

# THEORY OF MIND IN TWO GENERATION OF DEAF CHILDREN

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# RESEARCH AIM

The study's aim is to provide an examination of false belief understanding among deaf children using current hearing technology as compared to children who, belonging to a former generation, did not use such technology.

The effect of digital hearing aids or cochlear implant on theory of mind (ToM) development has been researched. Furthermore, the relationship among age, linguistic development and mentalist abilities has been analyzed

# PARTICIPANTS

- 100 children and teenagers with a severe or profound hearing-loss. They were divided in two groups:
- Group 1: 54 participants did not use current hearing technology, aged between 6 and 19 years. They were assessed in 2000. All of them attended school for deaf children.
- Group 2: 46 participants used current hearing technology, aged between 6 and 14 years. 26 employed cochlear implant and 20 used digital hearing-aid. 58% was fitted before 3 years old. They were assessed between 2012 and 2014. All of them attended general primary education classrooms.
- All of participants had hearing parents , used oral language as a main communication system at home as well as with their teachers.

# INSTRUMENTS

1. Peabody Picture Vocabulary Test III provided participants lexical age (Dunn, Padilla, Lugo & Dunn, 1986)
2. ToM assessment. Three tasks were used:
  - **2.1. Contents False Belief (first order):** A child judges another person's false belief about what there could be in a distinctive container when the child knows what there actually is in the container (Hogrefe, Wimmer & Perner, 1986)
  - **2.2 Change of Location (first order) :** A child judges another person's false belief about the location of an object. Sally and Anne classic false belief task (Baron-Cohen, Leslie & Frith, 1985)
  - **2.3. Change of Location (second order) :** A child judges another's person false belief concerning to the belief a third person has about the location of an object (Núñez, 1993)

Range of scores in ToM competence is among 0 to 3 points.

**TABLE 1. AVERAGE AND ESTÁNDAR DESVIATION IN LEXICAL AGE AND AGE IN TWO GROUPS \***

	AVERAGE		SD	
	G1	G2	G1	G2
LEXICAL AGE	4,2	6,3	1,31	1,56
AGE	13,54	9,71	3,93	1,86

(\*) Group 1: Without hearing technology  
 Group 2: With hearing technology

# LEXICAL COMPETENCE

## COMPARING TWO GROUPS

- After comparing two groups, results showed significant differences in lexical ages:  $F = 32.66$ ,  $p < .01$ , indeed controlling effects of age. Group 2 (used current hearing technology) had an average lexical age bigger than group 1 (didn't use current hearing technology). Although group 2's mean age was lower than group 1's.

