

# Engagement matters: Understanding intentional actions in infancy

A second person perspective

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# Joining intentions

- Intentional actions have a quality of incompleteness, of waiting
  - Allowing the intentionality of actions to be perceived
  - And potentially inviting others to engage with the incompleteness
- The most irresistible intentional actions are those directed to us
  - Arousing and demanding response
  - Leading to others' responses to our responses
- Joining of intentions (in 2<sup>nd</sup> person engagements) → understanding the intentionality of others' actions
- Towards a natural history of the joining of intentions
  - Anticipatory adjustments to being picked up (2 months →)
  - Compliant responses to directives for own intentions (6 months →)
  - Teasing – challenging, re-directing and elaborating other's intentions (8 months →)

# Conceptualising intentions

- Intentions conceptualised as internal and hidden
  - neglect of early engagements or explicit dismissal as irrelevant (Perner, 1991; Tomasello et al, 2005; Barresi & Moore, 1996)
    - lean on a Cartesian legacy, perpetuating a mind-behaviour dualism
    - necessitating a specific developmental model of watersheds:
      - early perception of mindless behaviour
      - Later inference of intentions behind the mindless behaviour
- Attempts to separate action understanding from intention attribution (not inference; explicit, conscious) (Uithol&Paulus, 2012)
  - Help focus on early engagements
  - Aim to get rid of mental state watersheds
  - But still leave the intentional quality of actions (the *manner* of actions, a la Ryle) occult & unavailable to perception.
  - Do not really explain the motivational and emotional bases of inter-intentionality (Stern, 1985)
- Perceptual availability of intentions (considerable evidence in adults. Becchio et al, 2008, 2009; Ansuini et al, 2014)
- Perceptual availability (of attention) only in **engagement with the world** (Merleau-Ponty, 1961)
- Perceptual and emotional availability first in **engagement with the self** (Reddy, 2011, 2014)
  - Of attention
  - Of intentions

# Re attention

- *“I discover vision, not as a “thinking about seeing,” to use Descartes’ expression, but as a gaze at grips with a visible world, and that is why for me there can be another’s gaze.”*  
(Merleau-Ponty, 1961)

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- *“I discover vision, not as a “thinking about seeing,” to use Descartes’ expression, but as a gaze at grips with **me**, and that is why for me there can be another’s gaze.”*

# Expanding awareness of others' attention ... from self to time

Age	Attention to:	Responses to/ directing others' attention
2 m	<b>Self</b>	Responding: <i>Joy, Distress, Indifferent, Ambivalent</i> Directing: <i>Prompting response, Calling when absent</i>
4 – 5 m	Self- <b>body</b>	Responding: <i>Enjoy tickle, games, avoid?</i> Directing: <i>Seek repeat/ more</i>
7 - 10 m	<b>Self Acts</b>	Responding: <i>Enjoy, avoid, refuse to perform, comply</i> Directing: <i>Perform: Clowning, showing-off, teasing</i>
10 - 14 m	Things in <b>space</b>	Responding: <i>Follow gaze to distal objects</i> Directing: <i>Pointing (imperative, declarative, informative, interrogative?)</i>
12 – 24 m	Things in <b>time</b>	Responding: <i>Narratives on request</i> Directing: <i>Inform selectively; report past events</i>

- “I discover *intention*, not as a “thinking about *intending*,” to use Descartes’ expression, but as an *action* at grips with *me*, and that is why for me there can be another’s *intention*.” (M M-P, 1961)

