

SOCIAL INFORMATION-PROCESSING SKILLS IN DEAF ADOLESCENTS

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Abstract

Profoundly deaf people frequently experience difficulties with social competence (Rom & Silvestre, 2012). Previous studies have shown a link between social competence and the social information-processing skills (McGee, Bjorkquist, Price, Mattson & Riley, 2009). The current study assesses the social information-processing patterns of profoundly deaf adolescents using a paradigm based on Crick and Dodge's reformulated six-stage model (1994). It also explores the relationship between social information-processing skills and social competence.

The sample was composed of two groups of deaf and hearing age-matched participants (aged 13-21).

The participants were tested using a structured interview measure of social information-processing involving 18 videotaped vignettes of adolescents in group entry and provocation situations. Their social competence was assessed using "The Matson Evaluation of Social Skills in Youngsters" test (Matson, Rotatory & Helsel, 1983).

Deaf adolescents obtained lower scores than their peers in almost all the stages of Crick and Dodge's model (steps: *encoding, interpretation, clarification of goals, response generation, response evaluation* and *behavioral enactment*). With respect to social competence, deaf adolescents also showed less competence than their hearing peers, and in both cases, social competence correlated with social information-processing skills.

INTRODUCTION

Profoundly prelingually deaf people, in general, present lower levels of social competence than their hearing peers (Rom & Silvestre, 2012). Social competence is linked to patterns of social information processing (SIP) (McGee, Bjorkquist, Price, Mattson & Riley, 2009).

The "Six-stage model" of SIP of Crick and Dodge (1994) is extensively validated. According to this model, when people face a social situation, they carry out six sequential mental steps:

- Step one: They encode social cues. People focus their attention and encode certain external and internal social cues.
- Step two: Interpretation of social cues. From the relevant social cues, they construct a mental representation of the situation.
- Step three: Clarification of goals. People establish their goal in that situation.
- Step four: Response access or generation. People access one or more responses stored in their memory or, if the situation is novel, they generate one or various responses to that situation.
- Step five: Response decision. They assess the possible responses as a function of their appropriateness and the expected results and choose the one they think is the most favorable.
- Step six: Behavioral enactment. They carry out the selected response.

Effective processing at each step determines a socially competent behavior, whereas erroneous or biased processing leads to the emission of a socially maladaptive behavior. Each step is necessary but insufficient by itself to respond adequately and efficaciously. Contrarily, the steps are related to each other.

The application of the SIP model has allowed us to better understand the origin of behavior problems of different populations of children with diverse types of disabilities (intellectual impairment, autism spectrum disorders, etc.) but till now, it has not been applied to people with loss of hearing.

It is reasonable to think that the loss of auditive information, the scarce quality of the communicative-linguistic code, and the lack of social interactions—which very frequently accompany deafness—may impair certain mental processes involved in the SIP of deaf people. Thus, some researchers have suggested that the socio-emotional adaptation problems observed in deaf people may be due to their delayed acquisition of perspective-taking (Weissel & Bar-Lev, 1992), social attribution skills (Kusché & Greenberg, 1983), and theory of mind (González, Barajas, Linero, & Quintana, 2004), all of which are very closely related to SIP.

The current study assesses the social information-processing patterns of profoundly deaf adolescents using the paradigm based on Crick and Dodge's (1994) reformulated six-stage model also attempting to explore the relationship between social information-processing skills and social competence.

METHOD

Participants

The sample was made of two groups: 32 deaf adolescents (13-21 years) and 20 hearing adolescents (13-21 years). Table 1 presents the main characteristics of both groups.

Table 1. Characteristics of the study participants

Groups	N	Age (SD)		Gender	VMA M (SD)	NV-IQ M (SD)
		M (SD)	Range			
Deaf	32	16:2 (2.52)	13-20:11	20 – 12	7:4 (3.02)	95.38 (9.77)
Hearing	20	16:2 (1.96)	13:2-20:11	11 – 9	14:10 (2.66)	94.91 (8.70)

Age (Years: months), Range (Years: months), Gender (Male-Female), VMA: Verbal mental age (Years: months), NV-IQ: Nonverbal IQ.

