ПОЛИМОДАЛЬНЫЕ ПОДХОДЫ К ОВЛАДЕНИЮ ЯЗЫКОМ: 
ВЫРАЖЕНИЕ ОТРИЦАНИЯ

Цель исследования заключается в анализе развития полимодальных навыков у детей. Изучение способов выражения отрицания на основе данных об общении взрослого и ребенка, взятые за несколько лет, дает уникальную возможность анализа полимодальных способностей детей. В некоторых работах отмечается, что отрицательные речевые акты обладают трансмодальной континуальностью. Мы собрали и проанализировали все действия, жесты, звуки и слова, произведенные франко- и англоговорящими детьми за период от одного до трех лет. Результаты показывают, что сначала зрительная и слуховая модальности объединяются общей интенцией, а затем начинают выполнять разные функции, каждая из которых усиливает или дополняет другую.

Ключевые слова: овладение языком; жест; полимодальность; отрицание.

MULTIMODAL APPROACHES TO LANGUAGE ACQUISITION 
THROUGH THE LENS OF NEGATION¹

The aim of our research is the construction of a developmental overview of children’s multimodal skills. The study of the expression of negation in longitudinal data of adult-child conversations is a privileged locus to analyze children’s multimodal skills. A number of authors have observed the transmodal continuity in the expression of negative speech acts. We coded and analyzed all the actions, gestures, vocalizations and verbal productions of a French-speaking and an

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English-speaking monolingual child from one to three years old. Results indicate that the visual and auditory modalities are first combined into one communicative intent and then used with specific functions, which either reinforce or complement each other.

**Key words**: language acquisition; gesture; multimodality; negation.

Through constant exposure to adult input, in dialogue, children’s language gradually develops into rich linguistic constructions that contain multiple cross-modal elements subtly used together for coherent communicative functions. The study of the expression of negation in longitudinal data of adult-child conversations is a privileged locus to analyze children’s multimodal grammar under construction. Indeed, previous research on first language acquisition has highlighted a tight relation between actions, gestures, signs and speech to express negation. As discussed by Spitz [33] and Clark [8], children’s first negative constructions seem to take over from early gestures of rejection and avoidance. In parallel to this developmental observation, for Kendon [22], in many cultures, gestures of negation are a progressive ritualization of spontaneous actions. In both cases, bodily reactions and actions are transformed into communicative gestures. A number of authors have observed the transmodal continuity in the expression of negative speech acts [3] and how negation is expressed through gestures as early as the end of the first year, sometimes before the first verbal markers [18]. However, the use of multimodality differs according to children’s development. The multimodal resources are first used in an integrative manner in the service of a global communicational intent. The productions become more complex as the children grow older and each modality expresses specific functions, which either reinforce or complement each other. In this paper, we will first set the framework of our multimodal approach to language acquisition, then focus on negation. A study of two little girls’ expression of negation will illustrate our approach. We first present quantitative analyses to show the similarities and differences between their pathways from one to three years old and end with qualitative analyses of the evolution of the use of gestures in our data.

1. **Acquisition, dialogue and multimodality**

Language – a social phenomenon – is captured, internalized and reconstructed again and again by each individual child thanks to its transmission by care-givers in their daily interactions with their upspring. Joint parent-child action / interaction provides the scaffold for children’s
growing ability to grasp both what is happening around them, and what is being said in the situation. They learn to understand language and action together, each providing support for the other. To examine how children come to use language in general, one must examine the broader context in which they experience events and interaction. Gestures, verbal productions, signs, gaze, facial expressions, and postures, are all part of our socially learned, inter-subjective communicative system. Human beings, with all their representational skills, combine modalities in order to share meaning, to refer to present and absent entities and events, to express their intentions, their desires and their inner feelings. As McNeill [25, p. 2] pointed out, we might “broaden our concept of language.” Research in signed languages has helped to show how the visual modality can be used symbolically. Thanks to combinations of experimental and field studies, video recordings, specialized software, multi-language databases, theoretical approaches that include multiple levels of analyses, and thanks to rich collaborations among experts from several scientific fields, we now have the tools to pursue the insight that “vocal language is inherently multimodal” [29, p. 216].