# Towards a natural history of the joining of intentions

- Most studies use third-person methodologies – infant as **spectator** (Woodward, 1998; Bellagamba & Tomasello, 1999; Meltzoff, 1995; Baldwin, Baird, Saylor & Clark, 2001).
- Most use looking time measures
- Anticipatory responses harder and reported later (e.g., 6 months) (Cannon & Woodward, 2012; Gredeback & Melinder, 2010; Ambrosini, et al, 2013; Falck-Ytter et al, 2006; Kanakogi & Itakura, 2011; Rosander & von Hofsten, 2011; )
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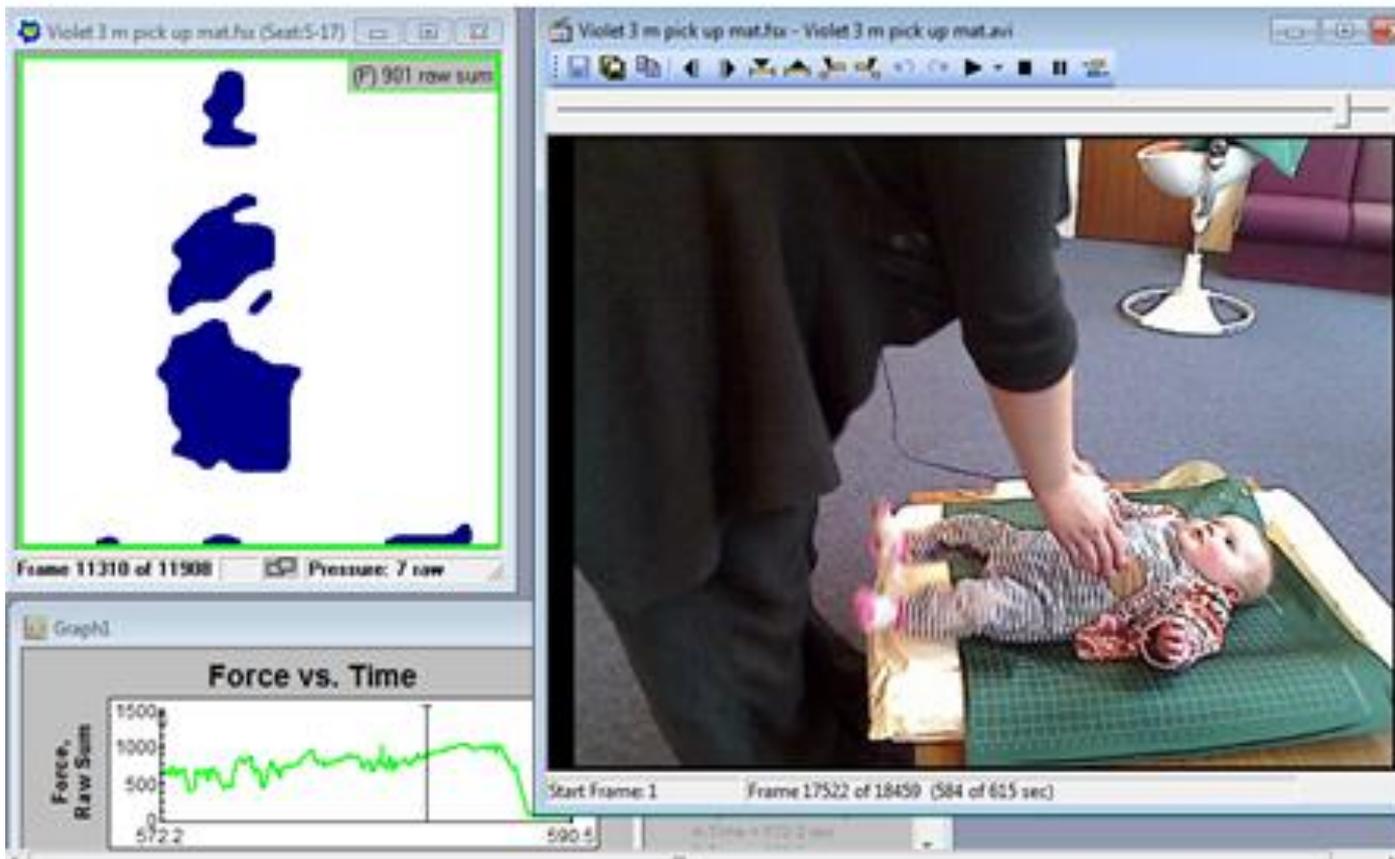
# Being picked up: one of the earliest actions infants experience

- Significant indicator of atypical development
  - Kanner (1943) children with autism reported by parents not to make the typical APA of typical infants - anecdotal reports of back arching at 4 months but no systematic study.
- In typical development:
  - By 12 months infants lift up their arms to be picked up and may start doing this earlier – 7? 8 months? No systematic information
  - Emergence of pick up requests from anticipatory pick up responses (Lock, 1984; Service, 1984)
  - But when do anticipatory pick up responses begin? Not known
  - And what do they look like? Not known
  - What would sensible adjustments be?