The deaf adolescents presented severe or profound bilateral pre-lingual disability, with no associated disorders. All of them had been orally educated and had an optimum level of competence in oral speech to be able to perform the tests orally. Twenty-one of the youths used hearing aids and 11 had received cochlear implants. The average time since receiving the implant was 9 years ($SD = 2.14$). Mean age when receiving the implant was years 5.33 years ($SD = 1.74$).

All the participants of the sample had a nonverbal IQ within the normal range. The two groups of the sample were matched in age, gender, and nonverbal IQ.

Instruments

SIP Task

A SIP test was designed, consisting of a structured interview after having viewed short scenes of social situations. The scenes present social situations adolescents in group entry and provocation situations, with three types of peer intention (benign, ambiguous, and hostile). There was total number of 18 scenes (9 of adolescents in group entry and 9 of provocation situations, and within each one, three stories for each type of intention).

First, each participant viewed the social scene and subsequently completed an individual structured interview, with questions corresponding to the six steps of the Crick and Dodge (1994) model. Specifically, the interview included the following questions: "What happened in the story we just saw?" (to evaluate Step 1, encoding), "Why did the other youth act that way?" (to assess Step 2, interpretation; responses were coded as "hostile" or "non-hostile"), "What would you like to happen next?" (to assess Step 3, goal clarification; responses were coded as "competent", "aggressive", "inept", "irrelevant"; the proportion of each responses across stories was calculated), "What would you say or do if this happened to you?" (to assess Step 4, response generation; the responses were coded as "competent", "aggressive", "inept" or "irrelevant"). In the Step 5, response decision, children viewed three possible response strategies (i.e., aggressive, competent, and inept) and were asked: "Would the other youth like you to do or say that?" (to assess the affiliation), "Is this response effective to obtain the desired result?" (to assess the instrumental outcome of the response). And, lastly, the participant was requested to enact a competent response to the event (to evaluate Step 6, enactment; responses were coded on a scale of 0 to 4, based on the quality).

Nonverbal intelligence test

To assess nonverbal IQ, we administered the Perceptive Reasoning subtests of the Wechsler Intelligence Scale for Children WISC-IV (Wechsler, 1974/2005) to participants under 17 years of age, and the Manipulative Scale of the Wechsler Intelligence Scale for Adults WAIS-IV (Wechsler, 1997/2005) to participants over years 17 of age.

Social competence test

The social competence was assessed using "The Matson Evaluation of Social Skills in Youngsters" (MESSY; Matson, Rotatori, & Hiesel, 1983). Specifically, we used the teacher version, to be completed by the student's tutor. This version is made up of 64 items on which the teacher rates the degree to which each statement describes the relationship of the student with others, using a 5-point Likert-type scale ranging from 1 (*not at all*) to 5 (*very much*). The higher the score obtained the higher degree of social inadequacy.

Linguistic competence test

The Spanish Peabody Picture Vocabulary Test (TVIP; Dunn, Dunn, & Arribas, 2006) was used to assess vocabulary in Spanish.

Procedure

Participants were assessed in two sessions in a classroom of their school. In the first session, they completed a questionnaire with their personal data, and we administered the Wechsler Intelligence Scale. In the second session, they completed the SIP test. Each tutor completed the MESSY social competence test at the same time as the SIP task was applied to the corresponding participant.

RESULTS

Table 2 shows the comparison between deaf and hearing adolescents in the diverse SIP variables, using the nonparametric Mann-Whitney *U*-test.