One approach to children’s linguistic knowledge is to study longitudinal naturalistic recordings of individual children and analyze both the children’s productions and the input they receive over a certain period of time. Child language research is one of the first fields in which spontaneous conversation data was systematically collected, initially through diary studies, and later by audio and video recordings shared worldwide thanks to the CHILDES project [24]. Corpora from various languages therefore form the backbone for a large number of issues in the field.

The data-centered method has allowed many researchers to confirm that in the course of their development, children make their way through successive transitory systems with their own internal coherence [11]. This phenomenon can be observed at all levels of linguistic analysis.

Following Tomasello [35], we assume that children initially learn concrete chunks of language, linguistic gestalts that can take different sizes and shapes, in dialogue. They then generalize across those various elements in order to assemble abstract constructions [14; 16] in the process of creating new utterances. These linguistic constructions are units of language that contain multiple cross-modal elements used together for coherent communicative functions. Language acquisition is a fruitful field in which to apply Construction Grammar and in particular “Multimodal Construction Grammar.” The 19th-century observers of child language had
already expressed their intuitions about gestalt language in their diaries about their own children [34; 31]. These intuitions were expanded by many developmental-functionalist approaches to language acquisition [5; 10] to relate language development to other domains of cognition and to its social, conversational anchoring.

The starting point of language acquisition scholars’ interest in gesture, visible bodily action or object-actions [32] could be summarized in de Laguna’s assertion that “in order to understand what the baby is saying you must see what the baby is doing” [13, p. 91]. Children’s productions are like evanescent sketches of adult language and can only be analyzed in their interactional context by taking into account shared knowledge, actions, manual gestures, facial expressions, body posture, head movements, all types of vocal productions, along with the recognizable words used by children [27]. Research in language acquisition has therefore developed the tools, methods, and theoretical approaches to analyze children’s multimodal productions in context as early as the second half of the 19th century, through scientists’ diary observations of their own children, followed by audio and then video-recordings made by outside observers. The detailed follow-ups of children’s language anchored in their daily lives are a source of links between motor and psychological development, cognition, affectivity, and language.

2. Negation in language acquisition

Stern & Stern in 1928 had already noticed how early “no” and its equivalents were used in language acquisition and there has been a whole lineage of valuable scientific literature on that topic. However, actions and gestures interpreted as negative in dialogue have not thoroughly been included in research on negation. Tracing the transitions or complementarities between actions and gestures, and between gestures and verbalized/signed expressions in very young children, and apprehending the function of each modality can be quite complex. While the expression of negation may vary in terms of non-verbal and verbal form, and may not always exist in a dichotomous system, a unifying feature endures: all human systems of communication have a representation for negation [20, xiii]. Human beings use negation as a pragmatic tool for a whole set of functions, including refusal, denial, prohibition, and even affirmation in anaphoric negations [38; 4]. The study of negation in a pragmatic context is especially propitious in the
context of language acquisition. Children learn how to use negation as a tool to express their needs, their desires, and ultimately, their will, which is part of establishing their own identity [26, p. 10].

Gesture is a cornerstone in the development of negation, and should not be neglected. Clark & Clark [9, p. 348] report that the first expressions of negation are gestural, possibly combined with one word. According to Darwin (1899), habitual gestures, such as the headshake, have become associated with the movement of certain muscles. Darwin argues that the association between the intention behind the movement and the movement itself is so strongly imprinted in the mind that it becomes natural to perform that gesture with its corresponding intention. Darwin provides the example of a man wishing to get rid of someone. In “passion”, he will move his arms as if to push the person away [12, p. 75] therefore enacting his intention. This could be paralleled in children’s early bodily manifestations of negation. Mimetic schemas for imitable actions, shared representations of objects that can be manipulated, ground the acquisition of children’s first gestures and first words or signs [39]. In addition, evidence from brain and behavioral studies shows that language use engages motor representations and that through complex imitation, manual-gestural communication in social interaction leads to spoken language [2].

