

Infants' early pragmatic understanding of pointing gestures: the role of prosody and gesture shape

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Introduction

- Human communication is **multimodal** because we express our intentions and emotions through oral and visual cues.

Aim

- Infants have to pay attention to both strategies to **understand** the adult's intentions and emotions.

Methodology

Can they do that? If so, when?

Results

Conclusion

Introduction



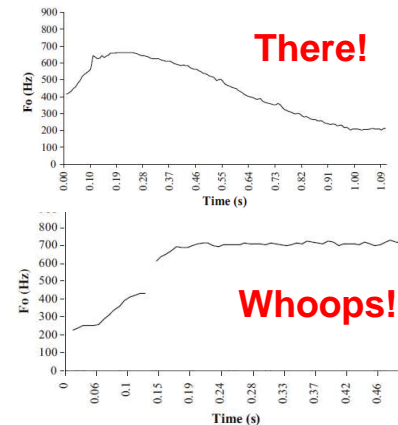
3-month-old infants show different neural responses when somebody has a fearful **facial expression** accompanied by **eye-gaze**, than when it is only a fearful facial expression (Hoehl, Wiese & Striano, 2008)

Aim

Methodology

14-month-old infants rely on **lexical** and **prosodic cues** to know when an action is intentional or accidental (Csibra & Gergely, 2009; Martin et al., 2012; Sakkalou & Gattis, 2012)

Results



Conclusion



12-month-old infants understand that a **pointing gesture** has an imperative, expressive, or informative intention if the **social-contextual information** helps them. (Aureli et al. 2009; Behne et al., 2005; Behne et al., 2012; Camaioni et al., 2009)

Introduction

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- Infants have to pay attention to both strategies to **understand** the adult's intentions and emotions.

Methodology

Can they do that? If so, when?

Results

- **When common ground provides enough relevant information, infants are able to identify the specific adult's intention from gesture or speech.**

Conclusion

- **When no common ground is available, infants rely on gesture or speech cues to decide whether an act is intentional or not.**

Introduction

So... What we do not know?

When no common ground is available, whether infants can identify the specific adult's intention by relying on both gesture and speech cues.

Aim

In our study,

Methodology

1. No common ground is available for infants

Results

1. Infants will have to identify an imperative, expressive, or informative intention behind a pointing gesture accompanied by speech.

Conclusion

Introduction

(1) Can 12-mo infants infer the specific the imperative, expressive, or informative intent of an act when no common ground is available and they can only rely on the adult's use of gesture and speech cues?

Aim

H1: they can

Methodology

(2) Which are the specific gesture and speech strategies that adults use to convey these communicative intentions, specifically in terms of gesture shape and prosodic cues?

Results

Conclusion

(3) Do infants rely on these gesture shape and prosodic cues to determine the imperative, expressive, or informative intentionality of the adult's act?

H2: gesture shape and prosodic cues are crucial

Introduction

Aim

Methodology

Results

Conclusion

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Exp.1

Exp.2

Introduction

Aim

Methodology

Results

Conclusion

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H2: gesture shape and prosodic cues are crucial

Exp.1

Exp.2

Introduction

Participants

Set-up and materials

Procedure

Data coding

Aim

Eighteen Dutch caregiver-infant dyads (9 girls; *M* infants' age = 12;17; range = 12;07–12;28).

Methodology

Recruited from a Dutch **database** of parents from a middle-size city in The Netherlands who expressed interest in participating in research with their child.

Results

The experiment had **three conditions** (expressive, informative, and imperative), and some dyads were assigned to the expressive condition ($N=6$), some to the informative condition ($N=6$), and some to the imperative condition ($N=6$)

Conclusion

Introduction

Aim

Methodology

Results

Conclusion

Participants

Set-up and materials

Procedure

Data coding



Camera view



Caregiver's view



Experimenter's view

Introduction

Participants

Set-up and materials

Procedure

Data coding

Aim

Same set-up, materials and procedure across conditions. The only difference was that we told parents to have different intents across conditions.

Methodology

Imperative condition

Expressive condition

Informative condition

“Ask your son/daughter to give you the cup. Feel free to use the words or gestures you feel like using but please, don’t touch the cup before the child reacts”

“Share your interest about the cup with your son/daughter. Feel free to use the words or gestures you feel like using but please, don’t touch the cup before the child reacts”

“Inform your son/daughter that there is something under the cup. Feel free to use the words or gestures you feel like using but please, don’t touch the cup before the child reacts”