# Force mat system

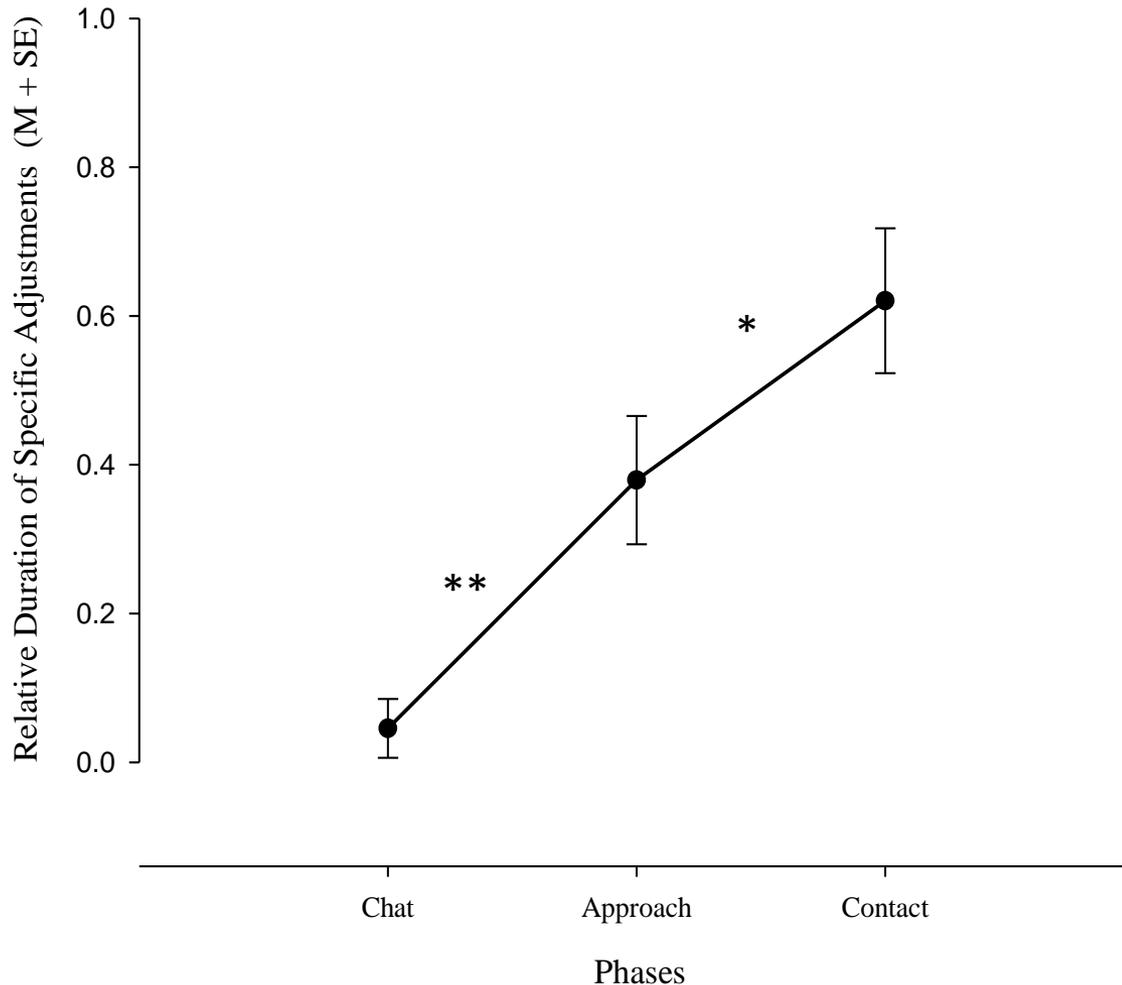
Mat dimensions:  
31cm x 26cm

Grid of 1008 sensors  
CONFORMat



# Duration of Specific Adjustments at 3 months X Phase

Reddy, Markova & Wallot, 2013, *PloSOne*



## Durations x Phase

- $F(2,34) = 18.01, p < .0001, \eta^2 = .51$
- linear trend,  $F(1,17) = 34.40, p < .0001, \eta^2 = .669$

