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Human Development – Special Section: Autism Spectrum Disorder

Word loss trajectory in autism spectrum disorder: Analysis of home videos

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Abstract

The regression of previously acquired skills has been highlighted as a potential early indicator of Autism Spectrum Disorder (ASD). The aims of the study were to validate parental reports regarding the occurrence of word loss and to investigate the characteristics of the words and other skills in a child aged 42 months with ASD over a 10-month period. It is a longitudinal and exploratory case study using systematic observation. Ten home videos showing the child's behavior between 13 and 23 months of age were analyzed according to the home video observation protocol and PROTEA-R. A total of 171 episodes involving the investigated behaviors were identified, which included the use of 51 words (the majority being nouns). Word loss and loss of other skills (play and social abilities) were observed. Word loss was the first or primary motive for parental concern, reinforcing that this phenomenon constitutes a potential early indicator of ASD.

Keywords: autism spectrum disorder; child development; language; home videos; diagnosis.

PERDA DE PALAVRAS NO TRANSTORNO DO ESPECTRO AUTISTA: ANÁLISE DE VÍDEOS CASEIROS

Resumo

A regressão de habilidades previamente adquiridas tem sido destacada como um potencial indicador precoce do Transtorno do Espectro Autista (TEA). Os objetivos do estudo de caso longitudinal e exploratório, utilizando observação sistemática foram validar os relatos dos pais sobre a perda de palavras, investigar suas características e outras habilidades em uma criança de 42 meses com TEA ao longo de um período de 10 meses. Foram analisados dez vídeos mostrando o comportamento da criança entre 13 e 23 meses de idade de acordo com um protocolo de observação de vídeos caseiros e do PROTEA-R. Analisamos 171 episódios envolvendo os comportamentos investigados, incluindo o uso de 51 palavras (a maioria substantivos). Observamos perda de palavras e perda de outras habilidades (de brincar e habilidades sociais). A perda de palavras foi o primeiro ou principal motivo de preocupação dos pais, reforçando que esse fenômeno constitui um indicador precoce potencial de TEA.

Palavras-chave: transtorno do espectro autista; desenvolvimento infantil; linguagem; vídeos caseiros; diagnóstico.

PÉRDIDA DEL VOCABULARIO EN EL TRASTORNO DEL ESPECTRO AUTISTA: ANÁLISIS DE VIDEOS CASEROS

Resumen

La regresión de habilidades previamente adquiridas es destacada como un potencial indicador precoz del Trastorno del Espectro del Autismo (TEA). Los objetivos del estudio de caso longitudinal y exploratorio, utilizando observación sistemática, fueron validar relatos de los padres sobre pérdida de vocabulario, investigar sus características y otras habilidades en un niño de 42 meses con TEA en un período de 10 meses. Se analizaron diez vídeos mostrando la conducta del niño entre 13 y 23 meses de edad de acuerdo con un protocolo de observación de vídeos caseros y el PROTEA-R. Analizamos 171 episodios que involucra los comportamientos investigados, incluyendo el uso de 51 palabras (la mayoría de ellos sustantivos). Observamos pérdida de vocabulario y pérdida de otras habilidades (jugar y habilidades sociales). La pérdida de vocabulario fue el primer o principal motivo de preocupación de los padres, reforzando que ese fenómeno constituye un indicador precoz potencial de TEA.

Palabras clave: trastorno del espectro autista; desarrollo infantil; lenguaje; videos caseros; diagnóstico.

1. Introduction

A meta-analysis study (Barger, Campbell, & McDonough, 2013) revealed that around 32.1% of children with autism spectrum disorder (ASD) experience a period of developmental regression (DR). Although there is no consensus on the operational definition of DR, it tends to be described as a significant or permanent loss or deterioration of previously acquired skills, where the duration and the time since the loss must be three months or more. This period has been used as a parameter for the stability of the loss.