Results

Conclusion



Introduction

Participants

Set-up and materials

Procedure

Data coding

Aim

Infant's behavior

Caregiver's use of speech & gesture

Methodology

Results

Conclusion



Infant's behavior

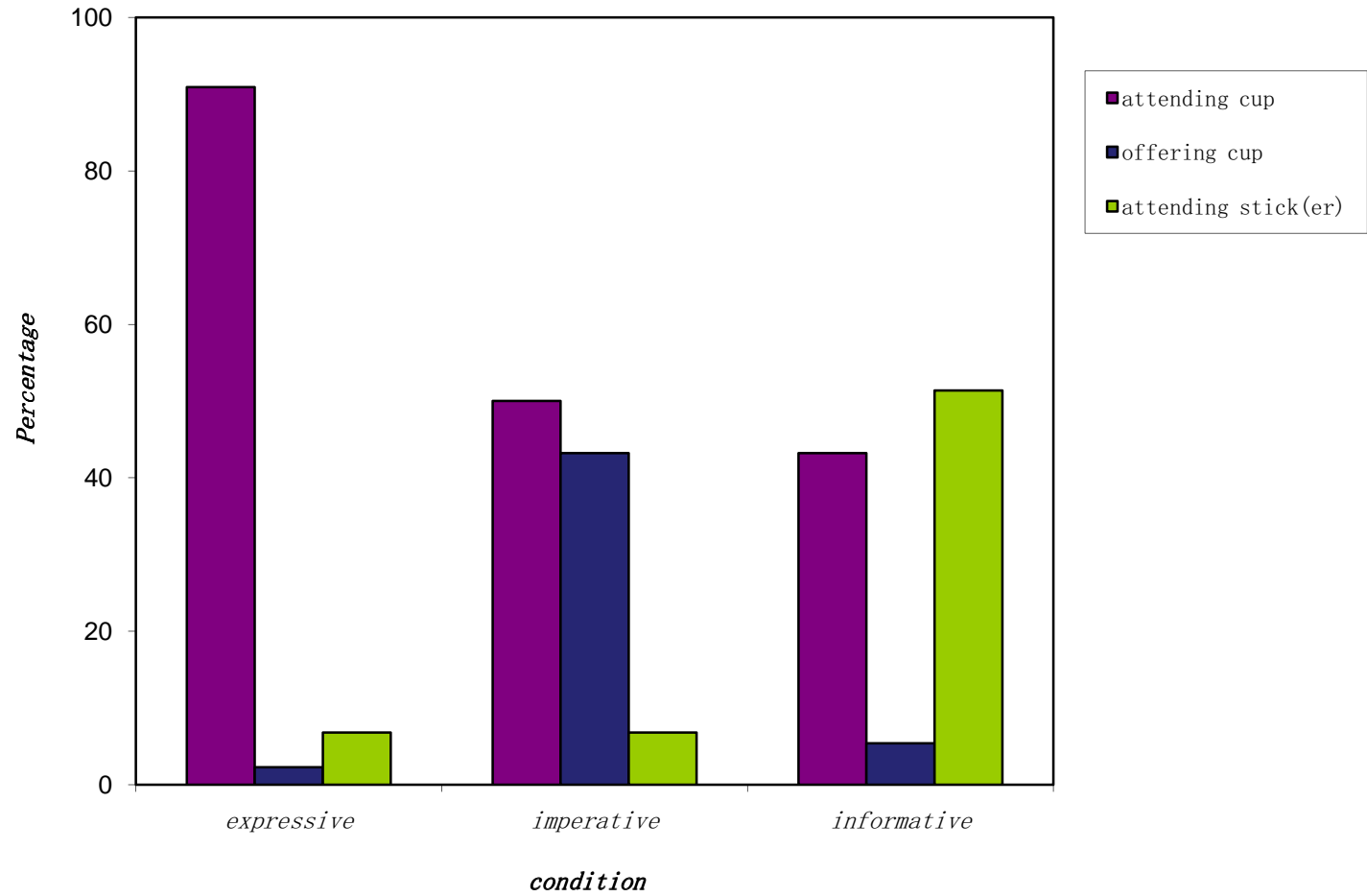
Introduction

Aim

Methodology

Results

Conclusion



Chi-square test: $\chi^2 (4, N=125) = 60.2, p < .001, \phi = 0.694$

Infant's behavior

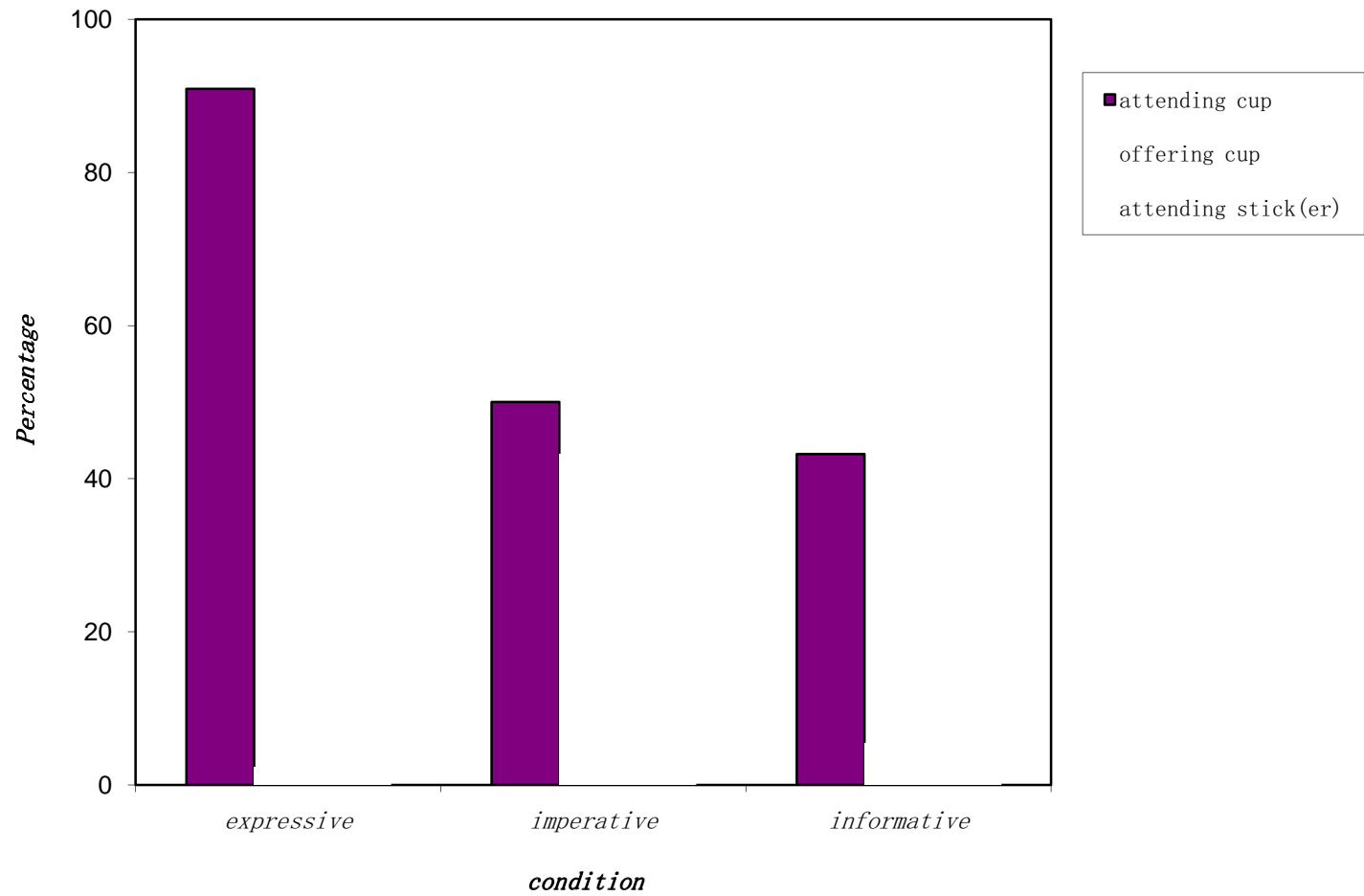
Introduction

Aim

Methodology

Results

Conclusion



ANOVA: $F(2,124)=14.430, p < .001, \eta^2 = .191$

Infant's behavior

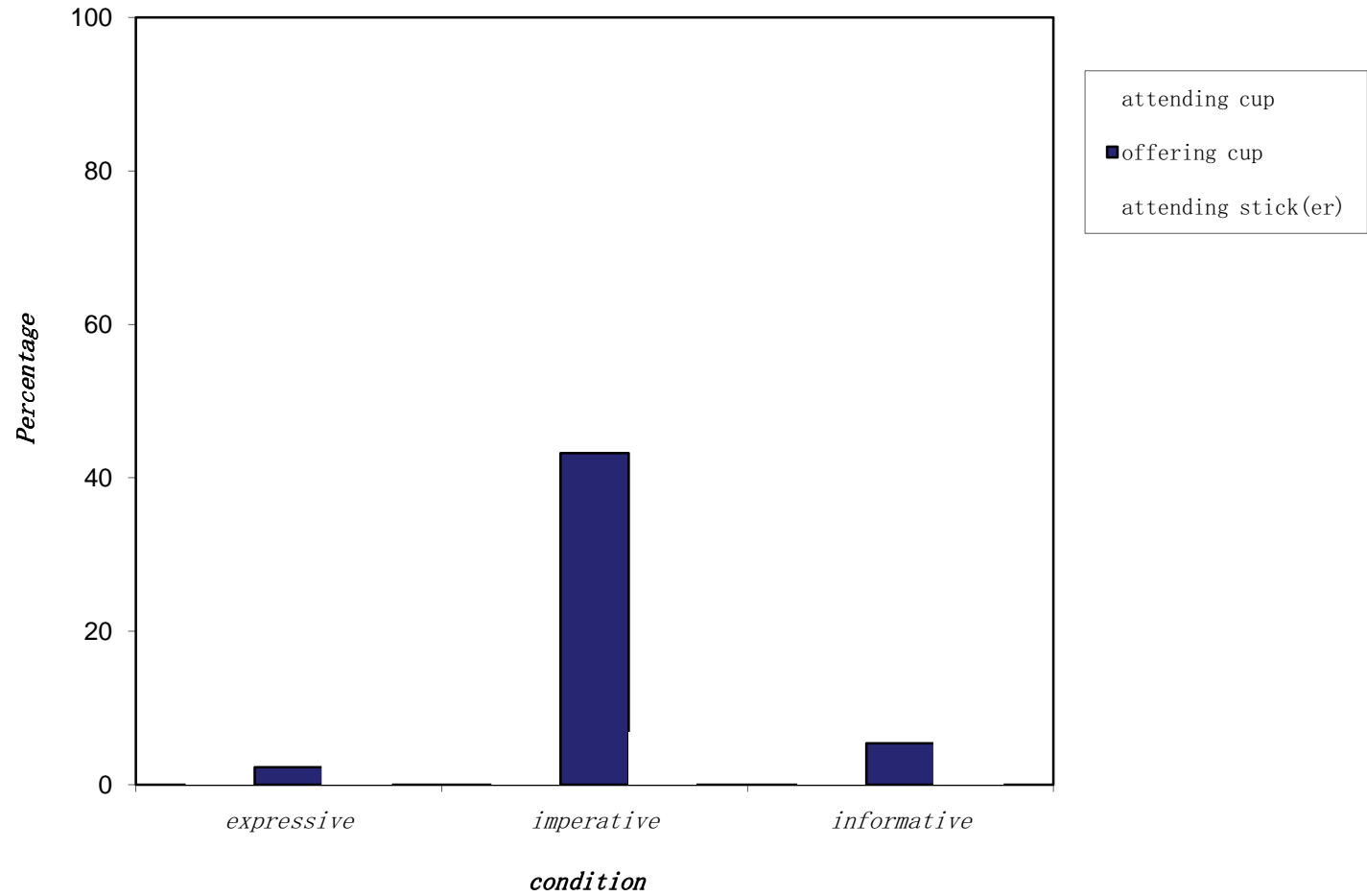
Introduction

Aim

Methodology

Results

Conclusion