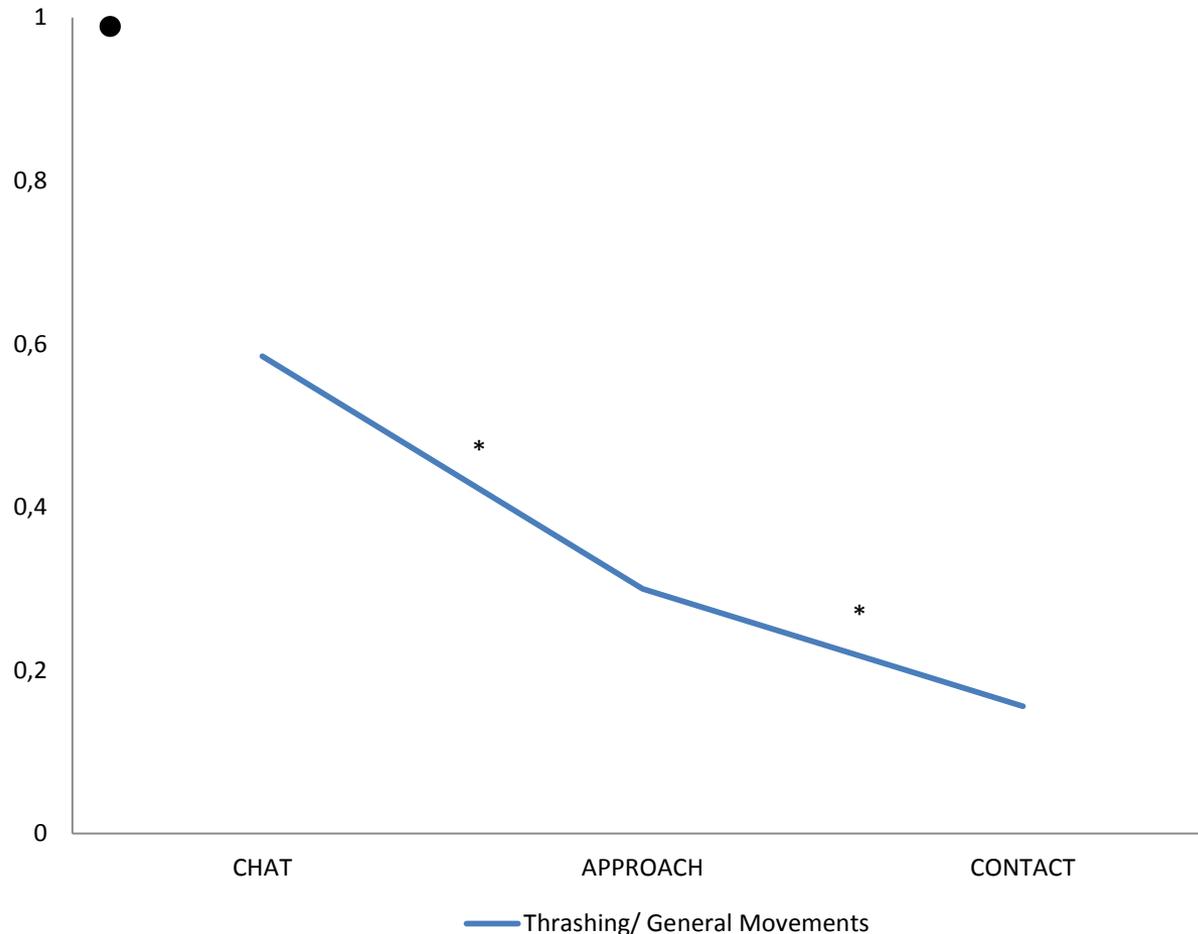
## Presence x Phase

CHAT	APPR	CONT
2	12	14

**3 infs = 0**

- $\chi^2(2) = 17.2, p < .0001$

# Thrashing/ General Movements at 3 months X Phase



## Durations x Phase

- $F(2,34) = 10.64, p < .0003, \eta^2 = .39$
- linear trend,  $F(1,17) = 15.83, p < .001, \eta^2 = .48$

## Presence x Phase

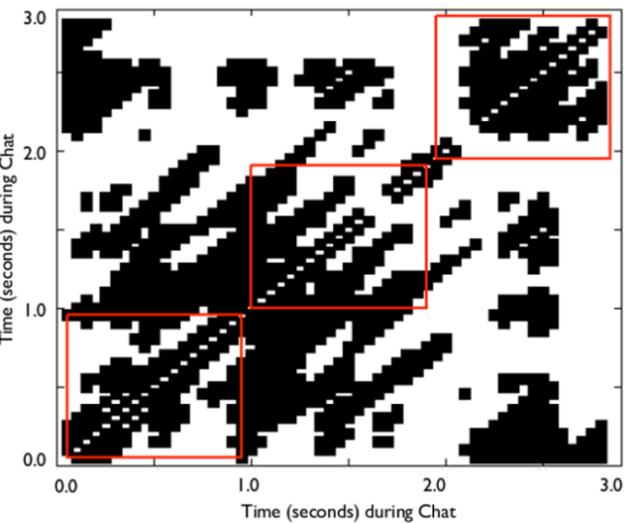
CHAT	APPR	CONT
11	13	3

6 infs = 0

- $\chi^2(2) = 12.4, p < .002$

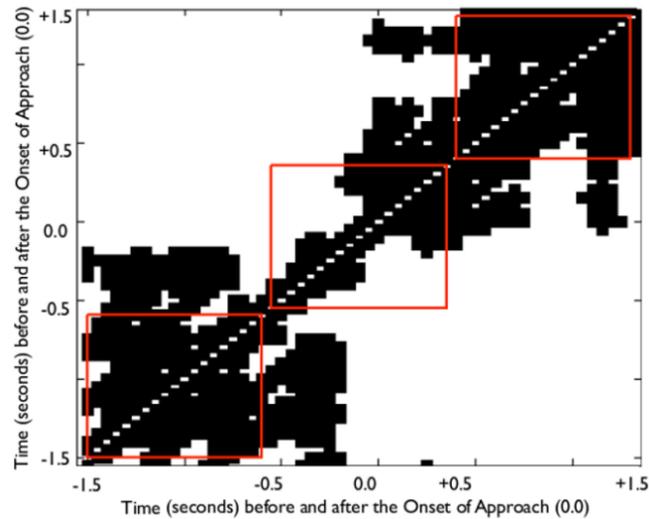
# Global postural shifts: Recurrence plot exemplar at 3 months