**TABLE 2. AVERAGE AND STANDARD DESVIATION IN TOM SCORE IN BOTH GROUPS \***

	AVERAGE		SD	
	G1	G2	G1	G2
ToM Score (0-3 points)	1,89	2,11	1,19	,9

(\*) G1 : without hearing technology  
 G2: with hearing technology

# ToM COMPETENCE COMPARING GROUPS

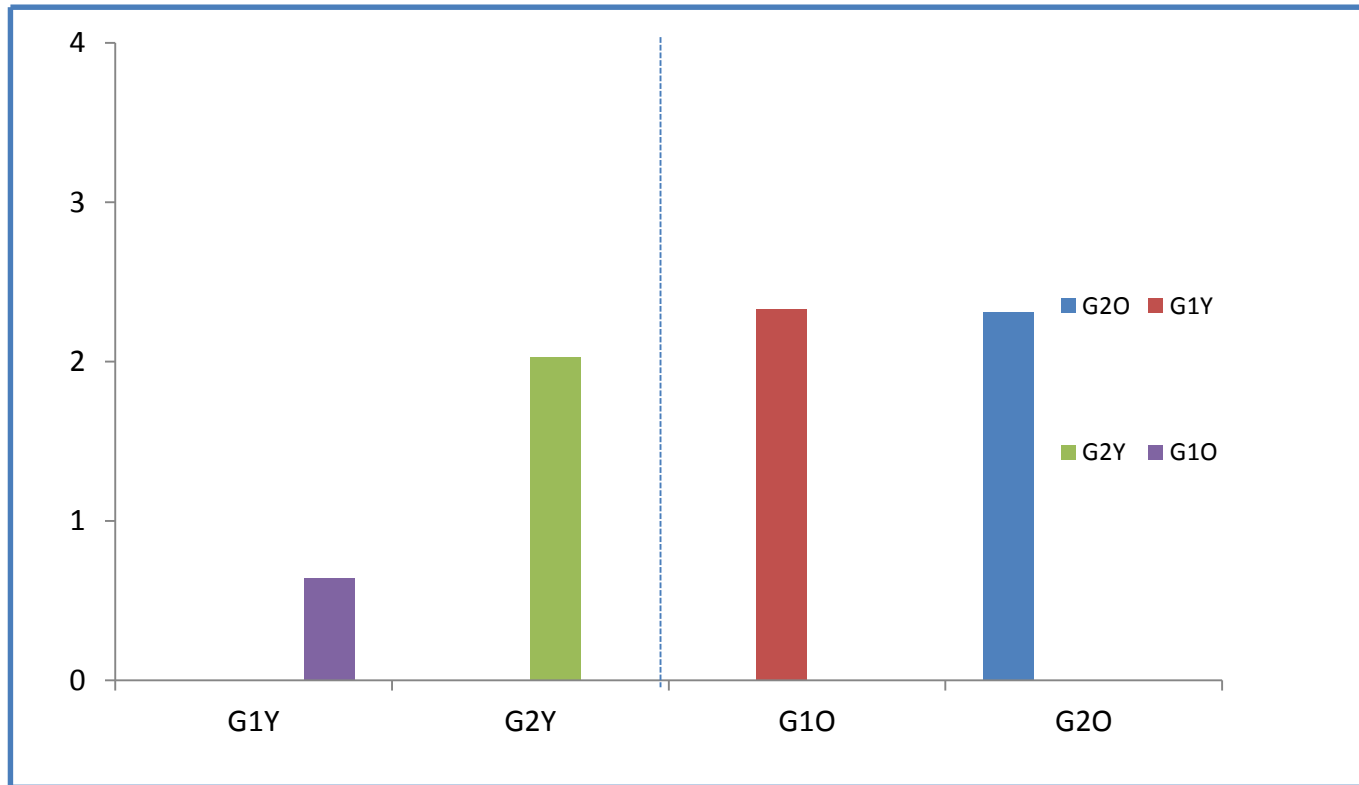
- After comparing two groups, results didn't show significant differences in ToM average:  $F = 1,05$   $p = .308$ . However, controlling effects of age differences were significant :  $F=27,554$ ,  $p<.01$



# Age and Hearing Technology Effects on ToM

- Four groups were formed for research about age and hearing technology effect on ToM competence:
  - G1Y (without technology and aged between 6 and 11 years) N= 14
  - G1O (without technology and aged between 12 and 19 years) N= 40
  - G2Y (with technology and aged between 6 and 11 years) N= 33
  - G2O (with technology and aged between 12 and 14 years) N= 13

# FIGURE 1. AVERAGE TOM SCORE IN FOUR GROUPS



G1Y: younger children without hearing technology

G2Y: younger children with hearing technology

G1O: older children without hearing technology

G2O : older children with hearing technology

# STATISTICS DIFFERENCES AMONG FOUR GROUPS ATTENDING TO HEARING TECHNOLOGY USE AND AGE

- Analysis of variance taking ToM score as dependent variable and hearing technology use and age as factor (4 groups) shows significant differences:  $F= 12,24, p < .01$
- Multiple comparisons with the Games-Howell post-hoc test show:
  - G1Y and the others groups ( $p < .01$ ) with average negative differences
  - G1O only with G1Y ( $p < .01$ ) with average positive differences
  - G2Y only with G1Y ( $p < 0.1$ ) with average positive differences

# CONCLUSION

- Current hearing technologies improve deaf children and teenagers' lexical competence and ToM development if compared with former cohorts.
- Children that didn't use current hearing technology show a low level of ToM competence. However, whenever children grow old this competence improve.
- Two factors mainly influence ToM development in deaf children and teenagers: the use of current hearing technology and linguistic competence (both very related to each other).
- In case of not being none of the former factors present, a richer experience is needed; then, we may conclude that being older is perhaps a necessary condition for reach an improved competence in ToM.

# REFERENCES

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