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The Relationship Between Infant Holdout and Gives, and Pointing

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We provide an analysis of holdout and giving (Ho&G) behaviours in prelinguistic infants and investigate their relationship with index finger pointing. The frequency of Ho&Gs at 10 and 11 months along with the length of the following social interaction correlated with index finger pointing at 12 months. We conclude that Ho&Gs are a precursor to index finger pointing and that this provides support for social-pragmatic approaches to communicative development.

The desire and ability to share attention through gesture and language is a uniquely human trait (Camaioni, 1997; Tomasello, 2008). The first instantiation of this behaviour is commonly held to be index finger pointing which

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emerges around 8–12 months in typically developing infants (Bates, 1976; Camaioni, 1997; Carpenter, Nagell, & Tomasello, 1998; Franco & Butterworth, 1996) and is viewed as a major milestone in infant development. In addition to being a species-specific behaviour, index finger pointing has been linked to language development, thereby assuring its status as a gesture par cognitive excellence in the literature (Bates, Camaioni, & Volterra, 1975; Butterworth, 2003; Iverson & Goldin-Meadow, 2005). Despite gaining the lion's share of attention, index finger pointing is not the infant's first attempt at engaging in declarative triadic behaviour. Prior to pointing, many infants hold out or give objects in attempts to draw an interlocutor's attention to an object of interest (Bates et al., 1975; Carpenter et al., 1998; Werner & Kaplan, 1963).

Although prelinguistic points and reaches are well defined in the literature, this is not the case for holdout and give (Ho&G) behaviours. For example, Bakeman and Adamson (1986) do not define holdouts (or shows) and combine these behaviours with acts of offering, while Bates et al. (1975) provide clear examples of shows and gives but avoid fine-grained definitions of the concepts. However, Carpenter et al. (1998) define holding out behaviours as involving "holding objects up toward the adult's face typically with a bent arm." In this study, we treat holdout (or shows) and gives as two forms of proximal declarative behaviour. Both involve the infant drawing the interlocutor's attention to an object, either by holding it up in view of the interlocutor or more directly by placing the object in the interlocutor's physical space. To some extent, whether a holdout remains a holdout or turns into a give is a consequence of the interaction with the interlocutor who may put out their hands in response to a holdout gesture, prompting the child to give them the object. In this study, we distinguish between giving to gain assistance (e.g., in opening a box) and giving as a form of declarative behaviour. Only the latter are considered alongside holdouts as declarative behaviours in which the infant appears to be expressing a *sharing* communicative motive (Carpenter et al., 1998; Tomasello, 2008).

There is evidence to suggest that holdouts and gives emerge around the age of 10 months and that their emergence precedes declarative pointing (Bates, 1976). Carpenter et al. (1998) suggest that holdouts and gives may be a cognitively simpler form of declarative behaviour than declarative pointing as the former involves physical contact with the object, while the latter involves directing the interlocutor's attention to an object out of the infant's grasp. Studies also suggest that proximal declaratives such as holdouts and gives may be related to and possibly be precursors to declarative pointing. For example, Bates, Benigni, Bretherton, Camaioni, and Volterra (1979) suggested that shows, gives, communicative pointing, and ritualized

requests were cognitively related in the prelinguistic stage and formed a gestural complex. From a socially oriented perspective, Werner and Kaplan (1963) claimed that index finger pointing emerges from social interaction around objects between caregiver and child. This approach is reflected in later work by Bruner (1983) and Liszkowski and Tomasello (2011), the latter of whom propose a social-pragmatic account of index finger pointing in which infants' ability to produce referential acts is based on their ability to engage in joint attentional frames and view others as intentional agents.