ANOVA: $F(2,124)=19.925, p < .001, \eta^2 = .246$

Infant's behavior

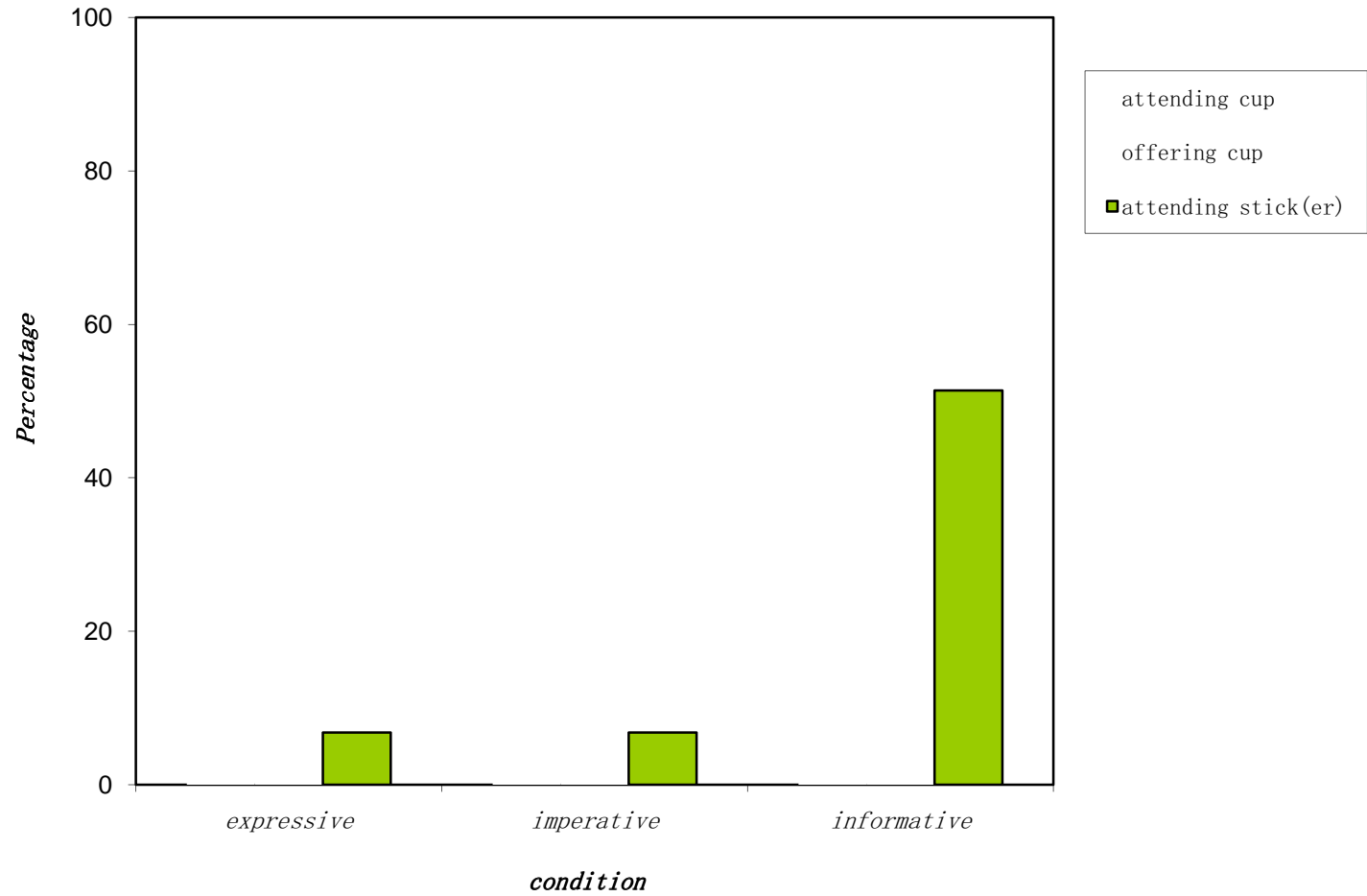
Introduction

Aim

Methodology

Results

Conclusion



ANOVA: $F(2,124)=21.243, p < .001, \eta^2 = .258$

Infant's behavior

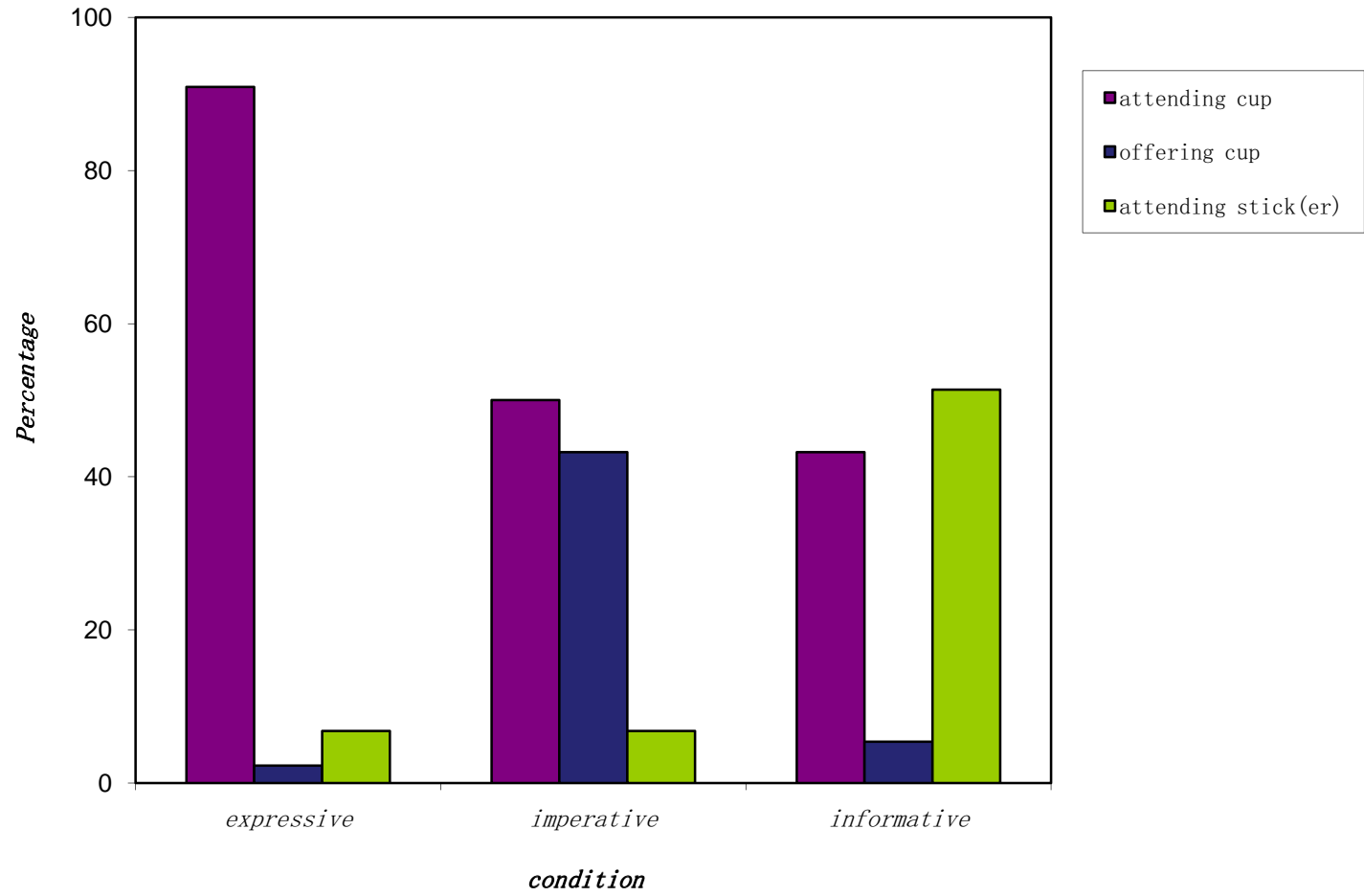
Introduction

Aim

Methodology

Results

Conclusion



Caregiver's use of speech and gesture

Introduction

Aim

Methodology

Results

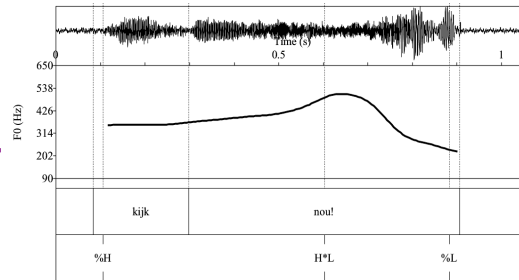
Conclusion

Imperative

Expressive

Informative

Intonation contour



Syllable duration

Mean = 170.7 ms
SD = 56.3 ms

Pitch range

Mean = 196.9 Hz
SD = 102.1 Hz

Hand shape



Caregiver's use of speech and gesture

Introduction

Aim

Methodology