Some researchers claim that there is an initial period when children produce communicative symbolic gestures independent of speech. In this initial stage, gestures are unaccompanied by speech sounds [3; 6]. However, gestures are not a sole modality of expression for long – as soon as children can break into the verbal realm, they learn to coordinate the two modalities within a single utterance. This shift from the gestural to the verbal does not necessarily attest to the child’s preference for one modality over the other, but more likely takes place because of the abundance of verbal information in the child’s input [3]. Other studies on the gesture-word relation have highlighted that symbolic gestures tend to develop in tandem with early words, which could mean that they are a manifestation of the same cognitive development [23]. For a number of children, gestures seem to represent an alternative means of expression until the linguistic means for the same function is available [1]. In the continuity of these studies, Guidetti [17] points out that, aside from pointing, gestures of agreement and refusal are the first symbolic gestures used by children, although the verbal modality for such functions already prevails at 2;00.
The first forms of negation are non-verbal: either vocal (intentional crying or babbling) or gestural (headshake, pushing away or physically stopping). It is yet to be definitively established which of these manifestations of negation are the first to emerge. Volterra et al. [37], suggest that vocal and gestural symbols (in general) emerge around the same time. In their study of children between the ages of nine and thirteen months, they found a correlation between the frequency of use and the rate of acquisition for both vocal and gestural symbols. The same pattern may be true for the meaningful use of negation since it has been proposed that the gestural manifestations of negation can be traced back to the earliest voluntary movements of the new born [33]. It should be noted, however, that the earliest manifestations of negation are not “gestural” in the true sense of the word; they are not representational and symbolic, but more accurately described as bodily movements that derive from natural expressions and will become re-organized as culturally specific gestures later on. The earliest forms of negation have largely been ignored in the modern, psycholinguistic approach in preference for studies focusing on verbal negation. It seems that the earliest stages and the development of negation have not received due attention. It should be acknowledged however that groundbreaking work was done, notably by Pea (1980) whose aim was to describe the transition period from nonverbal to verbal negation. He was also one of the few researchers to treat nonverbal and verbal on equal part. Contemporary researchers are now beginning to focus on this topic [17].

The study of the expression of negation via gesture is gaining ground, as is shown in Kendon’s [22] study of the headshake, or [7] and [9] studies of gestures of negation. These analyses are interesting for the semantic values of adult gestures, however, in children’s first uses of gesture, the forms are not this finely articulated – a horizontal movement of the hand will not be as clear-cut as the adult version – perhaps because these are cultural acquisitions that serve as intensifiers in speech or as an expression of attitudes about what is said, or as a form of meta-language [22]. Since children do not have a grasp of the subtleties of expression, gesture for them serves a more pragmatic purpose. It is only once the foundations of language have been acquired that children can supplement their expressions with gestures. The child’s frequent and stubborn refusals are often accompanied by body movements and actions. The first symbolic gestures expressing negation are intentional and more controlled movements and the first of these to emerge is the headshake. The headshake is one of the most
widely recognized head gestures. Kendon defines eight ways in which the headshake can be used, including the use of the headshake alone, with a verbal “no,” with speech to express implicit negation, or to complement a negative theme, to supplement superlatives, or as a metalinguistic tool for self-corrections. Thus, the headshake can be considered to play an important role in the meaning of linguistic utterances; it can either complement or anticipate an act of negation, or act alone. Indeed, because they cannot always be glossed by words, gestures (alone or in combination with words) express something about human experiences that cannot be captured by any other modality.

Other gestures are used by children to express negation, but they occur less frequently in the data. We have a few occurrences of shoulder shrugs and/or open arms palms up open hands that indicate lack of knowledge or absence. The headshake “no,” and the gesture of raising palms up in the air for “all gone” (disappearance) or the shrug to express “I don’t know” or “there is no X” are conventional gestures, because their meaning is specific to certain cultures and they are learned as such by children in the same types of situations as words or signs. We will also be particularly interested in children’s non-conventional body movements expressing negation that we call “actions” and that are interpreted in dialogue by their addressees as negations. The aim of this study is to trace children’s pathways into full bloom multimodal expressions of negation.