Developmental regression can compromise language, social interaction, play, motor abilities, and self-care skills (Backes, Zanon, & Bosa, 2013; Kumar, Karmakar, & Mohana, 2014; Thurm, Manwaring, Luckenbaugh, Lord & Swedo, 2014). The common age for regression is between 18 and 21 months of age, based on parental recall or medical records that document the regressive episode (Barger et al., 2013). Specifically, with regards to language, studies have indicated that word loss tends to be characteristic of ASD children and differs from other conditions such as language disorders and intellectual disabilities (Pickles et al., 2009; Thurm et al., 2014).

For the present study, the definition of a word involves meaning, intentionality and spontaneity, based on the principles of the socio-pragmatic approach. A “word” is considered a linguistic symbol that consistently represents an object or event, when both the context and the child’s actions are in accordance with the word used, even when its form of presentation (structure) differs from the conventional form. However, it is still similar to the model given to the child (i.e., “moo” instead of “cow”). Thus, a word as a symbolic means used in a conversational flow must be understood by all agents of the interaction (Tomasello, 2003) and involve the coordination of different communication and interaction channels (i.e., words, visual contact, and affective expressions).

Symbolic elements may have different communicative functions, which follow an acquisition trajectory, beginning with imperative use and followed by a declarative function (Tomasello 2003), among other more complex ones. The imperative function involves requests and seeking assistance behaviors. The declarative function refers to the sharing of interests. Lexical acquisition of grammatical categories of words (nouns, verbs, adjectives) is also associated with linguistic development. According to the weaker version of the noun bias hypothesis, the child’s first lexical acquisitions consist of nouns and verbs, the first being the most frequent element and the basis of the children’s vocabulary at around 22 months of age, which is later composed of more complex grammatical categories of words, such as adjectives and pronouns (Nóro, Silva, Wiethan & Mota, 2015).

Considering the complexity of the language acquisition process, the pediatrician cannot always verify whether there is any type of regression in children around the second year of life (Boterberg, Charman, Marschik, Bolte, & Roeyers, 2019). This can occur even when parents report complaints regarding the loss of language skills previously acquired. A simple tool that can help expressively is the use of home videos filmed in the family environment to follow the development of the child. These videos can help pediatricians, speech therapists, and developmental psychologists in making decisions regarding recommendations.

The analysis of home videos prior to and/or after the loss of skills has been used in validating parental reports of DR, among other aspects, (Goldberg, Thorsen, Osann, & Spence, 2008; Maestro et al., 2006) as they allow the direct, objective and independent analysis of the children’s behavior. This method has contributed to the understanding of DR (Bernabei & Camaioni, 2001). Authors investigated the

occurrence of DR in a boy with ASD through the analysis of home videos. From 12 to 38 months of age, previously developed communication and social skills were gradually lost so that he no longer answered when called by his name, did not demonstrate social interest and rarely looked at his mother or at other children, and began to show repeated and stereotypical behaviors which then progressively intensified. These findings are helpful in elucidating the DR since the use of home videos allows for an objective analysis of the child's behavior before and after the loss of skills, thus validating the parental reports.

Goldberg et al. (2008) aimed to verify the consistency between parental accounts (based on the ADI-R) and the coding of home videos made by independent evaluators in 56 children with ASD. The results showed that parental accounts significantly matched the video codings regarding the age of acquisition of the first words and the loss of oral language skills. However, the results were inconsistent regarding the loss of non-linguistic skills (for example, social behavior and play). These findings may be linked to the fact that the Revised Autism Diagnostic Interview (ADI-R) does not investigate the loss of non-linguistic skills as thoroughly as it makes the loss of oral language. Accordingly, the authors highlighted the importance of using additional measures which can better evaluate the loss of non-linguistic skills. Similarly, Werner and Dawson (2005) aimed to validate parental reports regarding the occurrence of loss of skills, including words, using home videos of children with ASD and a history of DR, in comparison to children with ASD without DR and to children with typical development (TD). At 12 months of age, children with DR presented communication and Joint Attention (JA) behaviors similar to the TD group (not observed in the group with ASD without DR). At 24 months, the ASD groups showed similar behaviors in relation to difficulties with the social use of words and JA, differing significantly from the TD group.