The results showed that the deaf adolescents obtained scores that were significantly:

- Lower than those of their hearing peers in the following steps:
 - Step 1 (with regard to mean encoding)
 - Step 3 (in clarification of competent goals)
 - Step 4 (in generation of competent responses)

- Step 6 (in response enactment).
- Higher scores in the steps:
 - Step 2 (interpretation): hostile attribution
 - Step 3 (goal clarification): formulation of aggressive, inept, and irrelevant goals.
 - Step 4 (response generation): generation of aggressive, inept, and irrelevant responses.
 - Step 5 (response decision): aggressive affiliation and inept instrumental response.

Table 2 Mean scores, standard deviations, effect size, and results of Mann-Whitney's *U*-test in the SIP variables of deaf and hearing adolescents

Variables	Deaf	Hearing	<i>U</i>	<i>ES</i> ^a	<i>p</i>	
Step 1: Mean encoding Encoding	1.52(0.21)	1.94(0.05)	2.00	.80	.000	
Step 2: Hostile attribution Interpretation	0.28(0.14)	0.14(0.11)	146.50	.48	.001	
	Non-hostile attribution 0.16(0.12)	0.11(0.08)	267.50	.23	.311	
Step 3: Goal clarification	Competent	0.81(0.14)	0.96(0.05)	68.50	.58	.000
	Aggressive	0.04(0.10)	0.00(0.01)	242.00	.27	.033
	Inept	0.06(0.07)	0.01(0.05)	192.50	.38	.007
	Irrelevant	0.07(0.08)	0.01(0.02)	147.50	.45	.001
Step 4: Response generation	Competent	0.71(0.13)	0.88(0.09)	99.00	.60	.000
	Aggressive	0.06(0.07)	0.02(0.05)	198.50	.31	.014
	Inept	0.13(0.09)	0.07(0.08)	194.50	.33	.018
	Irrelevant	0.08(0.08)	0.01(0.02)	148.50	.51	.001
Step 5: Response decision	Affiliation Competent	3.18(0.62)	3.23(0.28)	283.50	.05	.492
	Affiliation Aggressive	1.21(0.37)	1.04(0.10)	217.00	.29	.038
	Affiliation Inept	1.68(0.45)	1.85(0.38)	214.00	.19	.056
	Instrumental Competent	3.24(0.61)	3.39(0.26)	316.00	.15	.940
	Instrumental Aggressive	1.24(0.43)	1.09(0.11)	309.00	.23	.829
	Instrumental Inept	1.64(0.44)	1.29(0.19)	165.50	.45	.004
	Mean enactment	1.51(0.31)	1.80(0.20)	139.00	.48	.001

With regard to social competence, as assessed by the MESSY questionnaire, Mann-Whitney *U*-test differences between the two groups were found ($U(50) = 402$, $p = .007$, $r = .027$). Specifically, the deaf adolescents obtained significantly higher scores than the hearing adolescent ($M = 96.44$, $SD = 16.41$ versus $M = 87.25$, $SD = 16.15$, for deaf and hearing youths, respectively) in Social inadequacy (global score).

Table 3 presents the correlations between the SIP variables and the global score of the MESSY questionnaire in the two groups of the sample, using Spearman's Rho. Steps 2 (interpretation) and 5 (response decision) presented the highest significant correlation with social competence in both groups.

Table 3. *Correlations between the SIP variables and social competence (total score in the MESSY test, teacher version)*

	SIP Model	Deaf	Hearing
Step 1: Encoding	Mean encoding	.09	-.30
Step 2: Interpretation	Hostile attribution	.54**	.17
	Non-hostile attribution	-.55**	-.63**
Step 3: Goal clarificacion	Competent	.02	-.20
	Aggressive	.21	.26
	Inept	-.05	.19
	Irrelevant	.20	.01
Step 4: Response generation	Competent	-.02	-.35
	Aggressive	.17	.47*
	Inept	-.31	.22
	Irrelevant	.21	-.36
Step 5: Response decision	Affiliation	-.43*	-.36
	Competent		
	Affiliation	.28	.58**
	Aggressive		
	Affiliation Inept	.32	.26
	Instrumental	-.36*	-.64**
	Competent		
	Instrumental	.43*	.29
	Aggressive		
	Instrumental Inept	.18	-.04
Step 6: Enactment	Mean enactment	-.06	-.72**

Specifically in the group of deaf adolescents, the total MESSY score correlated significantly with the variables hostile attribution, competent affiliation and aggressive instrumental response. In the group of hearing adolescents, the highest correlation was between the variables generation of aggressive responses, aggressive affiliation, and mean enactment.

