The dialogical argumentation

three illustrations in different moments of development

La argumentación dialógica: tres ejemplos en diferentes momentos de desarrollo
A argumentação dialógica: três exemplos em diferentes momentos de desenvolvimento

Nadia Soledad **Peralta**
Florencia **Mareovich**
Mariano Andrés **Castellaro**

Resumen

Argumentation is a social situation that enables individuals to construct arguments either in favor of or against a particular position. It also facilitates the recognition, evaluation, and consideration of both their viewpoints and those of their peers. The cognitive advantages of this process are boundless, allowing for epistemic change and the collaborative construction of meaning with others. This article aims to exemplify the occurrence of argumentative episodes at three developmental stages. Three examples of interactional situations were presented: a. Argumentative episodes created by 5 – and 6-year-olds through various types of verbal expressions; b. socio-cognitive composition, social-emotional affinity, and argumentative episodes in the collaborative comprehension of frequency tables in sixth and seventh grade; and c. group composition and argumentation in resolving a dilemma task among university students. In the three scenarios described, the prevalence of argumentative episodes varies: young children tend to produce a simple type of argument (i.e., responding to a question) whereas older subjects present more complex arguments (involving conflict). The emergence of the more complex type of argumentative episode is contingent on the development of a set of cognitive skills over one's lifetime. As they grow, the influence of social interaction variables becomes increasingly significant. Our studies underscore the educational significance of argumentation, owing to its dual communicative and social functions.

Abstract

La argumentación es una situación social que permite a los individuos elaborar argumentos a favor o en contra de una posición determinada, y reconocer, evaluar y considerar puntos de vista propios y ajenos. Como resultado, el beneficio cognitivo es ilimitado, permitiendo incluso el cambio epistémico y la negociación de significados con otros. El objetivo del artículo es ejemplificar cómo los episodios argumentativos aparecen en diferentes momentos. Se presentaron tres ejemplos de situaciones de interacción: a. episodios argumentativos realizados por niños de 5 y 6 años en diferentes tipos de producciones verbales, b. composición socio-cognitiva, afinidad socio-emocional y episodios argumentativos en la comprensión colaborativa de tablas de frecuencia en sexto y séptimo grado; c. composición grupal y argumentación en la resolución de una tarea dilemática en estudiantes universitarios. Se utilizaron episodios argumentativos en los cuales un individuo emite una verbalización fundamentada como respuesta a una pregunta o en oposición a las que plantean otros (conflicto). Se observó que la predominancia de los episodios argumentativos es diferente: los niños pequeños tienden a producir un tipo simple de argumentos (respuesta a una pregunta), mientras que las personas mayores presentan argumentos más complejos (conflicto). Para que ocurra el segundo tipo de episodio argumentativo, el individuo necesita un conjunto de habilidades cognitivas que se desarrollan a lo largo de la vida. A medida que crecen, el impacto de las variables sociales de interacción se vuelve más significativo. Nuestros estudios resaltan el valor educativo de la argumentación debido a su funcionalidad comunicativa y social

Resumo

A argumentação é uma situação social que permite aos indivíduos elaborar argumentos a favor ou contra uma posição específica, reconhecendo, avaliando e considerando pontos de vista próprios e alheios. Como resultado, o benefício cognitivo é ilimitado, permitindo inclusive a mudança epistêmica e a negociação de significados com outros. O objetivo do artigo é exemplificar como os episódios argumentativos surgem em momentos diferentes. Foram apresentados três exemplos de situações de interação: a) episódios argumentativos realizados por crianças de 5 e 6 anos em diferentes tipos de produções verbais, b) composição sócio-cognitiva, afinidade sócio-emocional e episódios argumentativos na compreensão colaborativa de tabelas de frequência no sexto e sétimo ano; c) composição grupal e argumentação na resolução de uma tarefa dilemática em estudantes universitários. Episódios argumentativos foram utilizados, nos quais um indivíduo emite uma verbalização fundamentada como resposta a uma pergunta ou em oposição às questões apresentadas por outros (conflito). Observou-se que a predominância dos episódios argumentativos é diferente: as crianças pequenas tendem a produzir um tipo simples de argumento (resposta a uma pergunta), enquanto as pessoas mais velhas apresentam argumentos mais complexos (conflito).Para que ocorra o segundo tipo de episódio argumentativo, o indivíduo precisa de um conjunto de habilidades cognitivas que se desenvolvem ao longo da vida. À medida que crescem, o impacto das variáveis sociais de interação se torna mais significativo. Nossos estudos destacam o valor educacional da argumentação devido à sua funcionalidade comunicativa e social.

Citar como:

Dra Nadia Soledad **Peralta**, Psi
ORCID: 0000-0001-9950-6949

Source | Filiacion:
Consejo Nacional de Investigaciones Científicas y Técnicas (CONICET), Instituto Rosario de Investigaciones en Ciencias de la Educación (IRICE), Rosario, Argentina. Facultad de Psicología, Universidad Nacional de Rosario, Argentina

BIO:
Psicóloga. Profesora de Psicología. Doctora en Psicología.