3. Data and Method

In line with the literature on gestures, the use of a multimodal approach emphasizes our desire to consider language as a communication system relying not only on words but also on the other modalities of expression used alone or in combination. In this longitudinal study, we analyzed the expression of negation in the utterances of a typically developing English monolingual child named Ellie and a French monolingual child named Madeleine from the Paris Corpus [28]. Ellie was born in England. Her grandmother filmed her and her mother in their natural environment for one hour a month from ages 0;10 to 4;00. In the great majority of the recordings only the mother and the child were being filmed by the grandmother. Yet, because these films are made at home and in a private sphere, other participants like the child’s father or aunt are sometimes present on the videos. Madeleine was born in France and was filmed by Martine Sekali (2012) who is a linguist and her neighbor. Both Madeleine and Ellie’s
parents are college educated middle class adults. The present paper casts a new light on the traditional analyses of children’s first negative utterances in using a new methodological perspective.

The coding system was developed by a group of researchers in Paris. We conducted a multimodal and multilevel analysis of the emergence of negations and we coded actions, gestures, vocalizations and words of mother and child from sessions every six months from 1;0 to 3;0. We used Excel and CLAN with video data and transcriptions to analyze the negative functions the child expressed and the context in which they occur in dialogue.

The children have a complex system at their disposal that includes symbolic and non-symbolic means of expressing negation in two modalities. They can use the visual modality and produce actions and symbolic gestures or they can use the auditory modality and produce vocalizations or words. We consider gestures such as head shakes, or shrugs and words such as “no” “all gone” as symbolic conventional means of expressions words whereas we consider actions such as pushing away a glass of milk or vocalizations such as screaming as non symbolic means of expressions.

4. Quantitative Results

4.1. Ellie’s expression of negation

Graph 1 shows the results of our coding for Ellie’s longitudinal data.

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<tr>
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<th>1;00</th>
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<th>3;00</th>
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<tbody>
<tr>
<td>verbal</td>
<td>3</td>
<td>7</td>
<td>23</td>
<td>57</td>
<td></td>
</tr>
<tr>
<td>gesture + verbal</td>
<td>29</td>
<td>4</td>
<td>3</td>
<td>17</td>
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Graph 1. Rate of actions, gestures, and speech and number of occurrences per category in Ellie’s data

At the beginning of the data, action seems to be sufficient for the child to express negation. Beaupoil et al. (in press) have shown that the child begins to use gestures and enters a symbolic mode of expression at 1;02. But as early as 1;06, she is already using an important proportion
of symbolic means of expression, and predominantly with gestures (over 30% gesture in isolation and 35% combinations of speech and gesture). After 1;06, speech is the predominant modality either in isolation (over 35%) or combined with gestures (20%) or actions (15%). At 2;06, there is a decrease in the use of gestures (less than 10% and always in combination with speech). However the use of gestures makes a comeback at 3;00 in combination with speech (almost 20% of all negative productions) and in isolation. Overall, the child uses actions in 35% and gesture in almost 30% of her negative productions. Even though 71% of the child’s productions involve speech, only 35% of them are only verbal, 36% of the negative productions coded for this study are combinations of speech and either an action or a gesture. What is also extremely important is that as speech becomes predominant, Ellie’s spoken negative utterances are more and more complex. We observe that her spoken productions for negation are constantly getting more elaborate. At 3;00 the child’s negative utterances have an MLU – mean length of utterance – a little bit below 3. In only three years, she has developed a good mastery of her mother tongue. Even though speech becomes predominant around 2;00, an analysis of negations restricted to speech would leave aside a great proportion of Ellie’s productions and the role of the visual-gestural modality in her pathway. The come-back of the visual modality in the role of co-verbal actions and gestures at 3;00 also seems to indicate that once Ellie has acquired the verbal means to express negations, she can still resort to actions and gestures to complement her speech.

