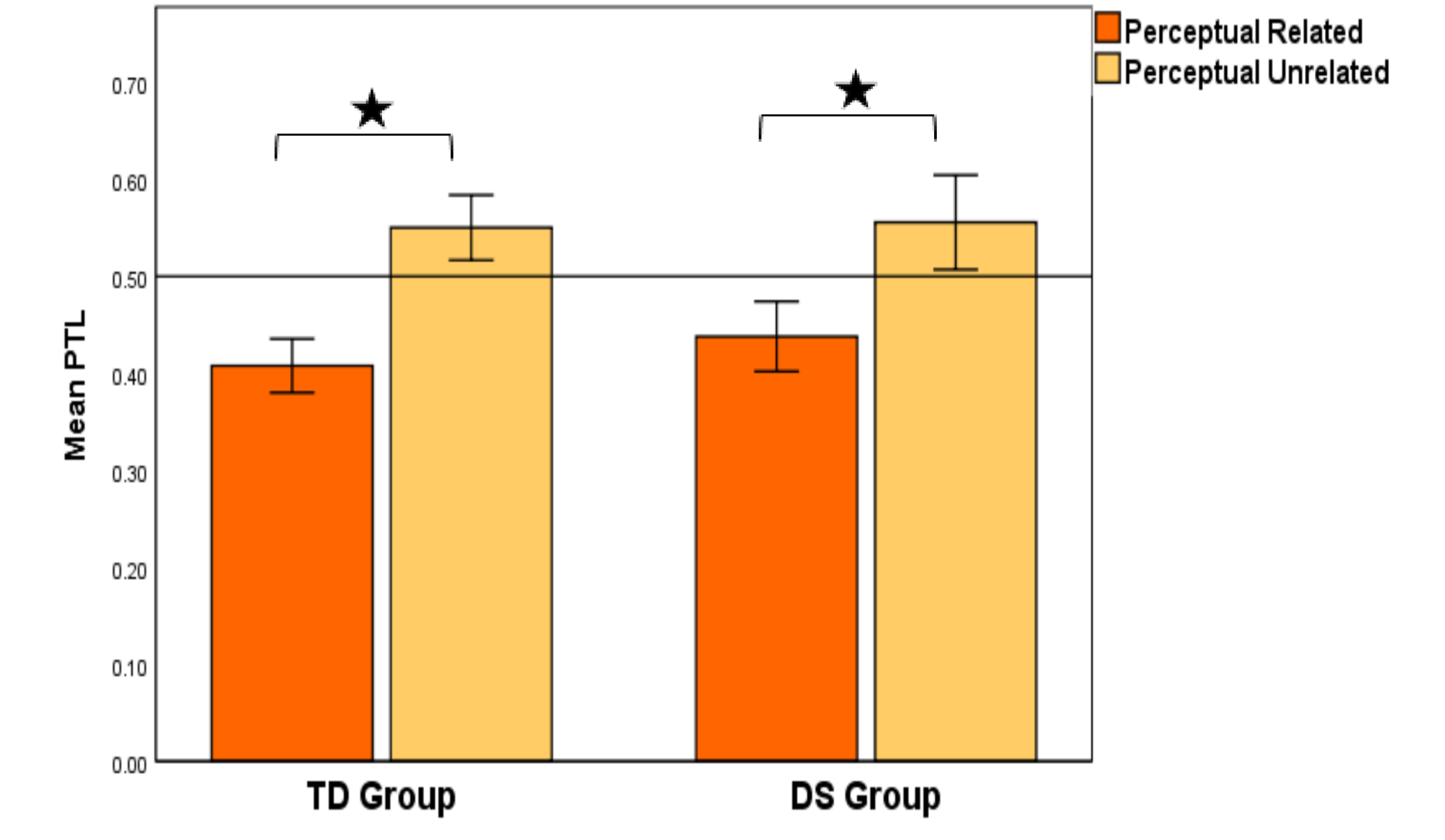
Figure 4. Mean PTL of Associative Experiment



Error Bars: +/- 1 SE

Condition	Prime	Target	Distractor
Associative Related	huevo [egg]	gallina [hen]	calcetín [sock]
Associative Unrelated	puerta [door]	gallina [hen]	calcetín [sock]

Figure 5. Mean PTL of Perceptual Experiment



Condition	Prime	Target	Distractor
Perceptual Related	paleta [lolly pop]	árbol [tree]	esponja [sponge]
Perceptual Unrelated	piano [piano]	árbol [tree]	esponja [sponge]

Note: The pairs used in the Associative experiment were selected from the Word Associations Norms for Mexican Spanish (Barrón-Martínez & Arias-Trejo, 2015) and corroborated their null or low-percentage for the Semantic pairs.

Note: With the aim to create the Perceptual Related and Unrelated pairs, an validation test was performed with a PsychoPy software and a TD group.

DISCUSSION

The results indicated activation effects for associative links between words (e.g., dog-bone), but inhibitory effects for semantic (e.g., dog-cat) or perceptual links (e.g., lollipop-tree). This outcome suggests that, apparently, the common features between words evokes inhibition effects, such as in the Semantic and Perceptual experiments. In the case of the Associative experiment, the context and life experience of people with DS allows the relationship between words.

The outcomes may indicate that lexical organization in the DS population occurs in several levels despite the problems they have in lexical production. The present evidence represents a first step in the knowledge of the lexical network of people with DS, which is relevant in terms of lexical processing, learning mechanisms and cognition. Further research could study these links in longitudinal studies.

REFERENCES

Arias-Trejo, N., & Plunkett, K. (2009). Lexical-semantic priming effects during infancy. *Philosophical Transactions of the Royal Society of London. Series B, Biological Sciences*, 364(1536), 3633-3647. doi.org/10.1098/rstb.2009.0146.

Barrón-Martínez, J.B. & Arias-Trejo, N. (2014). Word Association Norms in Mexican Spanish. *Spanish Journal of Psychology*, 17, 1-13. Doi: doi.org/10.1017/sjp.2014.91

Dierssen, M. (2012). Down syndrome: the brain in trisomic mode. *Nature Reviews*, 13, 844-858. doi.org/10.1038/nrn3314.

Galeote, M., Sebastián, E., Checa, E., Rey, R., & Soto, P. (2011). The developmental of vocabulary in Spanish children with Down syndrome: Comprehension, production and gestures. *Journal of Intellectual & Developmental Disability*, 36, 184-196. doi: 10.3109/13668250.2011.599317

Johnson, E., McQueen, J. M., & Huettig, F. (2006). Toddlers' language-mediated visual search: they need not have the words for it. *Quarterly Journal of Experimental Psychology*, 64(9), 1672-1682. https://doi.org/10.1080/17470218.2011.594165

Meyer, D. E., & Schvaneveldt, R. W. (1971). Facilitation in recognizing pairs of words: evidence of a dependence between retrieval operation. *Journal of Experimental Psychology*, 90, 227-234. doi.org/10.1037/h0031564

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