City | Ciudad:
Rosario [ar]

e-mail:
nperalta@irice-conicet.gov.ar

Dra Florencia **Mareovich**, Psi
ORCID: 0000-0002-9052-5438

Source | Filiacion:
Consejo Nacional de Investigaciones Científicas y Técnicas (CONICET), Instituto Rosario de Investigaciones en Ciencias de la Educación (IRICE), Rosario, Argentina. Facultad de Psicología, Universidad Nacional de Rosario, Argentina

BIO:
Psicóloga. Doctora en Psicología

City | Ciudad:
Rosario [ar]

e-mail:
mareovich@irice-conicet.gov.ar

Dr Mariano Andrés **Castellaro**, Psi
ORCID: 0000-0001-5470-9662

Source | Filiacion:
Consejo Nacional de Investigaciones Científicas y Técnicas (CONICET), Instituto Rosario de Investigaciones en Ciencias de la Educación (IRICE), Rosario, Argentina. Facultad de Psicología, Universidad Nacional de Rosario, Argentina

BIO:
Licenciado en Psicología. Profesor de Psicología. Doctor en Psicología

City | Ciudad:
Rosario [ar]

e-mail:
castellaro@irice-conicet.gov.ar

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Introduction

Argumentation is a socio-cognitive process that invariably unfolds within social interactions **(Baker, 2020; Felton et al., 2019)**. The genesis of argumentation lies in communicative exchanges that occur in diverse contexts characterized by varying degrees of formality **(Kuhn, 1991; Mercier & Sperber, 2011; Sperber, 2000)**. It creates a social context in which individuals construct arguments, either in support of or against a specific standpoint, and engage in the recognition, evaluation, and consideration of their own perspectives as well as those of their peers. As a result, the cognitive advantages stemming from this socio-cognitive process are boundless, facilitating epistemic change and the collaborative construction of meaning with others **(Castellaro & Peralta, 2020; Felton & Kuhn, 2001; Perret-Clermont et al., 2019)**.

From an interactional perspective, argumentation inherently entails a conflict of viewpoints among participants. Socio-cognitive conflict **(CSC)** emerges when two or more subjects collaborating on a task encounter disagreement regarding its resolution **(Butera, et al., 2019; Staerkle & Butera, 2017)**, necessitating the consideration of each partner's perspective. This phenomenon requires a complex cognitive process, activating both psychological and discursive processes **(Billing, 1987; Perret-Clermont et al., 2019)**.

Moreover, it frequently occurs that conflict arises without a clear opposition between participants. Instead, conflict can emerge when one participant questions their partner about specific dimensions or aspects of a position. This phenomenon is called expanded CSC, and it occurs when one participant's intervention lead to an expansion of the partner's field of action. This expansion transpires without explicit expressions of disagreement but rather through the use of questions that prompt the other person to clarify or modify their representation of the issue **(Peralta, 2012)**.

In summary, an argument can be presented in two situations: the CSC (in strict sense) and expanded CSC. As such, we define an argumentative episode as a socio-cognitive situation consisting of two essential elements. First, it involves the articulation of a grounded verbal expression or a set of them to justify the reason of an idea, in order to address a task. Secondly, the verbalization is sent as an answer to a previous question (type 1), or as a contrasting reply to a previous assertion (or assertions) made by the other person (type 2) **(Peralta y Roselli, 2018)**.

From a developmental perspective, the second type of argument is more intricate than the first as it entails holding in mind two or more distinct viewpoints. In that sense, examining argumentative episodes at three stages of development is not only vital for understanding argumentative competition but also offers valuable insights into interactive development. Recent studies, for instance, have showed that children begin to conceive different points of view and construct arguments from an early age, typically around four years old **(e.g., Migdalek & Rosemberg, 2014; Migdalek, Rosemberg, et al., 2014; Migdalek, Santibáñez, et al., 2014; Rosemberg et al., 2021)**.

The primary aim of this paper is to provide examples of dialogical argumentation at three stages of cognitive development. The first example focuses on children aged 5 and 6, who engage in constructing verbal expressions, narratives, and descriptions while interacting with a researcher. Descriptions involve the presentation of elements depicted in pictures, while narratives encompass both verbal components (e.g., the use of causal and temporal conjunctions) and non-verbal cognitive skills (e.g., inference and identification of key concepts), as established by prior research **(e.g., Berman & Katzenberger, 2004; Shapiro & Hudson, 1991)**. The A previous study showed that children tend to produce narratives when presented with unrealistic pictures during interaction, while more realistic images promote the generation of descriptions **(Mareovich et al., 2020)**.

In this context, we inquire the nature of the productions that give rise to argumentative episodes. Our hypothesis is that, owing to their cognitive demands, narratives are more likely to lead to increased instances of argumentation.

We find this topic intriguing for several reasons: 1) It's uncommon to explore argumentative episodes in everyday activities that do not involve conflicts; 2) Such experiences could assist parents and teachers in designing educational activities aimed at enhancing argumentative skills; and 3) This research could offer valuable insights for developing educational materials.

The second example involves 11 – and 12-year-old children who participated in a comprehension task based on a frequency table. They collaborated with peers of either similar or different cognitive comprehension levels and with or without social-emotional affinity. This mixed analysis of cognitive competence and socio-affective affinity is aligned with the third generation of socio-cognitive interaction studies **(Psaltis et al., 2009)**, which advocates for the inclusion of psycho-social factors as regulators of the relationship between social interaction and devel-

opment. Thus, it was considered the spontaneous occurrence of argumentative episodes during peer interactions **(Zadunaisky Ehrlich, 2017)** in relation to these psychosocial variables.