To date, what we may call Ho&G behaviours, and their associated patterns of social interaction, have not been studied in depth. Consequently, the question of whether an infant's production of Ho&Gs is related to the emergence of index finger pointing still remains unanswered. This is an important question as it could reset the age at which we begin to see infants engaging in intentional, communicative, attention-sharing behaviours. In this study, we document the emergence of infant Ho&Gs and investigate whether their production is linked to subsequent use of index finger pointing. Our focus here is on infant-initiated behaviours, that is, cases where the infant independently attempts to draw the caregiver into a triadic frame of interaction. Our motivation for doing so is to avoid the dangers of ascribing communicative intentionality to rote learned patterns of interaction. We predict that the frequency of Ho&Gs will correlate with index finger pointing but not with reaches which typically express instrumental communicative motives (Bates et al., 1975; Franco & Butterworth, 1996; Masataka, 1993; see also Liszkowski & Tomasello, 2011). Furthermore, we suggest that the interactional sequences triggered by infant Ho&Gs will also be related to infant index finger pointing, suggesting that the relationship between Ho&Gs and index finger pointing is socially mediated.

METHOD

Participants

A total of 24 10-month-old infants (10 girls: mean age 313 days, range 267–356 days) and their mothers were recruited from the database at the University of Manchester Child Study Centre. All dyads were monolingual English-speakers from the northwest of the UK with no reported language delay. Families that participate at our Study Centre typically come from middle class backgrounds, although demographic information was not collected for the current study. The mothers were given travel expenses, and the children were presented with a book for their participation. Four dyads were excluded due to failure to attend all sessions.

Procedure

The study was based at the Child Study Centre at the University of Manchester and involved the dyads visiting the centre once a month for 3 months. Each visit was video-recorded and consisted of two parts:

1 Point eliciting (cf. Liszkowski & Tomasello, 2011): The mother held her infant on her hip and walked along a row of interesting objects hanging from the ceiling of the study room.
2 Ho&G eliciting: The dyad sat opposite to each other on a blanket and were given two sets of toys to play with for 10 min each. The caregivers were told to "let the infants lead the play," in order to encourage infant production of the target behaviours.

Coding

The video-recordings of the dyads were coded for the occurrence of infant Ho&Gs, reaches and index finger points at 10, 11, and 12 months. Hold-outs were coded as the infant holding out an object with their arm extended towards the mother. Gives were coded as a single action in which the infant placed an object in the proximity of the mother, usually by placing the object in the mother's hands (but sometimes dropping it into the caregiver's lap in cases where the caregiver did not open their hands to accept the object). Index finger points involved the infant stretching out their arm either partially or fully in the direction of an object and extending the index finger. Reaches were coded as instances when the arm was outstretched towards an object, but the index finger was not extended. All points were entered into the analysis regardless of task type (i.e., any infant points produced in the Ho&G eliciting session were also coded and entered into the analysis). Gaze alternation was not included in the analysis as for the pointing task the dyad was aligned in such a way as to be always facing the object display and, consequently, we would not expect the infants to engage in gaze shifting (see Liszkowski & Tomasello, 2011, for further discussion). Two coders coded the data and conducted reliabilities on 20% of the data yielding a Cohen's kappa of .93 for the infant behaviours.

The social interaction sequences following the infants' Ho&Gs at 10 and 11 months were also analysed. The analysis was conducted in the spirit of conversational analysis as a consequence of its emphasis on identifying the sequential patterns of interaction. For the purposes of the current analysis, the onset of the social interaction sequence was the infant's initial Ho&G and the sequence was coded as complete when interest in

the object was lost. Within each social interaction sequence, we analysed the object-based behaviours produced by the infant and caregiver (e.g., the caregiver's attempt to take the object from the infant, and the infant's subsequent response to the caregiver's behaviour). In keeping with the basic structures of conversational analysis, we refer to each behaviour within the sequence as a turn.

Although holdouts and gives were coded as two discrete categories, we conflated the categories in the main analysis due to their relative low frequency, and our underlying theoretical assumption that both represent examples of proximal declarative sharing behaviours.