Results

Conclusion

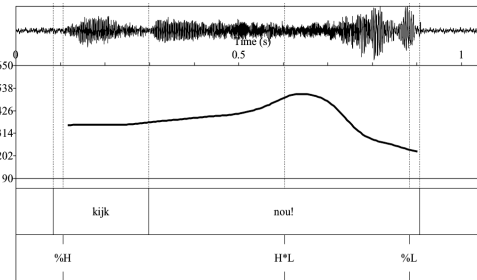
Intonation contour

Syllable duration

Pitch range

Hand shape

Imperative

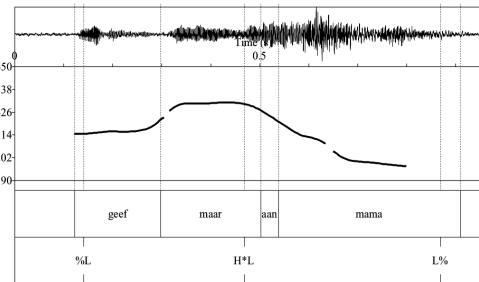


Mean = 170.7 ms
SD = 56.3 ms

Mean = 196.9 Hz
SD = 102.1 Hz



Expressive

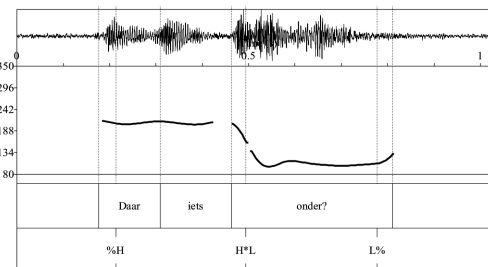


Mean = 261.9 ms
SD = 85.1 ms

Mean = 223.3 Hz
SD = 127.8 Hz



Informative



Mean = 178.8 ms
SD = 33.8 ms

Mean = 151.6 Hz
SD = 117.5 Hz



Introduction

Experiment 1

Aim

- (1) Can 12-mo infants infer the specific the imperative, expressive, or informative intent of an act when no common ground is available and they can only rely on the adult's use of gesture and speech cues?