Maestro et al. (2006) also used home videos to describe the early developmental trajectory of children with ASD and DR, in comparison to those with ASD without DR and to TD children at 18 months of age. Each group was made up of 15 children. The videos were divided into three time periods (0-6 months, 6-12 months, and 12-18 months). The ASD without DR group showed premature deficits in social attention. In the ASD with DR group, the skills associated with social attention kept developing up to the child's first birthday, when impairments in these skills began to show, in proportion to an increase in non-social attention. The

authors highlighted that the use of home videos in the investigation of DR was revealing in the sense that this allowed behavioral subtleties to be analyzed, which would otherwise only have been known through the parental accounts.

The usual clinical methods for the ASD diagnosis consume several hours of evaluation by interdisciplinary teams and can be expensive. This difficulty has led to the validation of evaluation methods based on home videos. Tariq et al. (2018) demonstrated the efficacy (with an accuracy of 92%) of US videos of machine learning classifiers to accelerate the process by collecting home videos of US-based children. They identified a reduced subset of behavioral features that can be scored by untrained raters to determine children's "risk scores" for ASD. Some of the characteristics indicative of risk were social initiation, eye contact, and social smile. Furthermore, even though the loss of words may potentially be an early indicator of ASD, there are still few studies involving the analysis of home videos that also investigate the characteristics of the words acquired before the loss occurrence (for example, grammatical categories of words, communicative function, coordination with other means of communication).

Accordingly, in the light of both the empirical and theoretical premises reviewed, it is plausible that children with ASD with a history of word loss have developed the basic socio-cognitive and socio-interactionist abilities. However, little is known about the kind of words produced by the children before the loss occurrence. Were those truly words, that is, linguistic elements composed of a single unit which intentionally express an idea towards a listener in conversational flow? Or were they mere repetitions of the other's speech, without spontaneity or intent? What grammatical categories of words were they assigned to? Were they used communicatively? If so, what was their communicative purpose? In what context were they used? Are parental reports a reliable way of collecting information about the loss of words and other skills? To answer these questions the present study aimed to validate parental reports regarding the occurrence of word loss through the home video analysis of a boy with ASD and history of DR. More specifically, the intention was to investigate the words used by the child before the loss – what grammatical categories they were assigned to (e.g., noun, verb, adjective, article, pronouns), the type of use (e.g., initiative and response), communicative function (e.g., imperative, declarative) and coordination with other means of communication (e.g., gestures, visual contact). Furthermore, considering that the word loss

was accompanied by the loss of other skills, the aim was to also investigate the occurrence of these skills in the video recordings (such as use of gestures, visual contact, and interest in interactive play).

2. Method

2.1 Participant

A systematic observation case study was conducted with a boy (named A.D. in the present study, in order to protect his identity as well as to facilitate the presentation of the results) aged three years and six months at the time of the first interview. The diagnosis was made according to the ADI-R results for ASD symptoms, and a history of loss of words and other skills, with no associated sensory impairments being observed. The case selection was made based on the following criteria: a) the number of home video recordings available (minimum of one video per month of age; b) video recordings that cover the age period from around 12 to 24 months; and c) video recordings of good technical quality (sound and image).

The video recordings registered the boy's development from the age of 13 months up until the month prior to word loss (at 23 months of age), as reported by the mother. From the total of 19 video recordings available from the family comprising the period, nine were excluded due to the poor technical quality of sound or image, which could compromise the analysis. The videos selected had different durations, varying from six seconds to two minutes and 37 seconds, with two videos at 13 months; one video at 17 months; two videos at 18 months; one video at 22 months; and four videos at 23 months.

2.2 Instruments

Socio-demographic data and child linguistic milestone acquisition chart: Family socio-demographic information, such as level of education, civil status, and living arrangements, as well as the acquisition of the main linguistic milestones were investigated. The chart was used in order to characterize the subject and his family and to investigate at what age his first vocalizations, words, and phrases were acquired.