RESULTS

Age of emergence and frequency of the target behaviours

No gender effects were identified for any of the behaviours, thus the data were collapsed across boys and girls. Ho&Gs were attested in 50% (N = 10) of the infants at 10 months. By 12 months, 85% (N = 17) of the infants produced Ho&Gs. Reaches were produced by 75% (N = 15) infants at 10 months and 19 infants by 12 months. In contrast, index finger points emerged in the 11 months sample and even then only for 20% of the sample (N = 4). By 12 months, 40% of the infants (N = 8) produced index finger points (Figure 1). Reaches were the most frequently

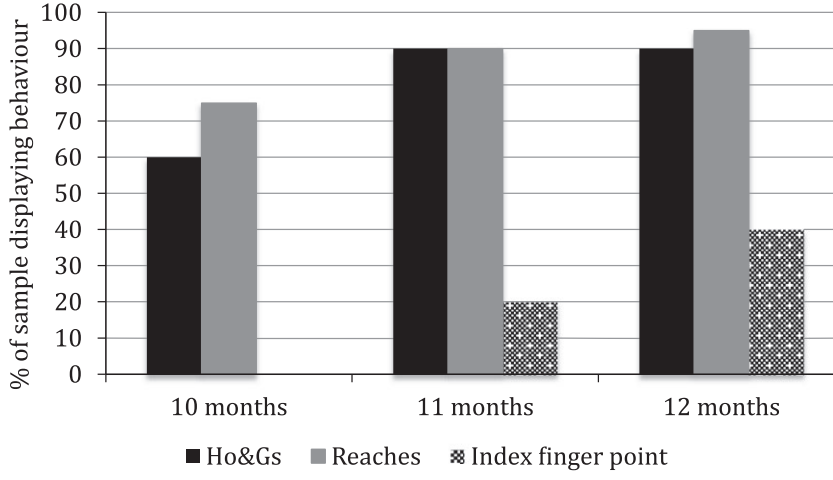

Figure 1 Cumulative number of infants displaying the target behaviours.

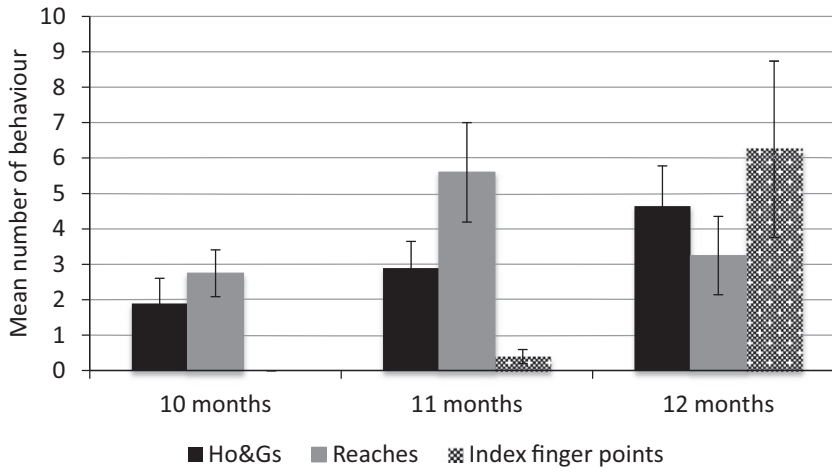

Figure 2 Mean frequency and *SE* of target behaviours across the sample.

produced behaviour at 10 and 11 months, with Ho&Gs and index finger pointing increasing in frequency over the study period (Figure 2).

Response sequences to HO&Gs

A summary of the social response sequences associated with infant Ho&Gs is displayed in Figure 3. In many cases, an initial holdout turned into a give in response to the mother's prompt for the object, and therefore, both behaviours are shown on the same diagram. The mean length of turns associated with Ho&Gs (i.e., the number of object-focussed behaviours within the interaction) ranged from 2 to 4.23 with an average of 2.67 turns across the sample. We also analysed the frequency with which mothers acted upon the object of interest (e.g., demonstrating the affordances of an object or using the object in a playful way such as using a sieve as a hat) in order to ascertain whether the level of caregiver engagement with the objects was related to later emerging declarative behaviours. On average, 31.7% of response sequences involved the mother acting on the target object.

The main response sequences to Ho&G behaviours differed significantly in length and are displayed in Figures 4 and 5, respectively. The single most common response sequence to holdouts (accounting for 18/52 holdouts) involves the infant holding out the object (HOLDOUT[1]), the mother reaching out (*reach out*) towards the object in an attempt to obtain it, and

[1]The typographical conventions used in Figures 3–5 are repeated here to aid interpretation of the sequences.