Yes, they can because behaved in a different way in each pragmatic situation.

Methodology

Results

- (2) Which are the specific gesture and speech strategies that adults use to convey these communicative intentions, specifically in terms of gesture shape and prosodic cues?

In an *imperative condition*, falling contour, short syllables, high pitch range, and open-hand gesture.

In an *expressive condition*: falling contour, long syllables, high pitch range, and index-finger pointing gesture.

Conclusion

In an *informative condition*: falling contour, short syllables, narrow pitch range, and index-finger pointing gesture.

Introduction

Aim

Methodology

Results

Conclusion

(1) Can 12-mo infants infer the specific the imperative, expressive, or informative intent of an act when no common ground is available and they can only rely on the adult's use of gesture and speech cues?

H1: they can

(2) Which are the specific gesture and speech strategies that adults use to convey these communicative intentions, specifically in terms of gesture shape and prosodic cues?

(3) Do infants rely on these gesture shape and prosodic cues to determine the imperative, expressive, or informative intentionality of the adult's act?

H2: gesture shape and prosodic cues are crucial

Exp.1

Exp.2

Introduction

Participants

Set-up and materials

Procedure

Data coding

Aim

Thirty Dutch infants (9 girls; *M* infants' age = 12;12; range = 12;03–12;26).

Methodology

Recruited from a Dutch **database** of parents from a middle-size city in The Netherlands who expressed interest in participating in research with their child.

Results

There were **three conditions** in the experiment (expressive, informative, and imperative), and some dyads were assigned to the expressive condition ($N=10$), some to the informative condition ($N=10$), and some to the imperative condition ($N=10$)

Conclusion

Introduction

Participants

Set-up and materials

Procedure

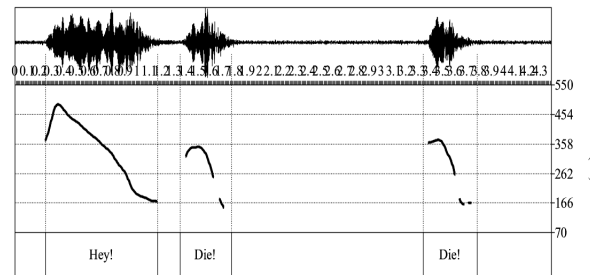
Data coding

Aim

Setting as in Exp. 1, but now it is an **experimenter** that drives the infants' attention.

The experimenter uses three different strategies to drive the infant's attention (based on exp. 1 results):

Methodology



Results

Imperative

Conclusion

Introduction

Participants

Set-up and materials

Procedure

Data coding

Aim

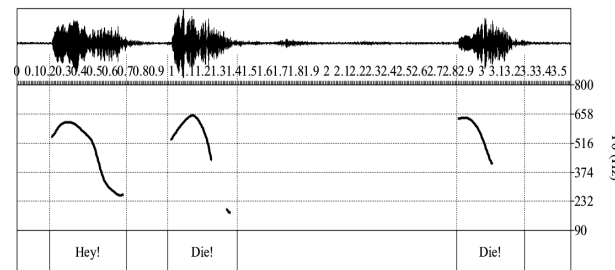
Setting as in Exp. 1, but now it is an **experimenter** that drives the infants' attention.

The experimenter uses three different strategies to drive the infant's attention:

Methodology

Results

Conclusion



Expressive

Introduction

Participants

Set-up and materials

Procedure

Data coding

Aim

Setting as in Exp. 1, but now it is an **experimenter** that drives the infants' attention.

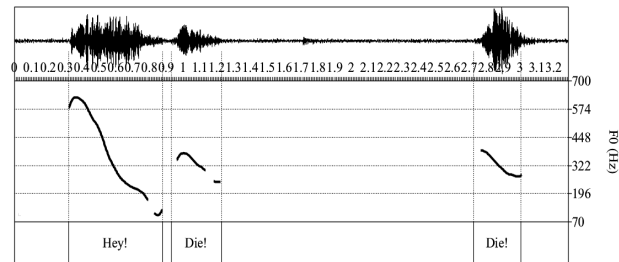
The experimenter uses three different strategies to drive the infant's attention:

Methodology

Results

Conclusion

Informative



Introduction

Participants

Set-up and materials

Procedure

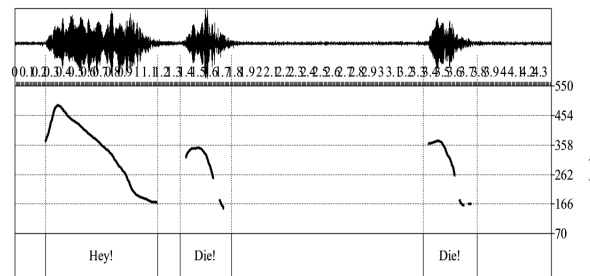
Data coding

Setting as in Exp. 1, but now it is an **experimenter** that drives the infants' attention.

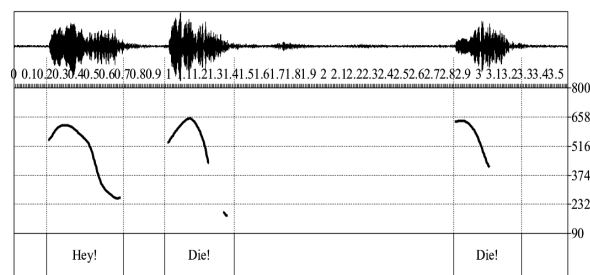
The experimenter uses three different strategies to drive the infant's attention:

Aim

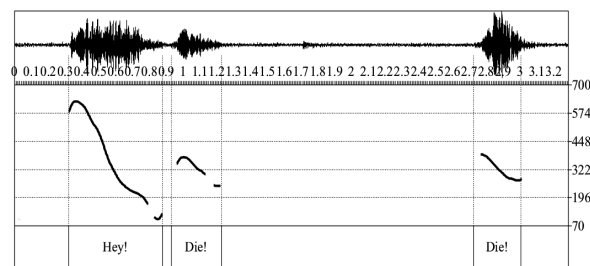
Methodology



Results



Conclusion



Crucial!