The Revised Autism Diagnostic Interview – ADI-R (Lord, Rutter, & Le Couter, 1994): This is a semi-structured diagnostic interview for parents or caregivers of children with suspected ASD. Of the 93 total items, items 11 through to 28 are

specifically aimed at investigating the loss of skills (for example, language, social interaction, play, self-care), including associations with physical conditions, age when the loss occurred and its duration. In Brazil, the ADI-R was translated and validated (100% sensitivity and specificity) by Becker et al. (2012). In the present study, the ADI-R was used to confirm the presence of ASD symptoms as well as to investigate the loss of skills and current behavior.

Protocol for Evaluation of Children with Suspected Autism Spectrum Disorder: Revised Version – PROTEA-R (Bosa & Salles, 2018): For observing the behavior of children aged between 24 to 60 months with suspected ASD. The PROTEA-R evaluates the quality and frequency of the impairments. The Quality Scale investigates the reciprocity, flexibility, comprehensiveness, conventionality, consistency, and intensity of these behaviors. The Frequency Scale is coded according to the quantity of the behavior and is a Likert type scale, ranging from 1 to 3, in which 1 is “rare,” 2 is “occasional,” and 3 is “frequent.” The evaluation requires a 45-minute observation session and involves free and structured play. The psychometric properties were reported in Bosa and Salles (2018).

Inventory for Loss of Words and Other Skills – IPP (Backes & Bosa, 2013): an instrument developed for evaluating the acquisition and subsequent loss of words and other skills. The IPP comprises two parts: part 1 investigates characteristics associated with word loss and aims to examine the grammatical categories of the words used by the child before and after the loss (noun, adjective, verb), quantity, communication purpose (imperative or declarative function, nomination), among other aspects; part 2 investigates the occurrence of the loss of skills in different areas of development and was used in order to examine whether the word loss was accompanied by losses in other areas.

An operational definition for the word loss, contemplated by the ADI-R and the IPP, was established: a) a minimum of five words should be lost; b) the word loss should be consistent across multiple contexts and not only in specific situations (such as in school), and c) the duration of the loss of words should be of at least three months.

Home Video Observation Protocol (HVOP): This was elaborated by the first author in order to analyze and code the videos and was based on the socio-pragmatic theory (Tomasello, 2003) and on empirical evidence regarding language acquisition, particularly in the Brazilian context (Nóro et al., 2015). This protocol is

comprised of two parts: a) word analysis that covers the categories word class, type of production, communicative function, and combined use with other means of communication; and b) loss of social interaction and play skills. This part was divided into three axes: 1) gestures; 2) vocalizations, facial and bodily expressions, categorized according to the type of use and coordination with words or means of non-verbal communication; and 3) exploratory, functional, symbolic and dyadic play, categorized according to interactivity criteria. The home videos were analyzed by two independent observers, and 64.4% of the agreement was reached between the two coders. When discrepancies were identified, a thorough examination of the items was conducted in order to reach a mutual agreement. Furthermore, a pilot study was carried out to ensure the protocol was adequate for the proposed objectives (Backes, 2016).

2.3 Procedures and Ethical Consideration

The present study was disclosed on social media and in associations for parents of children with ASD. The researcher was contacted via e-mail by the participant's mother, and the first interview was scheduled. From this first contact, the home videos were requested, so their technical sound and image quality could be analyzed. Four meetings were arranged for the application of the ADI-R with the boy's mother, behavioral observation of the child based on the PROTEA-R and the feedback interview with the mother. The participant's parents signed a consent form. This study was approved by the Research Ethics Committee according to resolution No. 466 of December 12th, 2012.

3. Results

At the time of the first interview, A.D. was three years and six months of age, did not attend school and received behavioral intervention and speech-language therapy. As reported by his mother, the first concern about A.D.'s development was the word loss, which occurred around 24 months of age, although in retrospect the mother was able to identify social impairments around the time the child was 16 months of age. His first vocalizations, words, and phrases were observed at 3, 12, and 23 months, respectively. A.D. was diagnosed at 32 months of age.