CHAT %REC



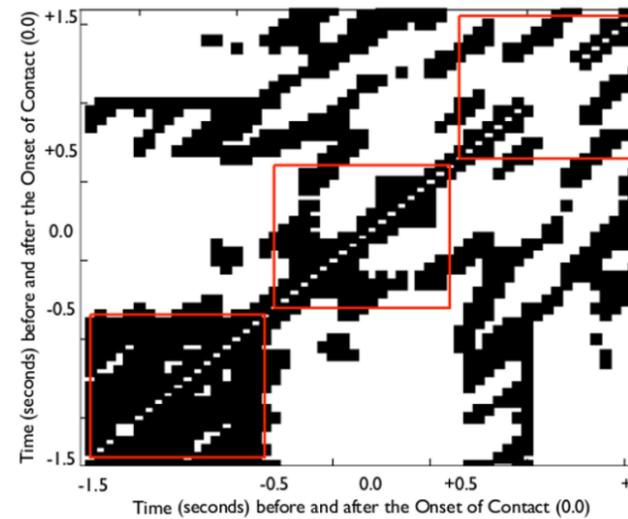
No effect of TIME

APPROACH % REC



Imm. drop then increase  
 $F(2,102)=2.78, p=.071$

CONTACT % REC



Decrease in third segment  
 $F(2,102)=16.73, p < .001$

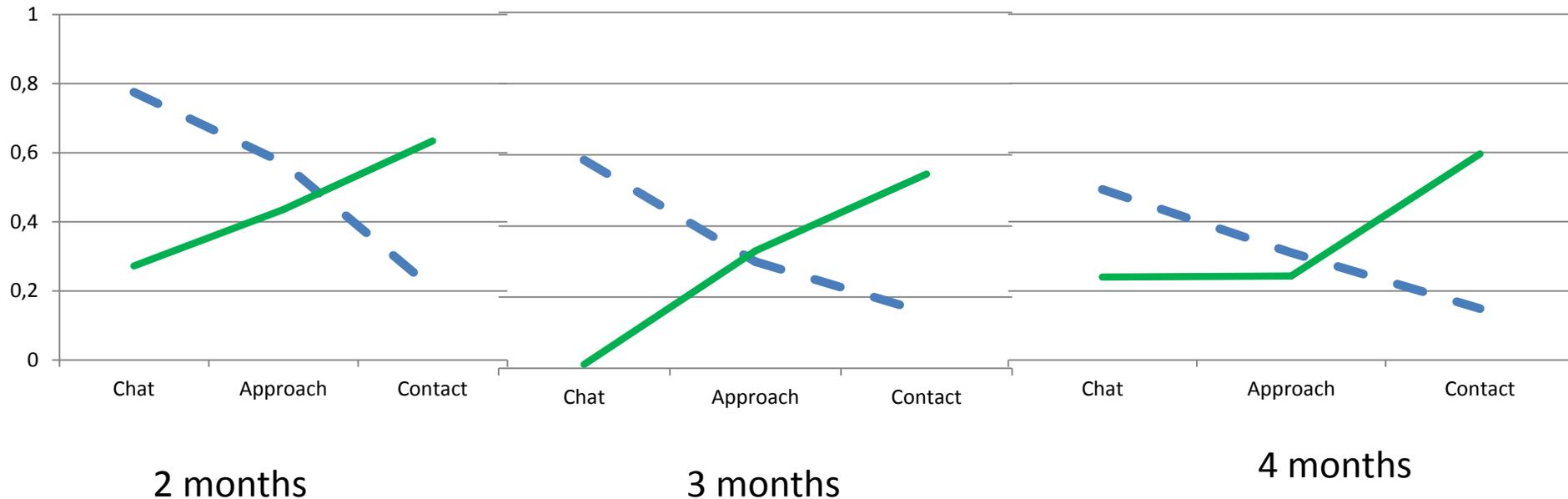
# Specific Adjustments and Thrashing/ General Movts

## Durations in each Phase at 2, 3, 4 months

### SPECIFIC ADJUSTMENTS or THRASHING/ GENERAL MOVEMENTS

### No Age Differences in Presence or Durations

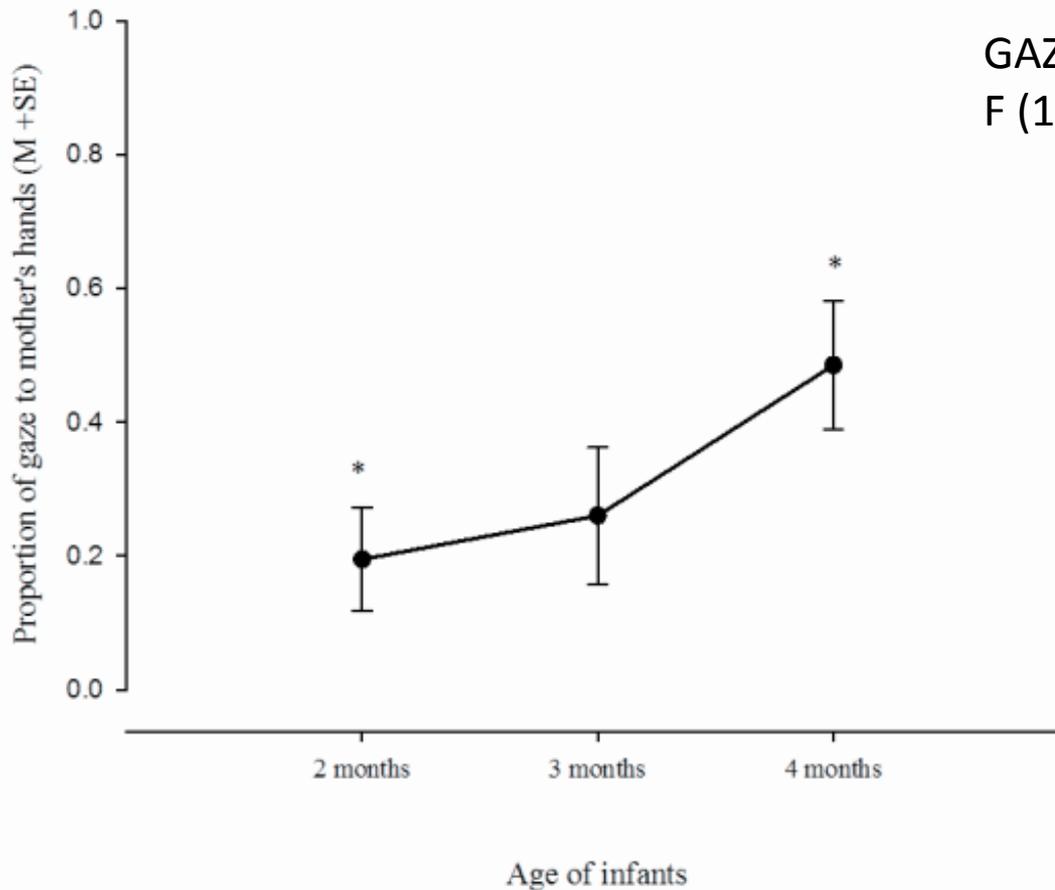
BUT in Presence of SPECIFIC ADJUSTMENTS: 2months : NO Phase Differentiation in Presence, n.s.; 3 months:  $p = .007$ ; 4 months  $p = .023$