The lexical information is controlled

Participants

Set-up and materials

Procedure

Data coding

Introduction

Aim

Methodology

Results

Conclusion



Imperative condition



Expressive condition



Informative condition

Introduction

Participants

Set-up and materials

Procedure

Data coding

Aim

Infant's behavior

a. Offering cup
(expected behavior in the imperative cond.)

Methodology

b. Attending cup
(expected behavior in the expressive cond.)

Results

c. Attending stick(er)
(expected behavior in the informative cond.)

Conclusion

d. No reaction

Infant's behavior

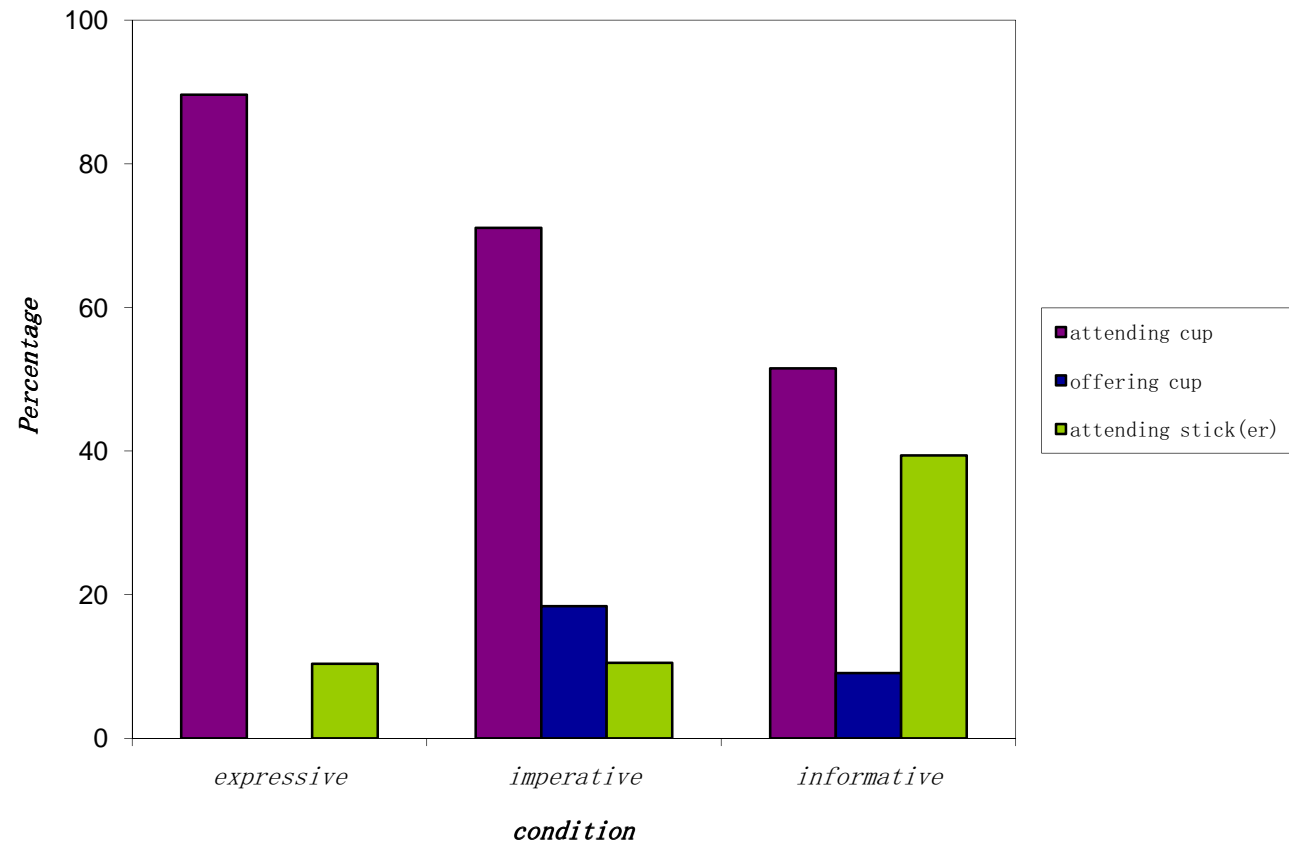
Introduction

Aim

Methodology

Results

Conclusion



Chi-square test: $\chi^2(4, N=219) = 41.5, p < .001, \phi = 0.436$

Infant's behavior

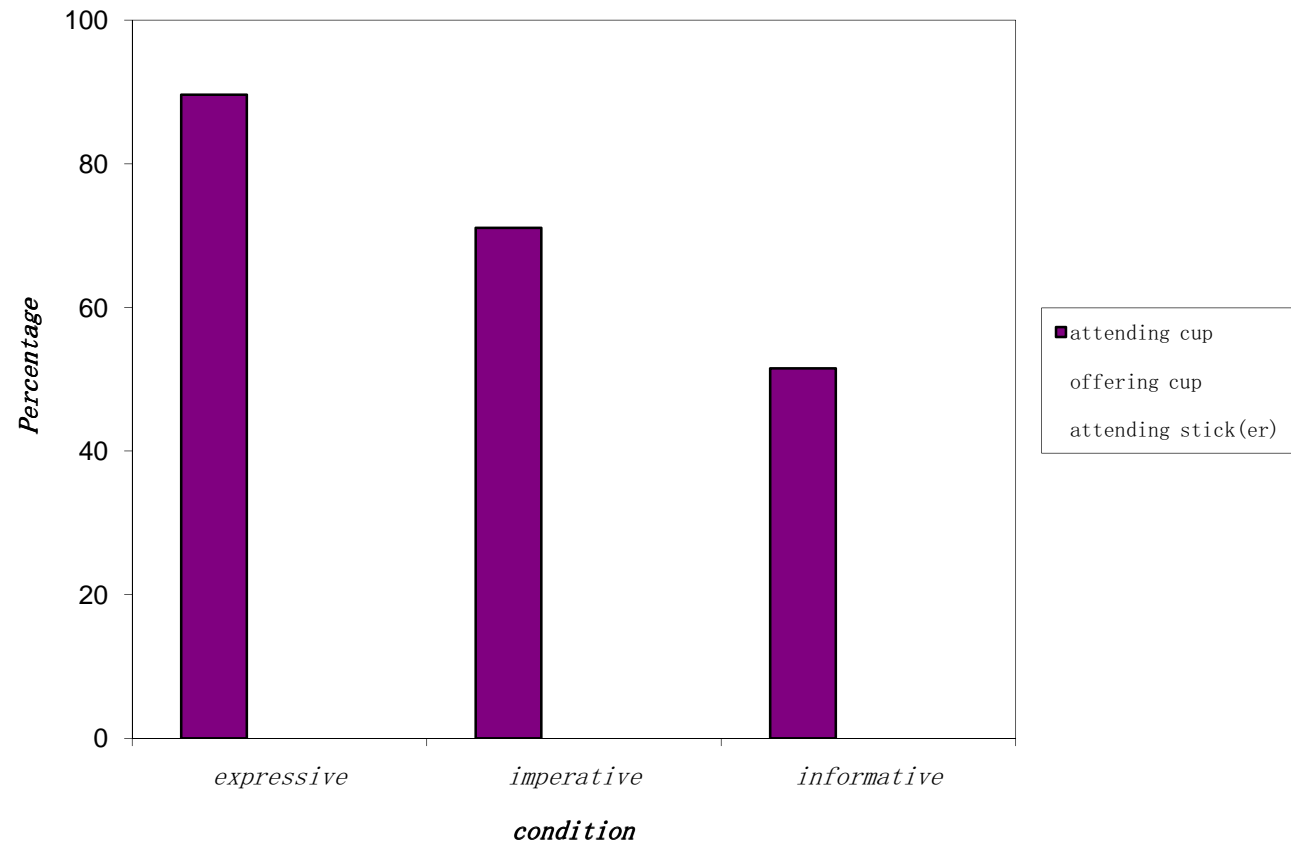
Introduction

Aim

Methodology

Results

Conclusion



ANOVA : $F(2,218)=14.192, p < .001, \eta^2 = .135$