4.2. Madeleine’s expression of negation

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<tbody>
<tr>
<td>verbal</td>
<td>2</td>
<td>102</td>
<td>34</td>
<td>20</td>
<td></td>
</tr>
<tr>
<td>gesture + verbal</td>
<td>4</td>
<td></td>
<td>2</td>
<td>16</td>
<td></td>
</tr>
<tr>
<td>action + verbal</td>
<td>10</td>
<td>4</td>
<td>6</td>
<td></td>
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<tr>
<td>action</td>
<td>2</td>
<td>2</td>
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</table>

Graph 2. Rate of actions, gestures, and speech and number of occurrences per category in Madeleine’s data
Madeleine’s pathway is quite different from Ellie’s as she does not use gestures during an intermediary period to enter the symbolic expression of negation. She is already producing speech at the beginning of the data, but mostly in combination with actions interpreted as negative by her addressee and the coder (pushing away toys, turning away from her mother, avoiding spoonfuls of food…). At 2;00 her speech in isolation is highly predominant (over 90% of her productions). However, co-verbal gestures start emerging and are part of 45 % of her productions at 3;00. Gestures seem to be used by Madeleine once she has a finer mastery of speech. As she has been extensively studied in the CoLaJE project, we know that Madeleine’s mastery of speech is quite precocious and that as of 2;03, she has mastered the French phonological system, she uses quite a variety of grammatical tenses [28], produces 3 argument clauses, prepositions and connectives, she refers to herself in the first person, starts using complex sentences and can self-repair her utterances.

5. The blossoming of multimodality

The analysis of each child’s individual pathway into negation clearly demonstrates their differences but there are some common features. In this section, we will analyse two examples drawn from Ellie’s data (for simplicity since the data is in English) but both children’s multimodal skills follow similar paths from an integrative multimodal intent, to more elaborate use of each modality for specific functions.

All the children who have access to the gestural-visual and auditory-vocal modalities use them both but they all start expressing their rejections and refusals with actions that are clearly interpreted by their interlocutors and integrated in the on-going dialogue. Children’s neurological maturation enables them to control their bodily movements and transform them into gestures thanks to increasingly finer motor skills. Some of these gestures are assigned meaning by their interlocutors as in the following example.

(1) Ellie 1;05

Ellie and her grandmother are outside and playing with a toy pushcart in which her Teddie bear is seated. The grand-mother has just asked Ellie if she is going shopping.

Grandmother: Do you need your basket?
Ellie: 0.
Action: holds the handles of the push-chair.
Gaze: looks behind her.
Ellie:  0.

*Action*: moves her upper body from left to right.

*Grandmother*: +< Mummy might find your basket.

Ellie:  0.

*Action*: Ellie lets go of the stroller, turns her back on the camera.

*Gesture*: produces a palm-up gesture (8 seconds)

*Grandmother*: Oh! We don’t know where it is, do we Ellie?

Ellie:  0.

*Action*: Ellie walks away looking for the basket.

*Gesture*: Her arms are still in a palm-up configuration but there is no tension in her hands.

*Grandmother*: oh! She says, I don’t know.

Ellie:  uh uh::

*Action*: looks for the basket.

*Gesture*: Palm-up gesture.

*Mother*: Ellie!

*Action*: She holds out the basket.

Ellie:  0.

*Action*: Ellie turns round to face her mother.

Ellie:  Mummy:::