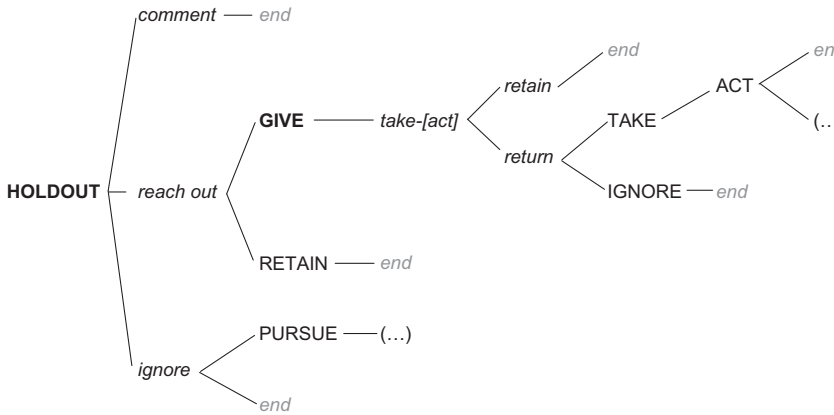

Figure 3 Schematic representation of infant–caregiver response sequences. Infant-initiated actions are shown in bold caps. Caregiver turns are shown in italics. Infant responses are shown in normal caps. "ACT" denotes the participant acting on the object and when in brackets denotes an optional element. (…) indicates a continuation of the response sequence with insufficient frequency to be coded.

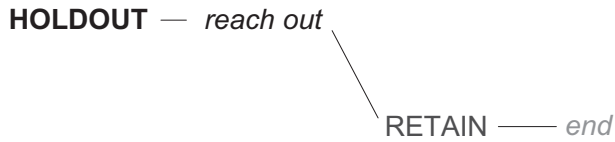

Figure 4 Key sequence for holdouts.

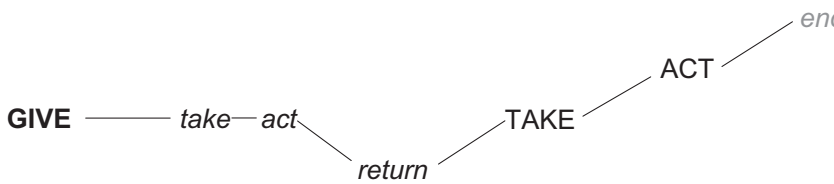

Figure 5 Key sequence for gives.

the infant pulling back the object (RETAIN). Therefore, the most frequent response to infant holdouts is a possible misinterpretation on the part of the mother; while the infant might be intending only to show the object, the mother interprets the behaviour as a give. In contrast, the single most common response sequence for gives (accounting for 11/44 gives) involves much closer coordination between infant and mother. The mother accepts the object from the infant (*take*), acts on the object (*act*), and then

returns it to the infant. The infant takes the object (TAKE) and acts on it (ACT) either imitating the mother's action or acting on the object in their own way. Interestingly, the mother does not interpret the give in an adult-like way (i.e., as a transfer of an object from person *A* to person *B*) but instead as an opportunity to share interest in an object back-and-forth and demonstrate its affordances.

The relationship between Ho&G behaviours and pointing

Our central focus was the relationship between infant Ho&G behaviours and the two forms of pointing (i.e., reaches and index finger points), specifically whether Ho&G frequency was related to subsequent declarative pointing frequency. For infants who pointed at T2 (11 months), we used Ho&G frequencies from T1, and for all other infants, we used the Ho&G frequencies from T2. The distribution of index finger points diverged significantly from a normal distribution, and therefore, we used nonparametric statistics to investigate the relationship between Ho&G frequency and pointing. The results of the analysis indicated a significant correlation between the frequency of Ho&Gs and subsequent index finger points (Spearman's $\rho = .413$, $p = .035$). There was not a similar correlation between the frequency of Ho&Gs and subsequent reaches (Spearman's $\rho = -.113$, $p = .318$). This finding is consistent with our hypothesis that Ho&Gs are related to subsequent index finger pointing in which the motive typically is to share attention, but not to reaches which typically express instrumental motives (Liszkowski & Tomasello, 2011).