In the final example, the participants consist of young adults, all of whom are freshman university students with an average age of 18 years. They engaged in dyads and triads to tackle a dilemmatic task aimed at assessing the impact of group size. Group size is recognized to play a significant role in the outcomes of interaction, particularly in studies that center on the analysis of argumentative expressions, primarily due to their educational significance **(Peralta y Roselli, 2017)**.

In summary, this paper aims to exemplify three distinct moments of the argumentation process, each characterized by interpersonal interaction, whether involving children and adults or peers.. The objective of this work is not to compare these groups, as the examples encompass different age groups and types of tasks. Instead, the goal is to demonstrate the occurrence of "argumentative episodes" at various points in time. In this regard, this research contributes valuable data to existing lines of inquiry in the field of argumentation, particularly those that emphasize the role of interaction.

Example 1. Argumentative episodes made by 5 and 6 year-olds in different types of verbal productions

The main objective of this study was to analyze argumentative episodes that emerged in various types of children's verbal production, with the aim of explore whether different oral productions contribute to the development of argumentation skills. Initially, we examined the types of verbal productions generated by 5 and 6-year-old children in response to various pictures during interactions with an adult. This inquiry was previously explored in a study where a qualitative analysis of the productions was undertaken **(refer to Mareovich et al., 2020)**. Subsequently, we identified argumentative episodes within these productions and sought to understand which types of verbal expressions were conducive to the emergence of argumentative episodes. In doing so, this research addressed two early and significant challenges: the development of argumentative skills and the development of narrative competence.

Narrative refers to the temporal organization of successive events that adhere to a specific grammatical structure **(McCabe & Peterson, 1991; Stein & Gleen, 1979)**. A well-structured story typically comprises an introduction, descriptions of the emotional and cognitive states of characters, and one or more instances of conflict and resolution. Constructing a narrative necessitates the use of various cognitive skills, including inference-making, main idea identification, summarization, prediction, comprehension of causal and temporal sequences, and more **(Pressley et al., 1994; Bornens, 1990; Snow & Ninio, 1986)**. From a linguistic perspective, narrative also involves mastery of several linguistic structures, such as temporal and causal connectors **(Alarcon-Neve & Auza-Benavides, 2015)**.

In terms of the development of argumentative skills, several studies have showed that children as young as three years old can articulate their viewpoints and construct arguments **(e.g., Crespo, 1995; Köymen, et al., 2014; Migdalek & Rosemberg, 2014; Migdalek, Rosemberg, et al., 2014; Migdalek, Santibáñez, et al., 2014)**. In these productions, children frequently employ causal connectors like

'but,' 'because,' and 'therefore.' The study of argumentation has encompassed various contexts, including play **(e.g., Manrique & Rosemberg, 2009; Migdalek & Rosemberg, 2014; Migdalek, Rosemberg, et al., 2014; Migdalek & Rosemberg, 2020; Wyman, et al., 2009)** and disputes **(e.g., Dunn & Munn; 1987; Migdalek & Rosemberg, 2020; Migdalek, Santibáñez,et al., 2014)**.

While some studies have employed conflictive narratives to explore how children resolve conflicts and develop arguments **(e.g., Stein & Albro, 2001)**, it is less common to investigate the spontaneous emergence of argumentative episodes in various types of oral productions. A recent study **(Mareovich et al., 2020)** revealed that narratives tend to contain more causal connectors, such as 'because,' compared to other forms of oral expression, like descriptions. The use of these connectors has been recognized as a significant tool for constructing arguments. So, we hypothesize that, owing to the linguistic and cognitive demands involved, narrative may be a form of verbal production that fosters the occurrence of argumentative episodes.

A total of forty-six boys and girls, with an average age of 5.9 years (SD=3.4 months, R= 5.4-6.8 years), hailing from a private school (city and country details omitted to maintain author anonymity), participated in this study. A convenience sample was utilized. The participants were divided into two different classrooms, with each group assigned to one of the experimental conditions: realistic or unrealistic. Written consent was obtained from both parents and the institutions. The mothers' average age was 37 years, and the fathers' average age was 38 years. The educational level of both mothers and fathers was predominantly at the university level. As per parental reports, they regularly engage in picture book reading routines with their children.

A total of twelve drawings were printed on standard paper sheets measuring 29.7 cm x 21 cm. These drawings were then divided into two sets, each consisting of six pictures: one set comprised realistic images depicting people with their pets, while the other set featured unrealistic illustrations portraying anthropomorphic animals, such as a cat wearing a t-shirt and pants. Both sets conveyed similar information but presented it in different formats, depicting the organization of a party (see Figure 1).