# Gaze to Mother's Hands

GAZE mostly to M's **face** at all ages

GAZE specifically to hands increases  
 $F(1,9) = 8.11$   $p = .019$



# Implications

- Different phenomenal quality of actions towards ourselves: directly and unavoidable *relevant* to the infant (in typical development).
- Being relevant, arouse bodily and emotional responses (i.e., appropriate *responsive* acts rather than just matching ‘motor resonances’, Gallese, Rochat, Cossu & Singaglia, 2009) allowing intentional engagement.
- This may be precisely why understanding and anticipating self-directed actions is easier (emotionally and cognitively).
- Active participation in intentional engagements
  - thus evident very early in life
  - and must constitute (rather than merely reveal) the infant’s developing awareness of others’ intentions.

# Towards a natural history of the joining of intentions

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# Intentions for infant's actions

- Communicative intentions a special - and more difficult - form of intentional understanding requiring a recursive process of representational understanding? (Tomasello, 1999; Tomasello, Carpenter, Call, Behne & Moll, 2005; Tomasello & Camaioni, 1997).
  - Directive intentions (they intend *versus* they intend that I do) only grasped in second year of life
- However, from the point of view of the *receiver* of the act both actions need require no more than a recognition that the other person wants me to sit down, thus both need involve only a recognition of intentionality towards the self's actions.
  - It is thus possible that long before the second year of life, and given the evidence of awareness of others' intentional action even before the so-called 'cognitive revolution' of the 9 month-old, infants can begin to understand that other people not only have their own intentions, but want and expect the infant to act in certain simple ways.

# Being drawn into action and cooperation

- Very early incidence of distal directives – communicative function
- Considerable embedding of intentions in family specific engagements - drawing out the awareness
- Cultural variations in onset, frequency, nature of directives – and of responses

# Frequencies of directives and compliance over age

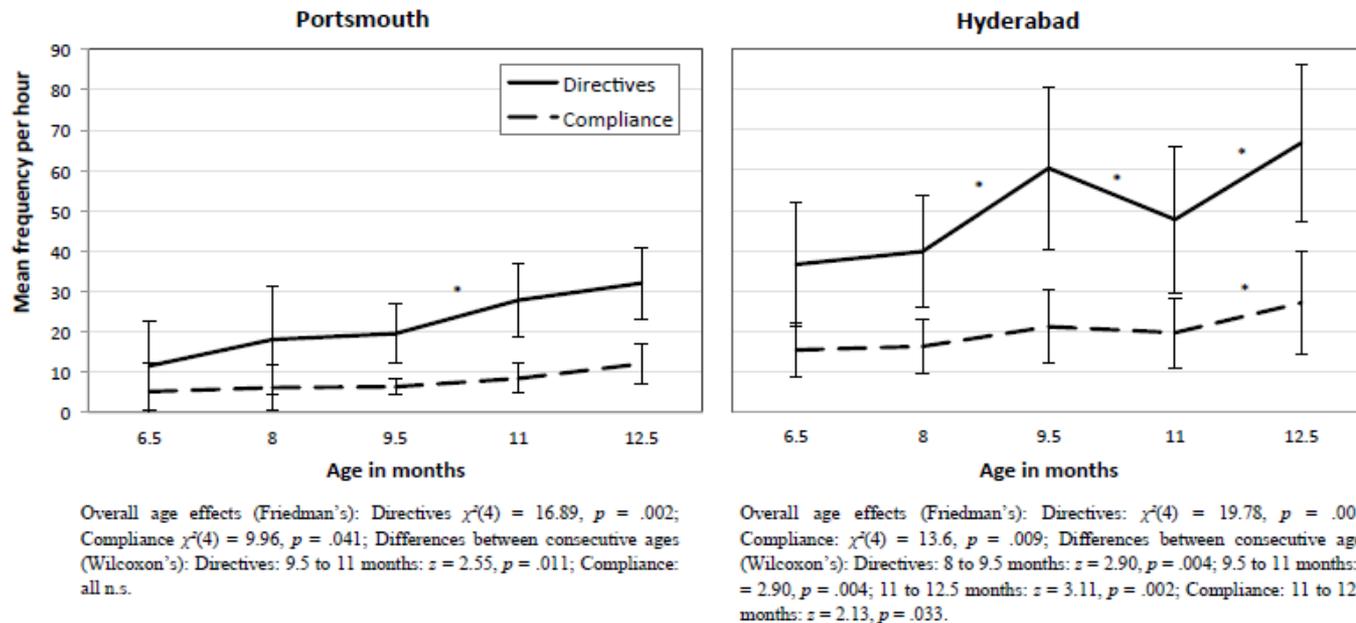


Figure 1. Parental Directives and Infant Compliance: Mean Frequency per hour over age