*Action*: walks to the mother, extends her arm to take the basket.
At 1;05, the child's lexicon is still very limited but she knows the negative marker *no* and uses it from time to time even if her communicative system still relies on body actions. In this sequence, Ellie is involved in a we-relationship [15] because there is a community of space and of time between the inhabitants of the interaction. There is also a strong link with the environment in which the interaction is taking place as well as with objects: the three inhabitants – the child, the grandmother who is filming and the mother - are looking for a basket. The notion of co-operation is fundamental in this sequence, as the grandmother is co-constructing what we could call the child’s narrative (the sequence of events that are taking place form a story that they are acting out together). When her grand-mother asks her where her basket it (to go shopping), without speaking, Ellie lets go of the stroller, turns her back on the camera and produces a palm-up gesture with both hands. She walks toward the garden, looking for the basket, her arms still held in a palm-up gesture configuration. According to the grandmother this gestural form has an epistemic meaning; she interprets Ellie’s gesture and glosses it when she says “oh we don’t know where it is, do we Ellie” and “oh, she says, I don’t know”. At this early age, it is still quite complex to distinguish between expressing absence and asking where the object is. The palm-up gesture Ellie produces in this sequence encapsulates both meanings because she successively answers her grandmother’s questions and looks for the basket. The gesture Ellie produces expresses an observation the child makes based on the environment: the basket is not present in the environment; as soon as she starts looking for the object the gesture’s meaning turns into “where is the basket?” This analysis is reinforced by the second production of a palm-up gesture when Ellie turns to face her mother, thus showing that she hasn’t found the basket and has no other choice now but to ask for her mother’s help.Instead of using speech, in this example, Ellie has resorted to a conventional gesture which has entered her repertoire at the beginning of her second year, the epistemic gesture or shrug + palm up gesture. Gestural communication does not disappear with the emergence of vocal productions and especially that specific epistemic gesture. Ellie uses that gesture 57 times in our data between 1;0 and 3;0 and there are as many occurrences in the first half of the data as in the second half. Furthermore, it is still largely used by adults themselves in combination with vocal productions (). Gestures do not only remain
functional but diversify in form and function as children become skilled multimodal conversationalists.

(2) Ellie, Palm-up avec verbal (3;00)

Ellie: 0 [=! making a horse noise] .
Action: Plays with her horse toy.

Ellie: where’s the yellow horsy?
Gaze: looks up.
Gesture: palm-up gesture on the right hand.
Mother: <oh hey Maria> [=! neighs] !
Action: Plays with a horse toy.

In this excerpt, Ellie is playing with her mother. She puts a horse toy into a small stable her mother built for her, then she looks up, flips her right hand up and asks “where’s the yellow horsy?” At 3;00 Ellie is able to combine her gestures with speech. The gesture she produces is less visible than the ones she used before 2;00. As Ellie grows older, her gestures are less and less distal. In this example, she produces a hand flip with her hand held close to her body and not extended in the adult’s direction. At 3;00, Ellie’s gestures are less visibly displayed in the environment and more subtle. In this sequence, Ellie produces the gesture with speech and uses the word where. At 1;05, Ellie didn’t combine the gesture with speech but thanks to the context we could understand that she meant “the basket is not there, where is it?” At 3;00 she is able to put her thoughts into words without her mother or her grandmother’s help. However, gesture and speech in combination are not redundant. Her spoken utterance is a question and she is asking for missing information; the gesture shows that the referent is not within the child’s field of vision. In this combination, the speech is not syntactically or semantically negative, yet we argue that the gesture has negative meaning and expresses absence – a common negative function observed in children’s data [4].
At the end of our data, Ellie thus combines the specific functions of speech and of gesture to express a rich range of subtle and complex contents.

**Conclusion**

The two little girls, despite their differences both use the multi-semiotic resources at their disposal and progressively enrich the complexity of their productions. At the beginning of the data, they both seem to be more involved in non-conventional bodily movements to express rejection or avoidance and will then use the conventional gestures and words that surround them. Their vocal productions (even screaming and crying) are going to develop into symbolic spoken productions. Interestingly enough, each child follows a different pathway. Madeleine enters the verbal modality very early and co-verbal gestures are added as soon as her speech is quite elaborate. Ellie uses more symbolic gestures before she masters speech. If we analyse the forms used in detail, we can observe how the two children are both multimodal from the very beginning but also how the use of multimodality differs according to the stage they are in, and their cognitive, motor and linguistic development. The multimodal resources are first used in an integrative manner in the service of a global communicational intent and will then be subtly mastered. The productions are going to become more complex and each modality can then be used with specific different functions, which either reinforce or complement each other.

Madeleine and Ellie’s very sophisticated gesturing illustrates, specifies, reinforces or modalises the meanings of their vocal productions. Gestures thus continue to enhance the blossoming of children’s communication skills after the “pre-linguistic” and the first gesture-word combinations. They are part of an intersubjective multimodal communicative system in which it is more and more complex to tease apart gestures from speech. The performative, interactional and sociocultural nature of language involves the cooperation of both modalities, with one constantly supporting, extending or modifying the other.

**REFERENCES**