Figure 1. Sets of pictures for unrealistic (left) and realistic (right) conditions

At school, the children underwent individual evaluations in a quiet room, conducted by the researcher. The experimenter presented each child with a set of pictures (either realistic or unrealistic) and encouraged them to create a story. She asked, "Have you seen these pictures? Can you tell me a story? Can you put it together?" The child's task was to arrange the pictures in order and construct a narrative. The stories evolved within a dialog context, with the experimenter posing various questions. These questions were spontaneous and non-standardized, varying according to the interaction. They served to elicit more details about the story or the descriptions (see Table 1). The only condition for the questions was that they were requests for clarification related to the production, either asking for additional details or repeating the last word spoken by the child. For example: Why are they sad? Is the fairy trapped? Did everyone go to the birthday party? The interactions were recorded and transcribed, with each session lasting approximately 15 minutes.

Table 1.

Examples of experimenter's questions and preschoolers' answers found in the narrations and descriptions

Type of production	
Descriptions	**Narrations**
E: What happen in this story P: The birthday boy who comes to the birthday party.	E: The little fish fell into the water and the little bird saved him? P: Yes, they were worried because he had fallen into the water and they thought he couldn't swim. The cat is scared and the dog is worried. But they already saved him.
E: What happen in this story? P: This boy goes here, and this one has a paper in his hand.	E: What happen in this story? P: They couldn't have the party but then they could. They are making an invitation. So, they wanted to have a party, at first they couldn't because they had not invited friends. But later they could because they made invitations and all the friends came.

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Initially, we categorized the children's productions into two types: Narration and Description. We analyzed the global child's production. We compared the frequency of these production types between the realistic and unrealistic conditions using the Chi-Square test **(for a more detailed explanation of this analysis, please refer to Mareovich et al., 2020)**. The category system was developed based on theoretical dimensions related to content and text structure, drawing from prior research **(Berman & Katzenberger, 2004; Bornens, 1990; Paris & Paris, 2003)**: (1) Narrations: Verbal stories characterized by a beginning, a conflict or an emotional state, and a resolution of the conflict or change in state; (2) Descriptions: Verbal expressions about the characteristics or properties of the pictures (e.g., "red bird") or events (e.g., "the cat came"). The descriptions may vary in detail, but they do not integrate information from different pictures. Furthermore, the descriptions may depict actions, but these actions are not interconnected within a narrative or causal plot.

The judges' classifications exhibited a high level of agreement (Kappa ≥ .85). We identified a total of 23 narrations and 23 descriptions. Notably, the majority of preschoolers in the unrealistic condition created narrations, while children who worked with realistic pictures tended to construct descriptions. This difference between the two conditions was statistically significant $(X2 (1, N=46) = 19.71, p < .0001)$. In other words, it appears that unrealistic pictures facilitate the construction of stories by children.

Subsequently, we identified argumentative episodes in the interactions. To classify them, we followed the coding system explained in the introduction. We then compared whether these argumentative episodes appeared with equal frequency in narrations, descriptions, or both productions using the Chi-Square test.

Consistent with the type of task and the children's ages, we identified argumentative episodes of Type 1. That is, episodes that referred to a socio-cognitive situation in which children emit a verbalization as feedback to a previous question posed by the adult. The distribution of the experimenter's questions is homogeneous in narrations (38) and descriptions (40). The questions were spontaneous, guided by children's production. The initial question was consistently, 'What happens in this story?' Then, the experimenter asked more questions to elicit further details or assist the children in continuing their narratives.

When we examined the nature of responses provided by preschoolers in both types of production, we observed that narrations enabled the justification of ideas and the provision of additional details about the story plot. In essence, questions within a narrative context tended to lead to argumentative episodes that veered toward resolving the task. On the other hand, responses generated in descriptive interactions were often binary (yes or no) or explanatory. Significantly different responses were evident between the narrative and descriptive contexts $(X2 (1, N=78) = 9.76, p < .01)$.

Example 2. Socio-cognitive composition, social-emotional affinity, and argumentative episodes in the collaborative comprehension of frequency tables in sixth and seventh grade

The current study aimed to examine the impact of socio-cognitive composition and social-emotional affinity on the production of argumentative episodes. Our study involved dyads collaborating to complete a comprehension task involving a frequency table, with participants in the 6th and 7th grades. This dialogic-interactive perspective on argumentation complements traditional approaches that have explored argumentation from an individual standpoint among individuals of similar ages **(e.g., Auriac-Peyronnet, 2001; Coquin-Viennot & Coirier, 1992)**.

The mixed examination of cognitive competence and socio-affective affinity aligns with the third generation of studies on socio-cognitive interaction **(Psaltis et al., 2009)**. This approach advocates for the inclusion of psycho-social factors as regulators of the relationship between social interaction and development. From this situated-psychosocial perspective, it's crucial to recognize that the equality or inequality of specific cognitive competencies between partners (socio-cognitive composition) is not solely determined by the symmetry or asymmetry in socio-cognitive interaction **(Asterhan, et al. 2014; Castellaro & Roselli, 2018; Schmitz & Winskel, 2008)**. Other psycho-social factors, such as gender, popularity, friendship, and more, also play a role in terms of social influence **(Leman & Duveen, 2003; Psaltis & Zapiti, 2014; Zapiti & Psaltis, 2019; Sorsana et al., 2013)**.

The concept of social-emotional affinity is closely tied to the idea of inter-individual feelings, as proposed by Piaget **(1968)**, encompassing the polarity of sympathy and antipathy. In this perspective, feelings of sympathy tend to emerge towards individuals who share the subject's interests and hold them in high regard as a person. This dynamic implies mutual appreciation between partners and a shared set of values that foster interaction. Conversely, antipathy implies the absence of these elements.