The information regarding the occurrence of loss of skills was provided by the IPP and the ADI-R. The loss of words was gradual and not related to stressful

events or health or family issues. He had lost between 41 and 50 words, including nouns, verbs, and adjectives, which he generally used before the loss with imperative purpose. He began to regain words at around 36 months of age and, currently, his vocabulary consists of around 50 words, including nouns and verbs, used with imperative and declarative function, although not as frequently and spontaneously as before the loss. In addition to the loss of words, the mother identified the loss of socio-communicative and play skills, such as the use of gestures (for example, pointing), social interest and interactive play, all of which were gradual and had lasted almost a year.

In order to evaluate A.D.'s characteristics at the time, two measures were used: the ADI-R and PROTEA-R. Regarding the ADI-R, scores were above the cut-off point, confirming the ASD diagnosis. He presented impairments in socio-emotional reciprocity and in the interaction with other children, in the use of gestures and visual contact, imitation and social and imaginative games, with circumscribed interests, and hand and body mannerisms. The PROTEA-R scores showed deficits in joint attention and in seeking assistance, alterations in the coordination of the means of communication, the occurrence of diffused smiles, deficits in symbolic play and imitation, repetitive use of objects, and repetitive hand and body behaviors (drumming or twirling of the fingers).

The information retrieved from the ADI-R and PROTEA-R, in addition to confirming the presence of ASD behaviors, was indicative of how the lost skills presented themselves at the time of A.D.'s participation in this study. The ADI-R and PROTEA-R data collection began around 18 months after the loss of the abilities. With regards to the oral language and more specifically to the use of words, although the mother identified that A.D. had around 50 words in his vocabulary at the time, her report in the ADI-R showed that these were not used in a functional way, which is consistent with the information observed during the PROTEA-R evaluation.

Regarding gestures, A.D. occasionally used some conventional gestures spontaneously, however, pointed to distant objects with a declarative purpose only a few times, according to the ADI-R. In fact, the PROTEA-R observations also rarely captured the use of gestures and, even when present, these tended to be isolated, without coordination with other means of communication (vocalization or visual contact). Finally, the ADI-R scores indicated that A.D. did not present pretend

play and did not tend to show interest in shared activities with other children, although he did begin to participate in some social games, however, with little spontaneity. In the PROTEA-R, the functional and exploratory play was observed. However, these activities were not very flexible, rarely initiated an interaction, and he generally only played socially at someone's insistence.

The analysis of the home videos investigated the use of skills before the occurrence of the loss of words, gestures, play, and other non-verbal means of communication. A total of 171 episodes of these categories were identified: 51 regarding the use of words, 42 of gestures, 23 of vocalizations, 34 of facial expressions, 6 of body expressions, 4 of exploratory play, 1 of functional play, 1 of symbolic play and 9 of dyadic play. The categorization of these behaviors in terms of frequency and percentage follows. All behaviors were coded by two independent coders, and the agreements above 70% were accepted. Disagreements were evaluated by a third coder. The final data was reached by consensus among the coders.

The grammatical categories of nouns contained the majority (64.7%) of the 51 words identified in the videos. Figure 3.1 shows the absolute frequency of the words identified according to the grammatical categories of the words.