We also found a highly significant relationship between the length of the Ho&G response sequences at 10/11 months and frequency of index finger pointing at 12 months (Spearman's $\rho = .561$, $p = .010$). In contrast again, and again in line with our hypothesis, there was no relationship between the Ho&G sequence length and frequency of reaches at 12 months (Spearman's $\rho = .162$, $p = .494$). Finally, we analysed the relationship between the frequency with which the mothers acted on target objects and infant index finger pointing. We found a significant correlation between the number of instances in which the caregiver acted on the object within the response sequences and index finger pointing at 12 months (Spearman's $\rho = .554$, $p = .011$) but no correlation with reaches (Spearman's $\rho = .003$, $p = .988$).

DISCUSSION

The current study provides three key contributions to the field of infant communication. First, the study indicates that Ho&G behaviours can be

found in infant interaction by 10 months and are produced by many infants by 11 months of age. Second, Ho&Gs afford rich social interaction sequences between caregiver and infant which, in some cases, involve lengthy give and take interactions. Third, within the quasi-naturalistic context of the current study, a strong relation exists between Ho&Gs (both in terms of the behaviour itself and its subsequent response sequences) and later emerging index finger pointing. The strong relationship between Ho&Gs and index finger pointing contrasts with the lack of a relationship between Ho&Gs and reaches indicating that the link between the former two behaviours is not simply due to some infants producing more communicative behaviours overall but instead due to some developmental trajectory across the communicative motive underlying Ho&Gs and index finger points. Our findings thus indicate that Ho&Gs are the first step in the emergence of declarative behaviours, or put another way, sharing for sharing's sake (cf. Liszkowski & Tomasello, 2011). In the following section, we discuss three potential reasons for the influence of Ho&Gs during prelinguistic development.

To begin, Ho&Gs can be viewed as a proximal practice ground for later declarative behaviours such as index finger pointing. Ho&Gs involve the infant drawing the caregiver's attention to an object and placing the object in a joint attentional frame. As Ho&Gs involve sharing attention to proximal objects, they are cognitively simpler than drawing attention to distal objects, the remit of index finger pointing (Carpenter et al., 1998). It is interesting, however, that it is not simply the case that infants of 10 or 11 months cannot engage in distal object behaviours; as our study and many others before it have demonstrated, infants produce reaches which generally represent a requesting motive towards distal objects prior to index finger pointing. Index finger pointing involves bringing two cognitively complex concepts together—the declarative motive and distal reference. Ho&Gs provide the infant with the opportunity to express and gain experience of the declarative, or sharing motive before combining it with distal reference.

Second, infant-initiated Ho&Gs result in infant-focussed interactions. The infant decides which object is of interest, and (unless the caregiver ignores the behaviour completely) the caregiver follows in to the infant's focus of attention. A number of studies have indicated the facilitative nature of caregiver follow-in behaviour on infant development (Tomasello & Farrar, 1986), and the strong correlation between response sequence length and the frequency of index finger pointing in the current study further supports this claim. The findings of the study fit well within social-pragmatic accounts of gesture development (Carpendale & Lewis, 2004; Salomo & Liszkowski, 2013; Vygotsky, 1978) in which social interaction is

claimed to be the vehicle of development. Within the social-pragmatic approach, behaviours such as index finger pointing are claimed to emerge from joint engagement activities.

> The act of reference emerges not as an individual act, but as a social one: by exchanging things with the Other, by touching things and looking at them with the Other. Eventually a special gestural device is formed, pointing at an object, by which the infant invites the Other to contemplate an object as he does himself.
>
> (Werner & Kaplan, 1963)

Finally, Ho&Gs provide a social and cultural backdrop for infant–caregiver interaction. When given an object by the infant, caregivers generally commented and/or acted upon the object and then handed the object back to the infant; that is, the caregivers treated the exchange of the object as a social act of sharing as opposed to an instrumental transfer. Therefore, HO&G behaviours and the social interaction within which they are embedded provide infants with an opportunity to play an active role in a social world where objects, events, and emotions are shared.

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