The developmental emergence of inter-individual feelings typically begins in early childhood and becomes more intricate as development progresses **(Piaget, 1968)**. Early moral feelings often involve one-sided respect for a superior adult figure. In contrast, during the second stage

of childhood, mutual respect emerges as a new feeling associated with peer cooperation. This implies a reciprocal assessment between peers and is typically a foundation for friendships based on bilateral interpersonal valuation. This conceptual foundation supports the hypothesis of a connection between the socio-affective affinity of partners and their social interaction **(Jones, 2002; Strough et al., 2001; Sorsana et al., 2013)**.

This study examines the argumentation process within a comprehension task involving frequency tables among sixth and seventh-grade students. It combines (a) research on peer socio-cognitive interaction, as mentioned above **(Psaltis et al., 2009)**, and (b) studies on the appropriation of external systems of representation **(Pérez & Scheuer, 2017; Pérez et al., 2010)**.

This interrelation between these two lines of research contributes in two significant ways. Firstly, it extends socio-constructivist studies on peer interaction beyond the development of primary logical notions, such as conservation, number, or spatial rotation, which are emphasized by neo-Piagetian schools. It also establishes a developmental framework within a phase where children have access to more abstract thinking and effective peer social coordination, as seen in the later grades of primary education or the early years of secondary education. Furthermore, while traditional studies on comprehension, construction, and utilization of external representation systems predominantly focused on individual resolution **(e.g., García-Milá et al., 2014; Pérez-Echeverría et al. 2018)** or adult-child interactions **(e.g., Peralta & Salsa, 2011; Peralta et al., 2013)**, this study ventures into the realm of children's peer interaction.

An interactive approach posits that knowledge relies on external representational mediations (objective or material support), involving various systems. These systems include written language and other enduring external representations, each characterized by distinct features and levels of complexity, such as numerical notation **(Martí et al., 2016; Rodríguez et al., 2018)**, graphics **(Salsa & Gariboldi, 2017; Salsa & Vivaldi, 2017)**, or maps **(Maita et al., 2014)**, among others. Within this array, tables represent a specific system in which the external or objective representation of knowledge is achieved through a two-dimensional spatial format, defined by columns, rows, and cells resulting from their combination **(Martí, 2017)**.

More specifically, we focus on the process of argumentation during the collaborative construction of frequency tables, which involve the production of tables containing numerical values summarizing a set of data **(García-Milá et al., 2014; Martí et al., 2011)**. In formal education, the appropriation of these representation systems typically begins toward the end of primary education and is integrated into the mandatory curricular content in various countries.

Two independent variables were examined in this study: (1) the socio-cognitive composition of the dyad based on the individual comprehension level of the table for each subject, categorized as basic-basic or basic-advanced, and (2) the reciprocal social-emotional affinity of the dyad (affine or not affine). A total of 45 dyads (90 individuals) from the 6th and 7th grades with an average age of 12.3 (SD=0.5) from Rosario (Argentina) participated in the study. These participants were distributed across gender and grade. The subjects were selected through a non-probabilistic method. All participants gave informed consent and that of a responsible adult. This work considered the ethical guidelines for social research established by the National Scientific and Technical Research Council (CONICET), and the National University of Rosario (UNR), Argentina.

The experience had two phases: individual and collaborative. First, at school, children were collectively evaluated in the classroom by two researchers. Each participant analyzed a frequency table and answered 12 multiple-choice questions referred to their comprehension **(Gabucio et al, 2010)**. Each question corresponded to one of the four comprehension levels of the table: (1) direct reading of data, (2) comprehension of the table structure, (3) particular data inference, and (4) global data inference. General advanced competence was attributed to individuals who correctly addressed at least most of the items at levels 3, 2, and 1. On the other hand, general basic competence was assigned to subjects who did not fulfill some of the aforementioned conditions.

The second individual task focused on identifying reciprocal and nonreciprocal social-emotional choices **(Strough et al., 2001)**. In this task, each participant proposed ten classmates on a grid with whom they would like to work as a team. Social-emotional affinity was established between two participants when there were reciprocal choices among their top three preferences from the list. The choices had to be made among subjects of the same class. Non-affinity was determined when there was a complete absence of reciprocal choices among the ten classmates proposed (in this case, all students were willing to work with the non-chosen partner, according to ethical guidelines). This individual phase typically took no more than 30 minutes.

In the collaborative phase, four types of dyads were formed based on the outcomes of the previous evaluations: basic-basic with affinity, basic-basic without affinity, basic-advanced with affinity, and basic-advanced without affinity. One to two weeks after the individual phase, each dyad tackled the same table comprehension task as part of their collaborative assignment. Both partners were asked to solve the activity together, engaging in discussions to arrive at a shared decision for each question and the correct solution. This phase took place in a quiet room at the school and involved 4-6 dyads working simultaneously. There was no time limit imposed on completing the task, and the interactions were recorded and transcribed for analysis.