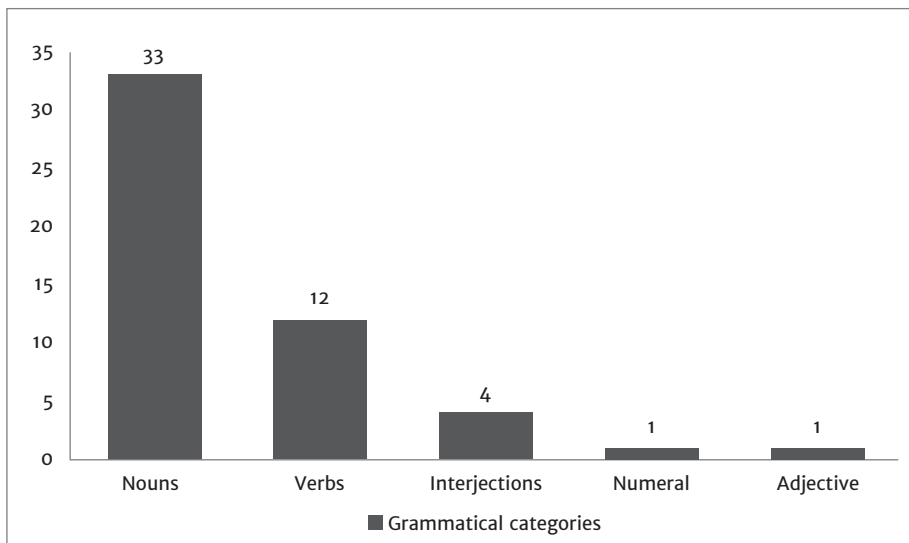


Figure 3.1. Frequency distribution of word grammatical category ($n = 51$).

Regarding the type of use of the words identified, 39.2% involved the child's own initiative, and 17.6% were responsive behaviors. The remaining words (43.1%) were subcategorized under "other types of use" and corresponded to the times they were said by an adult and A.D. repeated it (for example, the adult sang a song, and the boy sang it afterward). Of the 20 words initially used by the child, 15% had a declarative function, and only 5% had an imperative purpose. The remaining words could not be classified in terms of communicative purpose since, within the context, A.D.'s intent was not clear to the evaluators. It is emphasized that, in order to be classified as having an imperative or declarative function, the behavior should not only be clearly directed at the partner, but also be explicitly intentional (that is, it could not be based on inference). Thus, at times, the analysis was not achievable, and it was also due to limitations of the video recordings (for example, the child turned his head away during the episode). It was possible to observe that 70.6% of the words were accompanied by the use of non-verbal means of communication (for example, smiles, gestures) (see Figure 3.2) and 56.8% of these were clearly directed toward the partner through visual contact.

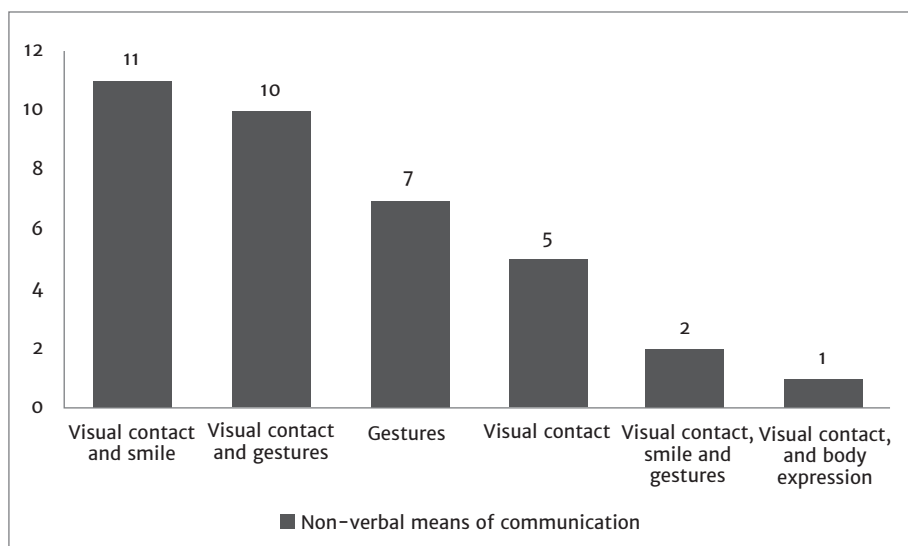


Figure 3.2. Frequency distribution of Coordination of the Use of Words with Other Means of Communication ($n = 36$).

The 42 gestures identified in the video recordings involved behaviors of clapping, waving, blowing kisses, greeting, showing parts of the body and reaching arms out asking to be held. Regarding the type of use, 50.0% of the gestures were considered to be of A.D.'s own initiative, 42.9% responses and 7.1% other types of use (that is, the child imitated the adult). Concerning the communicative function of the gestures considered to be of the boy's own initiative, 38.1% were categorized as having a declarative function and 14.3% imperative. As occurred regarding the words, A.D.'s intentionality was unclear for the remaining gestures, this being because of limitations in the video recordings, among other reasons. Of the 42 gestures observed, 33.3% were accompanied by words, and 73.8% coordinated with other means of communication (smile, visual contact, vocalization).