DISCUSSION

In general terms, deaf adolescents show poorer SIP performance than their hearing peers, because:

1st Step: Encoding of social cues: the deaf adolescents encoded relevant social cues more poorly. A possible lower exposure to social interactions and the information to be able to interpret them, which frequently accompanies the loss of hearing, may be responsible for the fact that deaf people do not adequately encode cues of social situations.

2nd step: Interpretation of social cues: the deaf adolescents performed an inadequate mental representation of the cues of the situation. They are more prone to make hostile attributions of other people's intentions. Their poor interpretation skills lead them to react aggressively more frequently, even in the absence of hostile intentions. These more frequent erroneous interpretations of the social situation by deaf adolescents may be due to their delay in the acquisition of social attribution (Kusché & Greenberg, 1983) and theory of mind (González et al., 2004).

In this regard, Kusché and Greenberg (1983) found that deaf adolescents presented delayed social attribution that made it impossible for them to make adequate cause-effect attributions in social situations.

Deaf adolescents have also been found to present delay in the acquisition of theory of mind (González et al., 2004; Russell et al., 1998), which would account for their difficulty to understand the desires, beliefs, and thoughts that explain and predict others' behaviors. The studies carried out with deaf children and deaf adolescents using tasks that assess theory of mind show that deaf people do not resolve these tasks at the same age as hearing people. This delay in theory of mind could justify deaf adolescents' difficulty in the 2nd step of SIP (interpretation).

3rd step: goal clarification: In comparison with their hearing peers, deaf adolescents are less prone to formulate competent goals and more prone to formulate inept, irrelevant, and hostile goals (i.e., vengeance) when asked to respond to the question "What would you like to happen next?" A prior history of few successful social experiences, in which one learns to act competently, could explain the poor results of deaf adolescents at this step.

4th step: response access or generation: deaf adolescents generate fewer competent strategies and more inept and irrelevant strategies than their hearing peers. These data agree with the findings in studies on resolution of interpersonal conflicts in deaf adolescents in which hearing youths were observed to employ more adequate and complex strategies than deaf youths (Puigcerver, 2003). It also coincides with observations of deaf children regarding their lower tendency to use assertive strategies and a higher tendency towards passivity and aggressiveness when compared to their hearing peers (Mies & Fornieles, 2010).

5th step: response decision: After watching an aggressive response as a possible solution to a social problem, deaf adolescents value it more positively than their hearing peers. Thus, after seeing an aggressive strategy, deaf adolescents tend to respond affirmatively to the question, "Would the other youth like you to do or say that?" Likewise, when watching an inept response, deaf adolescents also value it more positively than their hearing peers. These difficulties when deciding about the most socially competent response to a given situation may originate in their difficulties to encode (Step 1) and interpret (Step 2) social situations that involve deaf people. If social situations are not properly interpreted, these adolescents can hardly have the adequate criteria to decide whether or not a certain action is appropriate to a social conflict.

6th Step: Behavioral enactment: compared to their hearing peers, deaf adolescents create a poorer enactment of a socially competent response to the event. Again, the scarcity of social interactions that is typical of deaf people who lack a communicative code to share with others—or, at least, they do not master it like their hearing peers (the mean verbal mental age of the group of deaf adolescents is 7 years and 4 months)—would hinder the acquirement of the necessary social competence to display appropriate behaviors in social situations.

Ultimately, the application of the SIP model of Crick and Dodge (1994) has allowed us to detect important differences between deaf and hearing adolescents at all of the steps. The same model can be taken into account when designing educational actions to promote SIP in deaf people and, tied in with this, to promote their social competence.

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