For each dyad, we calculated the quantity of items containing instances of argumentation (0 to 12). To determine the presence of argumentation in an item, we considered the occurrence of any argumentative episode during its resolution, irrespective of its duration or extent. The operational definition of an argumentative episode was provided in the Introduction section. To ensure the reliability of our analysis, a second observer independently analyzed 20% of the randomly selected material. The level of interpersonal agreement was found to be satisfactory (91% agreement; K=.70).Initial data exploration revealed a relatively low quantity of argumentative episodes (X=1.55; SD=1.51; Mdn=1). Only 25% of the sample recorded three or more argumentative episodes. Regarding socio-cognitive composition, symmetrical dyads exhibited a higher average of argumentative episodes (X=2.21; SD=1.59) compared to asymmetrical dyads (X=0.81; SD=1.03). This difference was statistically significant (t(43) = 3.45, p<.01, d=1.04, Δ=1.35, g=1.01). In terms of reciprocal social-emotional affinity, dyads characterized by this condition showed a slightly higher level of argumentative episodes (X=1,86; SD=1.56) compared to those that did not have this condition (X=1.29; SD=1.46), although this difference did not reach statistical significance (t(43) = 1.26, p>.05, d=0.37, Δ=0.39, g=0.37).Finally, when considering the interaction between both factors, the presence of social-emotional affinity increased the argumentation values in both symmetrical dyads [with affinity, X=2.90 (SD=1.52); without affinity, X=1.85 (SD=1.46)] and asymmetrical [with affinity, X=0.91 (SD=0.83); without affinity, X=0.64 (SD=1.21)]. In terms of the types of argumentative episodes (Type 1 and Type 2), those based on conflict between affirmations (X=1.20; SD=1.18) predominated over those that involved answering a previous question (X=0.36; SD=0.68), and this difference was statistically significant (t(44)

= − 4.78, p<.001, d=0.87, Δ=1.23, g=0.86). This pattern held regardless of socio-cognitive composition and/or social-emotional affinity.

Example 3. Group composition and argumentation in the resolution of a dilemmatic task, in university students.

Research on argumentation in the university environment has witnessed significant growth in recent decades, primarily driven by teachers' concerns about students' difficulties in expressing this skill. Most of these works explore argumentation in classrooms, but there are some researches employ experimental methodologies that focus on specific variables, primarily socio-cognitive ones. From this perspective, argumentative dialogue is regarded as the ideal context for knowledge construction **(Leitão, 2000; Pérez-Echeverría et al., 2016)** because, through the exchange of viewpoints with others, it serves the purpose of convincing and producing discourse to define and justify a position **(Baker, 1998)**. Thus, argumentation is an undeniable dialectical and social activity **(Gutiérrez & Correa, 2008)**.

Research conducted in recent decades has shown the impact of group size on task resolution and the cognitive outcomes of interaction. Previous studies have revealed a significant relationship between group size and the nature of the type of resolutions reached. Specifically, in dyads, argumentative resolutions tend to revolve around maintaining individual positions, whereas in triads, argumentative resolutions are geared more towards fostering balanced dialogue among participants **(Peralta y Roselli, 2017)**. In another study we found disparities in the distribution of arguments between dyads and triads. In dyads, this distribution follows a symmetric pattern, while in triads, it takes on an asymmetric character. This suggests that if the aim is to ensure that all participants have an opportunity to contribute arguments to the resolution of an activity, working in dyads might be more appropriate **(Curcio et al., 2019)**.

The objective was to analyze the argumentative episodes (types 1 and 2) according to the group size (dyads and triads) of university peers. Previous studies have shown that the group size is a variable that influences argumentative sequences **(Peralta y Roselli, 2017)**. In this case, we use dilemmatic tasks, which present different possibilities, and participants had to argue their decisions. This type of task ensures discussion between participants and the presentation of diverse points of view.

The sample consisted of 50 students, all 18 years old, who were divided into 10 dyads and 10 triads. They were first-year students in a Social Sciences program at a university (the specific city and country were not disclosed to ensure participants' anonymity). The groups were intentionally composed of participants with different approaches to solving the task, ensuring a diversity of perspectives and, consequently, socio-cognitive conflicts. Participation in the activity was voluntary, and participants were assured of anonymity and data confidentiality.

A task was designed in which the individuals had to take a position in a dilemmatic situation. These dilemmas presented different problems, such as deciding whether to study abroad for personal development or to stay at home and care for sick parents. Participants could choose from four options: agreeing, disagreeing, or selecting two intermediate positions, one closer to the agreement and the other to the disagreement. This task was chosen because it ensures diverse viewpoints

in its resolution. All participants individually solved the dilemmatic task by providing a response without arguments; they simply chose one of the four options. The goal was to identify basic orientations for forming heterogeneous dyads and triads. Subsequently, in the experimental setting, groups were instructed to collaboratively work on the same task, discuss their positions, and attempt to reach a consensus. The experiment was conducted in university classrooms, with sessions lasting half an hour, and all interactions were recorded for later analysis.

The analysis units encompassed the interactions within each dyad and triad, totaling 20 argumentative episodes, which were categorized based on the classification proposed in the introduction. This classification distinguished whether the verbalization served as a response to a previous question (type 1) or as a response to a previous assertion (or assertions) made by another person, thus contradicting it ("no, this is different because…") (type 2). In each interaction, the type of argument that characterized the dialogue was identified, whether it resulted from a question or a confrontation. This was done to first determine the presence of argumentative episodes in the interactions and, more importantly, to differentiate the type of argument based on the group size.