Table 3. Examples of compliance at 6.5 and 8 months

Age	Portsmouth	Hyderabad
6.5 m	<p>1. AC: M taps a book: <i>That's horzy look</i>. Inf looking around the room, M tapping the book again. Inf looks at the picture M is tapping.</p> <p>2. JE: Inf turns towards the TV screen. M: <i>What're you after now?</i> Inf turns away to something else. M: <i>You can see your reflection, can't you?</i> tapping the screen, <i>Look at yourself</i>. Inf turns to the TV, looks, then turns to M's face, smiles, and looks back at the TV briefly, then away.</p> <p>3. JJ: After a period of playing with a toy telephone, with M demonstrating the dial, Inf turns to a different toy; M turns the dial again saying <i>What you were trying to do this morning wasn't it?</i> Inf looks back at the toy phone. M: <i>You do it</i>. Inf looks, then leans forward and turns the dial. M: <i>That's it! Good boy</i>.</p> <p>4. LC: Inf opens his mouth as M nears with another spoonful, then shuts it and turns to look at something else. M: <i>Open..</i> waiting. Inf turns back to it and opens his mouth.</p> <p>5. JE: M demonstrating pulling toy cow with string <i>Can you pull the cow up?</i> Inf reaches for the string. M: <i>That's it</i>. Inf pulls cow. M: <i>That's a good boy</i>, patting his back.</p>	<p>6. MA: Inf lying on her back on the bed; M holding her hands in her own, but not pulling her up, says <i>Get up, come on, come ooon</i>, waiting; Inf makes fussy sounds appearing to want M to pick her up; M says again <i>come oon</i> looking at her but doesn't pull her up, just waits. Inf stops fussing, looking at M and starts to strain her neck lifting her head up; M then helps pull her up.</p> <p>7. KA: M picks up Inf, asking: <i>Where's Aunty? Aunty? Aunty?</i> F speaks (inaudible). Inf turns to look at F. M says <i>Show where's Aunty?</i> F repeats the same. Inf turns his head towards the doorway where Au is standing, smiles broadly on seeing her, and raises both arms briefly. F and M silent, smiling as they watch Inf look at Au.</p> <p>8. SA: M holds Inf upright, then moves her nearer to and facing the wall. M: <i>Hold this. Hold the wall. Here</i>. Inf looks at the wall, reaches out and puts her palm against it. M: <i>Yes, hold it. Hold it</i>, lets go as Inf moves her other hand to the wall.</p> <p>9. SHS: M holding Inf standing on her lap, <i>Sit down sit down sit down. Sit. Sit. Sit down</i>. Inf looking around, doesn't react (not clear whether he has heard). M: <i>Hey, do it, sit</i> and bends to look into Inf's face. Inf looks at M. M: more softly, <i>Sit sit</i>. Inf bends his knees slowly and sits.</p> <p>10. SHS: M carrying Inf who is looking elsewhere: <i>Give me a kiss love, kiss me love...</i> turning her face to present her cheek to Inf. Inf turns and looks at M's cheek as M repeats <i>Kiss me love</i>. Inf bends his head forward and applies an open mouth to M's cheek.</p>

11. EM: M carrying Inf who is playing with a stick. M takes the stick away saying *Thank you* and, as Inf looks around the room asks *Can Mummy have a kiss?* Inf turns into M's shoulder and hugs her tightly. All laugh and M says *That's nice!*
12. JE: Trying to stop I from blowing a raspberry, M: *Can you give me a kiss please?* Inf looks at the camera, then at M's face, making a lip smacking sound. M: *That's it, clever boy!*
13. JM: Inf playing with a long sound-making stick, mouthing it. M suggests *You gonna wave? Gonna wave with it?* waving her own hand in front of Inf's face. Inf looks up at M, smiles and waves her own hand. M waves her own hand vigorously again. Inf looks at M's face then at the toy and waves the toy. M approves: *Shake it, that's it.*
14. EH: Inf and M at musical toy. M: *Ready* and opens part of toy. Inf watches. M waits, looking at Inf who is just watching the toy: *Can you do it?* Inf reaches out and does it.
15. AC: Inf hitting a large ball at his side with left arm. M: *Are you playing the rolling game?* Inf continues hitting the ball with left arm. M: *Are you going to roll it to me now?* Inf leans whole body to the side, getting arm
16. KA: M, carrying Inf, says *How does Thatha cough? Show how Thatha coughs* and coughs herself. Inf, although attending to something else, immediately makes an odd vocal coughing sound without looking at M. M laughs and says *Yes.*
17. SU: M, having walked Inf to the mat with her fingers in his palms, continues to stay that way and says *Sit, Mishu, sit, sit* and waits. Inf looks up at her. She nods and repeats *Sit.* He then starts to bend his knees and sit down. She breathes out *Oooph* in sympathy with his effort.
18. PO: Inf standing up looking down at something, with M lightly holding him. M says *Do 'dee', do 'dee'* (a head hitting game) moving her face slightly forward but head still upright and waiting (the heads have to be inclined forward to hit foreheads together). Inf looks up at her face then inclines his head forward. M inclines her head and they hit gently. (This is a regular game among many families).
19. PR: Inf lying on floor on his stomach. M sitting on floor nearby. Au asks Inf *Where's Baba? Where's Baba? Baba?* (i.e., poster of a Saint) M repeats *She's asking show where Baba Thatha is, Show where's Baba Thatha...* Inf turns from Au to M, smiling and lifts one arm upwards in an open palm 'point', and still smiling, glances at V and Au (reported as a regular routine, even in the absence of the poster).
20. SHA: Inf lying on his stomach looking at toys. M sitting at a distance: *Here.* Inf turns to look at her. M: *Say dai* (baby word for come), *dai, dai, dai, dai, love, say dai dai,* demonstrating a conventional