Infant's behavior

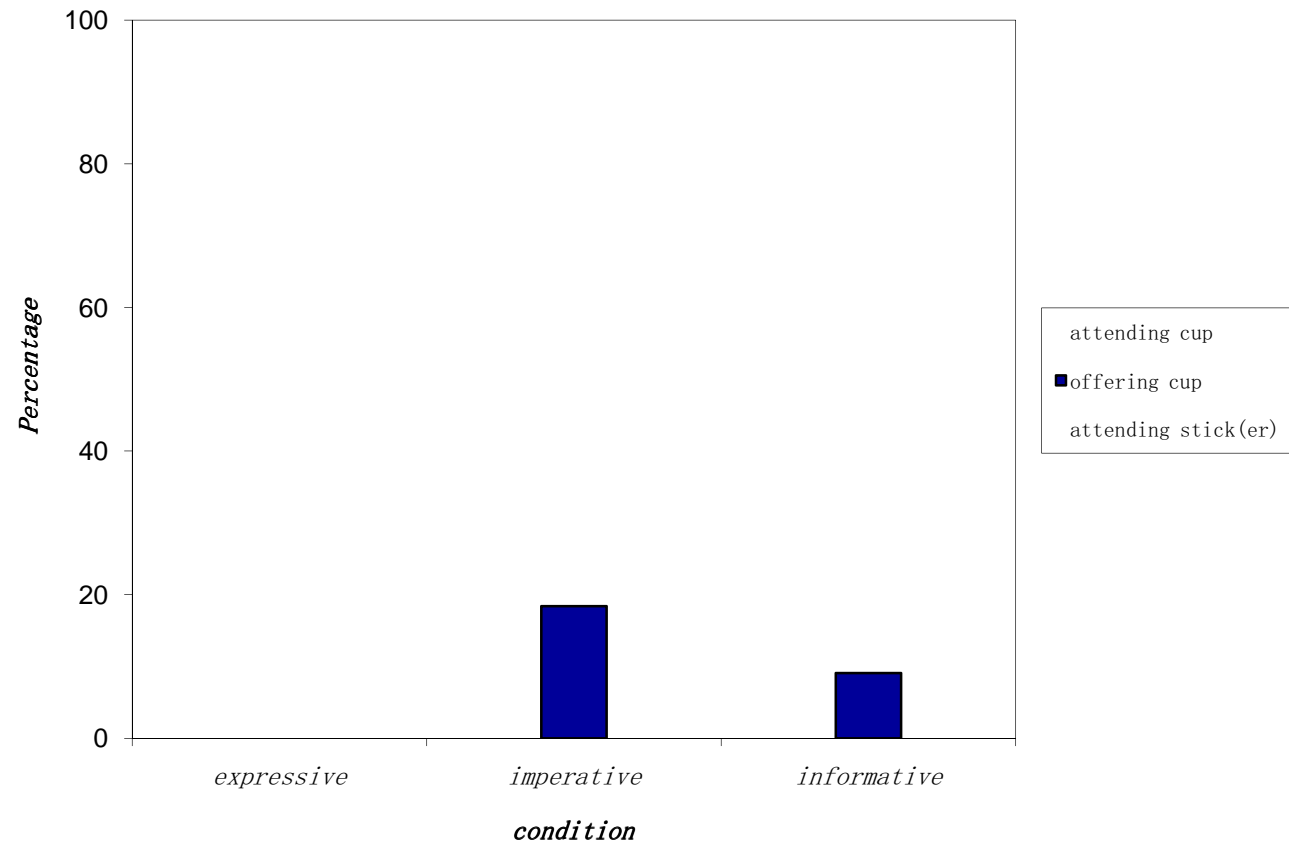
Introduction

Aim

Methodology

Results

Conclusion



ANOVA: $F(2,218)=8.306, p < .001, \eta^2 = .067$

Infant's behavior

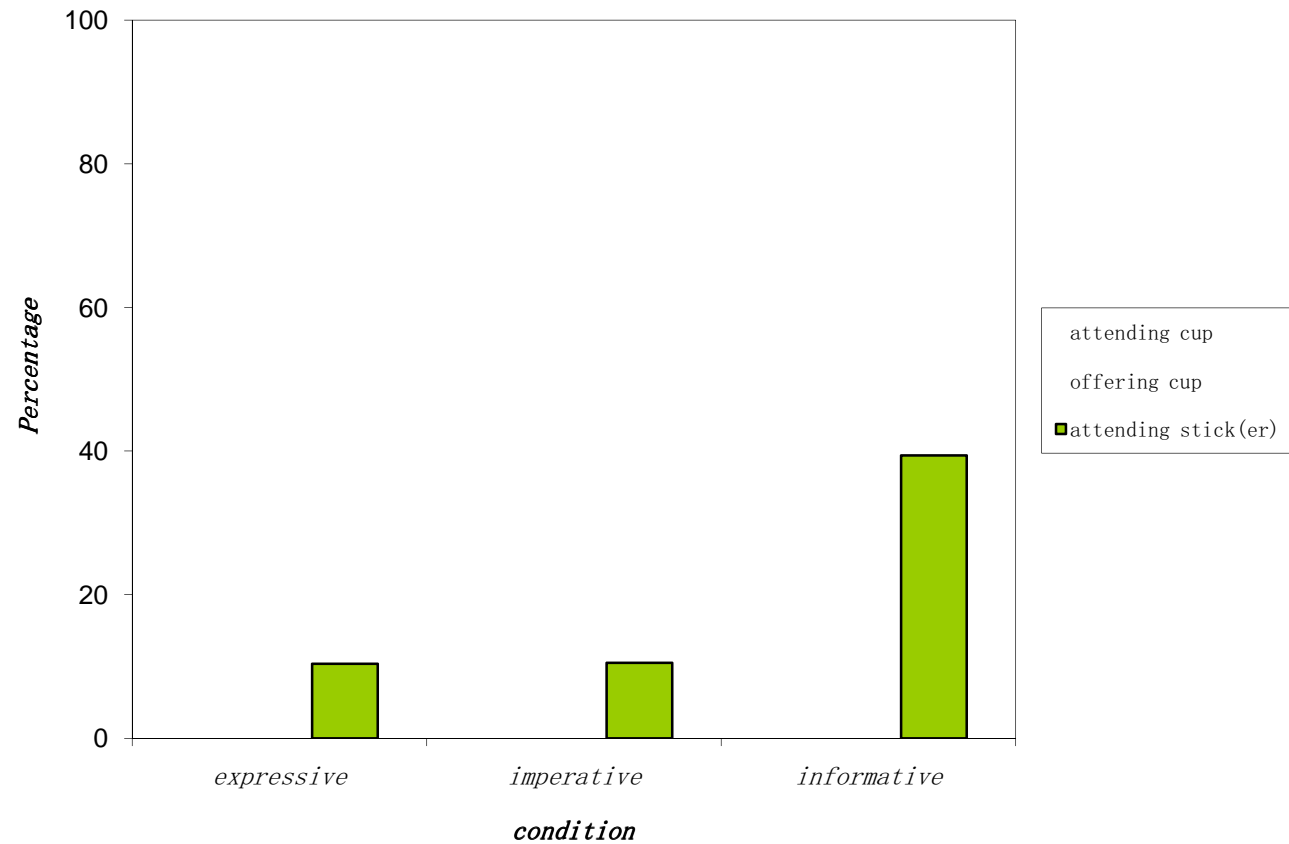
Introduction

Aim

Methodology

Results

Conclusion



ANOVA: $F(2, 218)=13.860, p < .001, \eta^2 = .083$

Infant's behavior

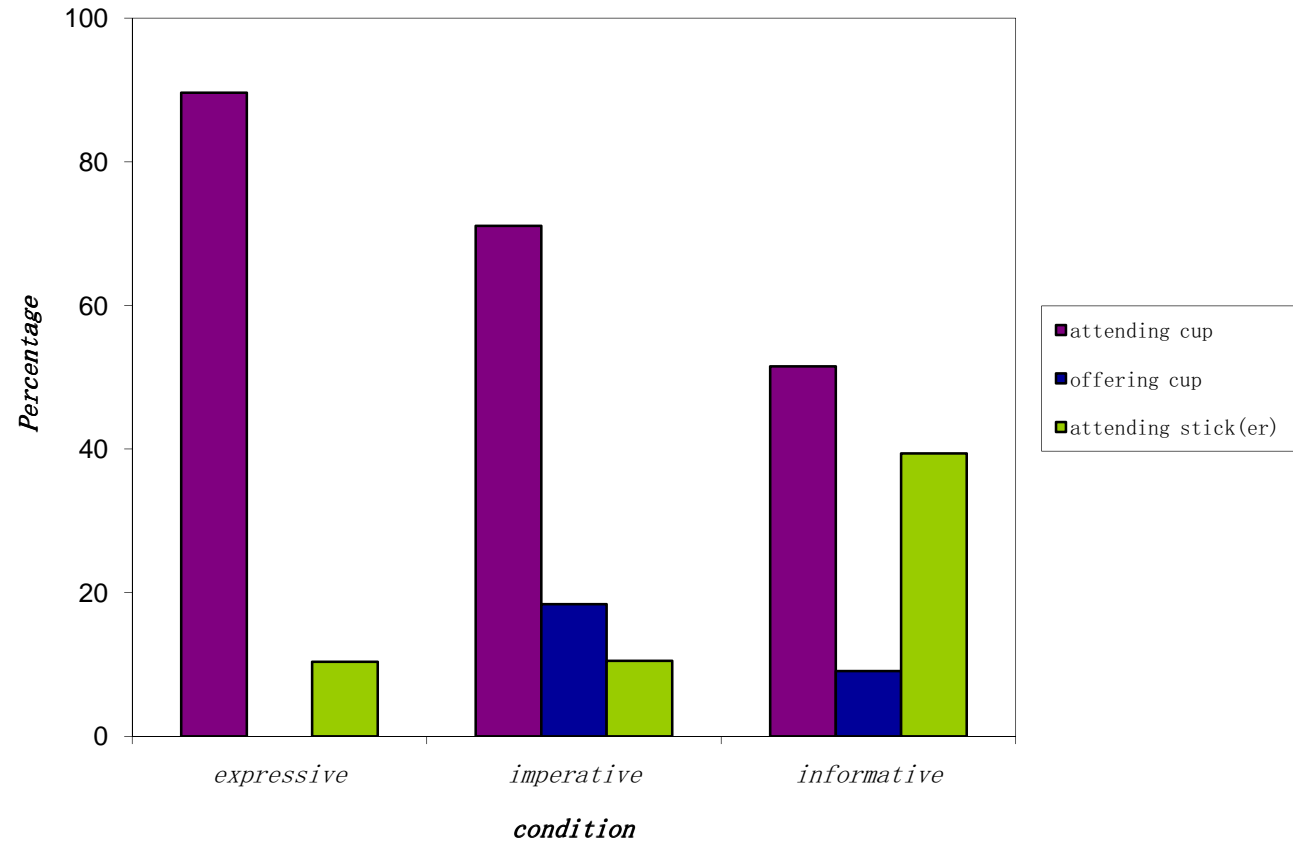
Introduction

Aim

Methodology

Results

Conclusion



Introduction

Experiment 2

Aim

(3) Do infants rely on these gesture shape and prosodic cues to determine the imperative, expressive, or informative intentionality of the adult's act?

Methodology

Yes, because they behave in a different way when they are addressed with an expressive, imperative or informative motive, even if the only differences across motives are the adults' use of phonetic cues of prosody and their hand shape.

Results

Conclusion

Introduction

Aim

Methodology

Results

General
conclusion

12-month-old infants understand the intentionality of multimodal acts relying on gesture and speech cues

- The **gesture shape** and the **prosodic cues** play a crucial role in this early ability.
- They can do it in absence of **contextual** information (experiment 1)
- They can even do it in absence of **lexical** information (experiment 2)



Follow-up questions

Introduction

Aim

- **Infants rely on prosody and gesture shape, but what would happen if we only have either prosody or gesture shape as a cue?**

Methodology

Would infants rely on prosody more than gesture? Would they rely more on gesture cues? Or do they need both cues together?

Results

- **And, what would happen if the information carried by the gesture or the one in speech is not congruent?**

General
conclusion

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