A preliminary examination of the data revealed that argumentative episodes were present in all dyads and triads. Among these, 15 interactions were categorized as type 2, indicating arguments arising from conflicts, and five were type 1, representing arguments in response to a previous question. Notably, dyads exclusively exhibited type 2 argumentative episodes, with all 10 interactions belonging to this category, that is, arguments as an answer to a previous statement that is contradicted. In contrast, in the case of triads, interactions were evenly split between type 1 (5) and type 2 (5). These findings are particularly interesting as they show the presence of argumentative skills among the students. Consequently, if universities incorporate teaching that reinforces this ability, students could develop the necessary tools to engage in various social settings with argumentation as a response to conflicts **(Correa et al., 2003)**.

Discussion

From a socio-constructivist perspective, argumentation emerges as a central topic due to its significant connection to development and learning. Argumentation competence, as a socio-cognitive process, evolves over a lifetime through interactional contexts. The production and exchange of arguments play a pivotal role in enhancing cognition by facilitating epistemic change **(Castellaro & Peralta, 2020; Felton & Kuhn, 2001; Perret-Clermont et al., 2019)**.

The strength of this paper lies in its analysis of argumentation from a developmental perspective. The study of argumentation in young adults **(e.g., Peralta el al., 2023; Peralta, 2012; Peralta y Roselli, 2017, 2018)** has provided insights into how arguments are structured and the environments that encourage them. Furthermore, the development of argumentation has been examined in early childhood **(e.g., Migdalek et al., 2014; Migdalek & Rosemberg, 2020; Rosemberg et al., 2021; Zadunaisky Ehrlich, 2017)** providing an understanding of the precursors and foundations of argumentative skills. Nevertheless, there is still a requirement for a more comprehensive analysis of argumentative development throughout the lifespan to gain a better understanding of how argumentation evolves from early childhood to adulthood.

To illustrate this developmental process, we conducted three interactive and quasi-experimental studies. First, we analyzed arguments

present in verbal expressions produced by 5 and 6-year-old children. Then, we explored how 11 and 12-year-old children construct different types of arguments while collaborating on tasks in pairs, with or without social-emotional affinity. Finally, young university students engaged in resolving a dilemmatic task within either dyads or triads.

Example 1 explored the verbal productions of 5 and 6-year-old children during child-adult interactions involving different types of pictures. The participants generated two distinct types of productions: descriptions and narratives. Descriptions typically involved listing elements or actions depicted in the pictures, whereas narratives presented a cognitive and linguistic challenge for the children. Narratives required the integration of data and the justification of the storyline in response to questions. It was observed that less realistic pictures allowed children to construct narratives **(see Mareovich et al., 2020)**. These narrative productions exhibited a higher frequency of argumentative episodes. Additionally, these argumentative episodes were primarily categorized as type 1, originating as responses to posed questions.

The results align with our hypothesis, indicating that narratives are a form of verbal expression that fosters the emergence of argumentative episodes. Narratives pose a cognitive challenge for young children as they require the organization of events, presentation of the plot, and resolution of the story **(McCabe & Peterson, 1991; Stein & Gleen, 1979)**. The ability to accomplish this task is facilitated by cognitive skills such as making inferences, identifying main ideas, summarizing, predicting and comprehending causal and temporal sequences **(Pressley et al., 1994; Bornens, 1990; Snow & Ninio, 1986)**. Additionally, the use of temporal and causal connectors **(Alarcon-Neve & Auza-Benavides, 2015; Mareovich et al., 2020)** plays a crucial role in this process. Many of these cognitive and linguistic tools empower children to construct arguments and defend their viewpoints from as early as three years of age. Notably, the use of causal connectors like "but," "because," and "therefore" stands out **(e.g., Crespo, 1995; Köymen et al., 2014; Migdalek & Rosemberg, 2014; Migdalek & Rosemberg, 2020; Migdalek, Rosemberg, et al., 2014)**.

In the case of 11 and 12-year-old children, regardless of the socio-cognitive composition and/or social-emotional affinity within dyads, a higher frequency of type 2 argumentative episodes was observed. These type 2 episodes involve responses that imply a contradiction of a prior assertion made by their partner. This prevalence of conflict-based arguments (type 2), in contrast to the subjects in the previous example (where type 1 arguments were more common); can be explained by a developmental hypothesis. This hypothesis suggests that the ability to engage in genuine socio-cognitive conflicts is linked to the development of operational logic and, consequently, the capacity to exchange viewpoints on a reciprocal level **(Castellaro & Roselli, 2015; Doise & Mugny, 1984)**. This capability is likely present in 11 and 12-year-old children but may not be fully developed in 5 and 6-year-olds, who are in a transitional phase from pre-operative to operational logic.

The third example reveals that young university students exhibited a notable prevalence of type 2 argumentative episodes, though these results became more balanced when they worked in trios, with an equal distribution between both types of argumentative episodes. These findings are part of a broader research initiative where various types of tasks were tested. The key discoveries from this study include the presence of argumentative episodes in dilemmatic-type tasks among university students, a prevalence of conflict-driven argumentation, and the observation that confrontation is a characteristic of dyads, while in triads there is no predominance of argumentative episodes.