Considering the vocalizations, of the 23 observed, 56.5% were classified as being of A.D.'s own initiative, 13.0% as responses and 30.5% as other types of use (imitation of his interactive partner). Furthermore, 95.6% of the vocalizations were accompanied by non-verbal means of communication (gestures, smiles). A.D.'s facial expressions (towards the partner) were not categorized in terms of initiative or response due to limitations in the video recordings, since at times it was not possible to analyze the partner's face during the scene. Therefore, only the coordination of these expressions with other means of communication was analyzed (words, visual contact, gestures). The 34 facial expressions observed included smiles, 14.7% of which were coordinated with words and 82.3% with other means of communication (visual contact, gestures, and vocalizations).

The six body expressions identified in the videos involved choreographies to songs that were being sung during the analyzed scenes. Of the six, 50.0% were classified as A.D.'s own initiative, 33.3% as responses and 16.7% as other types of use (that is, the boy imitated his interaction partner). The body expressions were not accompanied by words. However, 66.7% of them were coordinated with other means of communication (visual contact, smiles, gestures).

In addition, four episodes of exploratory play involving manipulation of objects were identified, two of which were categorized as presenting interactive behavior (that is, the child explored the objects with a social partner). Regarding functional and symbolic play, both had one episode identified, which were classified as interactive (that is, the child played popping soap bubbles and pretended to speak on the phone, respectively). The nine episodes of dyadic play involved sing-

ing and dancing, eight of which (88.8%) were classified as interactive. No episode was identified in which A.D. was stimulated to play and did not respond to his interactive partner.

4. Discussion

The aim of the present study was to validate the parental report of the occurrence of word loss based on the analysis of home videos of a child with ASD and DR. The information obtained from the IPP and the home videos were consistent. The data from the ADI-R and the PROTEA-R demonstrated that the skills were significantly impaired at the time these data were collected; in other words, after the loss. More specifically, the communicative use of words and gestures, the coordination between communicative means and the interest in interactive play were all present in the videos recorded before the occurrence of word loss. However, they were not reported in the ADI-R or observed during the PROTEA-R. These results validate the mother's reports regarding the occurrence of the loss of words and socio-communicative and play behaviors, such as the use of gestures and interest in interactive play, corroborating other studies (Barger et al., 2013; Goldberg et al., 2008; Maestro et al., 2006).

Particularly with regard to the grammatical categories of the words used by A.D. before the loss, the most frequent type were nouns, followed by verbs, a result which was expected in this study. The video recordings were made when A.D. was between 13 and 23 months of age, a period in which, according to the weaker version of the noun bias hypothesis, a child's vocabulary is basically composed of these two classes, which are acquired simultaneously, with the nouns being the most frequent element (Nóro et al., 2015). Furthermore, it was possible to identify words used by A.D. in order to both initiate interactions and to respond, imitating his interactive partner and using words coordinated with other means of communication (visual contact, gestures, smile). The fact that behaviors of initiation and response were observed was to be expected since, at this stage, children understand themselves and others as intentional agents and are able to comprehend, experience and even direct the socio-communicative flow, even if this is at an early stage (Tomasello, 2003). However, contrary to the expectations, the use of the declarative function was more frequent than the imperative one. This may be explained by the nature of the home videos, which tended to involve social inter-

action situations and not essentially everyday scenes of a child's problem solving or needs. The first situations are characterized by enjoyment and sharing of interests, while the latter tend to involve requests and to seek assistance – subjects which are not usually the focus of home video recordings.