# Implications

- No sudden and general onset of ‘understanding directives – recursive representational awareness problematic
  - Compliance with directives cannot be fixed to a single point in time; gradual emergence and gradual increase over time,
  - Compliance specific to context
- Consistent with findings of early word learning abilities at 6 months of age (Friedrich & Frederici, 2011) and of awareness of object- and self-directed actions (Woodward, 1998, 1999; Reddy, Markova & Wallot, 2013)
- Infant awareness of adult’s communicative intention emerges within the ‘response space’ created by the adults’ directives, their routines and repetition
- Awareness must be problematic if response absent - ASD

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# Three reasons for the importance of teasing to social cognition research

- Enticement and seduction:
  - to really tease, you need a person who can respond to your intentions, to whose responses you can direct your intentional actions. You need, therefore to know something about them as intentionally responsive beings.
- Foiling intentions:
  - detecting intentional actions before they are complete often highlighted as crucial evidence for showing the awareness of intentions (or also belief, thus studies focus on incomplete or false beliefs). Teasing instantiates such a disjunction. To tease someone, therefore, implies not just awareness of intentional action before it is completed but also awareness of the possibility of the action *not* being completed.
- Markers for reflection (and explicitness):
  - breaks in intentional engagements may be a crucial point for awareness and development to occur. Heidegger's hammer which is ready-to-hand gives way to the problematic hammer which suddenly becomes present-at-hand. The act of teasing, in one sense, may be less demanding of reflective awareness than is the act of recognising others' teasing as teasing (Nakano & Kanaya, 1993).

# Prevalence of teasing

	Prevalence of teasing
8 months % of sample	50%
11 months % of sample	93%
14 months % of sample	100%
Children with <b>Autism</b>	35%
Children with <b>DS</b>	91%

Types of teasing  
before 12 months

**Offer-Withdrawal of Object**

Hiding/ Withholding of object

Approach-withdrawal of self

**Provocative non-compliance**

False request/ refusal

Playful hurting

**Disrupting other's action**

Disrupting joint action

# Implications

- Anticipation of intentional actions sufficiently robust from around 8 months, to deliberately disrupt them
- Infants now drawing adults into *their* intentional nets, taking them to new routes of intentional engagements
- Mutuality of interests needed for teasing to emerge and develop (see also clowning)
- Children with autism show delays or deficits in the prevalence and content of teasing (and clowning) (Reddy et al, 2002)

# Prevalence of clowning

Infants (TD)	8 months	11 months	14 months
% of children reported	73%	93%	100%

	Children w Autism	Children w DS
% of sample reported to show any clowning ***	16%	81%

Mean number of clowning incident-types: DS > AUT \*\*\*

# Joining intentions as a process

- Two senses in which a static representational approach to intentions comes too late in the day:
  - in the immediate sense of having to wait until emergent intentions in single or joint actions are complete enough and concrete enough to be representationally abstracted,
  - and in the developmental sense of having to wait until infants can mentally represent separate and coordinated action plans in the second year. By the time we get to such a competence, if we want to explain how the joining of intentions happens, we've pretty much missed the boat.
- The joining of intentional actions is a process, building up developmentally in **complexity and scope** – from joining with intentional actions
  - **to the self**, then to intentions
  - **for actions of the body or on objects nearby**, and then to intentions
  - **for actions on objects or locations at a distance**
  - **And for actions over time**

# Conclusions

- Any theory of the emergence of intention awareness needs to recognise the crucial role of *response* (within engagements) for understanding its ‘how’ and its ‘why’
- Intention itself is a ‘historical’ process, something that unfolds in time and is subject, not to a prior plan, but to the vagaries of time and circumstance; the unfolding ‘history of the seed’ (Shotter, 1983) is the only thing that specifies the structure of the plant.
- The joining of intentions too, is both
  - a mutually constitutive process - the actions and responses and responses to responses unfolding and changing over time –
  - and an illuminating process. It is *in* the process of joining – in the postural adjustments to an approach, the acquiescence with a directive, or the playful disruption of an action, and in their subsequent success or failure - that intentions (others’ and our own) become transparent.
- **If you can’t join intentions you can’t (typically) understand them.**