The confrontation of arguments developed by individuals at different stages of development highlights the challenging nature of

argumentation, encompassing cognitive, linguistic, and interactive dimensions. It is observed that argumentative episodes of type 2 are associated with more advanced developmental conditions. To engage in this second type of argumentative episodes, it is necessary to possess a set of cognitive and linguistic skills that evolve throughout the life cycle.

It is crucial to note that this classification does not necessarily imply quality, solid foundation, or meticulous construction, but rather the complexity involved in contrasting with previously posited ideas. This nuance is essential when interpreting results, as in example 3, where the higher prevalence of type 2 episodes in dyads suggests that confrontation is a characteristic of these, which, in turn, is linked to a more advanced evolutionary stage.

The complexity of this activity extends beyond its content, requiring highly intricate cognitive skills such as reflection, flexibility, and the ability to change perspectives. This work carries significant theoretical implications. Firstly, it underscores the dialogic nature of the argumentative process, highlighting that argumentation inherently entails interaction with others. This interaction can manifest in two distinct ways: (a) through substantiating a perspective or position in response to a preceding question posed by others, and (b) by engaging in a well-founded confrontation between the positions of different individuals.

The potential for argumentation varies at different stages of life. In the case of younger children, it is natural to observe argumentative instances predominantly characterized by the dynamic of asking questions and providing substantiated responses. In contrast, as individuals progress into late childhood and beyond, one can anticipate the emergence of a second argumentative format involving the confrontation of distinct viewpoints, often in the form of more sophisticated and well-developed positions. These changes in argumentation abilities are closely tied to cognitive development. During development there is a gradual shift away from egocentrism, allowing children to consider various viewpoints **(Piaget, 1968)**. Recognizing that others may have different perspectives encourages children to express and defend their own points of view.

The socio-constructivist approach, from which we analyze the results, prompts us to reflect on whether the task's characteristics, specifically the interactive context in which participants develop their arguments, might be influencing the outcomes. While, in examples 2 and 3, participants interacted with their peers, in example 1, children interacted with the experimenter. In future studies, the construction of arguments within the context of oral productions prompted by pictures could be explored, but with dyads of two children without adult intervention.

The argumentative discourse has also two communicative functions; convince others (persuade) and evaluate the arguments made by others (deliberate). As we navigate conflict resolution, collaboration with others becomes vital for integrating knowledge and enhancing our collective comprehension. In this context, argumentation is not merely a means of expressing thoughts; it also plays a significant role in shaping and refining them.

Due to its dual role, communicative and social, argumentation holds significant educational value. Engaging in argumentative discourse allows us to compare perspectives, challenge assertions, and establish a stronger foundation for our own viewpoints. Moreover, it provides a platform for collaborative idea generation. In this context, we start from the socio-constructive principle that maintains that argumentative dialogue is the ideal framework for the construction of knowledge **(Pérez-Echeverría et al., 2016)**.

The dialogical argumentation
Three illustrations in different moments of development

Felton et al. **(2015)** affirm that argumentation has a very strong pedagogical power and it is important to understand how argumentative discourse promotes learning and reasoning, and which are the conditions under it is most effective. These objectives promote the educational potential of argumentation to support the construction of knowledge and conceptual change. In the end, successful collaborative experiences make discourse a useful context for extending our thinking, challenging our perspective and exploring new ideas.

This article underscores the significance of dialogic argumentation in educational settings and its potential contribution to curriculum planning and teaching strategies. For instance, with younger children, teachers play a crucial role in facilitating questions that encourage well-founded responses **(Sartori et al., 2021)**. These research findings offer promise for both parents and educators, as they can contribute to the development of educational activities, such as narrative productions, and the creation of educational materials, including non-realistic pictures, aimed at enhancing early argumentative skills.

In the case of older children, such as those who took part in the second example presented here, the teacher's facilitating role is complemented by the potential for fostering socio-conflict interactions among the students themselves. Consequently, teachers can employ various teaching strategies aimed at creating opportunities for the exchange of differing viewpoints and their conflict resolution **(Butera et al., 2019)**. Additionally, the data indicate that socio-affective affinity is advantageous for constructing arguments, which could provide teachers with valuable insights for forming workgroups that promote and enhance argumentation.

The examination of argumentation within the university environment holds great significance because it is a skill expected of students, although it is often given insufficient attention. As exemplified in the third example, group composition in dyads can enhance the development of more complex arguments. Consequently, these findings, based on empirical data, provide valuable insights for the creation of educational tools that support the teaching and learning of this crucial competence **(Peralta y Roselli, 2018)**.

In summary, there is a widespread recognition that argumentation not only encourages individuals to reflect on their own viewpoints but, when conducted in contexts of interactive collaboration, it also enables them to derive benefits from exchanging perspectives with their peers. This skill is valuable at all stages of a person's educational journey. Employing classroom strategies that promote collaboration, socio-cognitive conflict, and argumentative dialogue enhances individuals in their learning, particularly in the acquisition and development of skills like understanding, active listening, tolerance, informed criticism, and effective teamwork.

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