Consistent with the evidence previously presented, the present study identified the use of non-verbal means of communication (gestures, smile, and vocalizations) prior to the occurrence of the loss, not always accompanied by words but generally coordinated with them. In fact, considering A.D.'s age group (13 to 23 months) at the time of the video recordings, the use of non-verbal behaviors coordinated with oral language was to be expected (Iverson & Wozniak, 2016; Mundy, 2018). Furthermore, the coordination between these means of communication clearly directed toward the social partner reveals the shared intentionality in the interactive flow, which is reinforced by the observed episodes of interactive play (both face-to-face and mediated by an object). In these episodes, A.D. demonstrated that he shared cultural and socially learned activities with his interaction partner, even if these were at different levels of complexity (Tomasello, 2003).

Considering the previously presented aspects, the analysis of the characteristics of the words used by A.D. prior to the occurrence of the loss not only corroborates the IPP and the ADI-R scores, but also indicate that the boy's language was developing according to the standards expected for his age (Nóro et al., 2015). Therefore, in general, the words he used were linguistic elements used with the meaning to initiate or respond to conversational situations. However, a few repetitions of words took place after a model was identified, with the intentionality being unclear, leading to a disagreement between the coders in classifying the communicative purpose of these words. Similar characteristics were found in relation to the non-verbal means of communication (gestures, visual contact, facial expressions), which were frequently directed at another person and used in a coordinated manner during the communicative context, according to the expected developmental standards (Iverson & Wozniak, 2016; Mundy, 2018). In turn, the episodes associated with play, although not frequent, demonstrated that A. D. was interested in interactive and shared activities by the end of his first year. Thus, it is a fact that A.D. had skills used during social interaction, which were later lost and had not yet been fully recovered at the time the present study was conducted. In relation to this assertion, it has been discussed whether DR constitutes a true loss

or a developmental stagnation. However, there is still no consensus among researchers (Lampreia, 2013). In any case, A.D.'s loss of skills seems to be a rupture, not only at the level of the symbolic elements themselves (that is, words and gestures), but also, and more importantly, in the social and culturally shared experiences during the social interactions.

The results of the present study revealed important aspects of A.D.'s development prior to the loss of skills, which were only possible to access retrospectively through the analysis of the home videos. In fact, the use of these videos proved to be relevant, despite the methodological issues inherent to the use of non-standardized recordings (Tariq et al., 2018). Furthermore, it is considered that the results regarding the characteristics of the words used by A.D. before the loss provide important information for a better understanding of the initial linguistic development of children affected by this phenomenon. In this manner, it is considered fundamental to conduct new studies in the field, including a greater number of cases and widening the scope of the analysis to co-related skills, such as joint attention. Furthermore, the development of prospective studies involving children at risk for ASD could be helpful in understanding the process of word loss occurrence.

It is highlighted that although the skills later lost by A.D. were observed on the home videos, the possible existence of qualitative deficits in play and socio-communicative behavior, including language, at the time of the recordings (that is, before the loss of the skills), should be considered. This would constitute another investigative focus and would require a different type of analysis. Therefore, the present study has limitations which need to be highlighted. The use of home videos prevented a greater precision in the method, with regard to the observed situations, limiting the analysis of some aspects, such as the type of use and communicative function of the behaviors investigated. Furthermore, being a case study, the investigation was centered on exploring the analyzed phenomenon in detail and not on the generalization of the findings, making it possible that other children with ASD and history of loss of skills may present characteristics different from those found in this study, before and after the loss. Finally, the present study focused on the analysis of lost skills, while other socio-communicative behaviors, such as joint attention, were not investigated.

It is highlighted that frequently, as in A.D.'s case, the loss of words constitutes the first or primary reason for parental concern, even when other impair-

ments may be presented beforehand, possibly because these alterations are more subtle than the loss of this linguistic milestone. It is imperative, therefore, that professionals whose fields of work are associated with child development become familiar with the characteristics of word loss and its evolution. The wide array of published studies in the DR field clearly shows that it is not a case of parental “delusion” or any other emotional artifices, but that it is a real phenomenon which affects a significant number of children later diagnosed with ASD. Accordingly, all evaluations, including the routine kind, should address the investigation of the occurrence of word loss. Interventions can, therefore, begin early, minimizing possible negative outcomes and, consequently, fostering the development of the child.

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