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# Background

The most cost-effective way to tackle the root causes of many social and educational problems is to intervene early in children's lives, before the problems have had a chance to entrench. Key to this strategy is improving children's language development in the early years. Children who enter school with good language skills have better chances in school, better chances of entering higher education, and better economic success in adulthood.

Reading is very effective in supporting children's language development. Children who read regularly with their parents or carers tend to learn language faster, enter school with a larger vocabulary and become more successful readers in school. Because of this, local authorities often commission services to promote family-based shared book reading (e.g. Bookstart).

However, recent studies suggest that shared book reading interventions work less effectively for children from disadvantaged backgrounds than originally thought, particularly when their parents have lower levels of education. This means that there is a danger that the benefits of shared reading will be restricted to children from more affluent homes

To solve this problem, we need to develop a better understanding of how reading interventions work, and of how parents use them. We need to identify what parents do and say when reading aloud with their children and why this makes reading so effective at boosting children's language. We need to find out whether differences in how parents read mean that parents from disadvantaged backgrounds use these language boosting behaviours less frequently. We need to determine how to design interventions that increase the use of these behaviours in all parents, especially those with lower levels of education. Then, once we have identified how reading interventions work, we need to determine how to help parents use them successfully in their daily lives.

The aim of this project, across 3 work packages and 7 studies, is to determine how shared reading promotes child language development, and use this knowledge to make it an effective language boosting tool for children from all social and economic backgrounds.

This study (Work Package 2, Study 4) focuses on a known language boosting behaviour, caregiver contingent talk. It investigates how using contingent talk during shared book reading effects language development across socio-economic groups in infancy. Contingent talk refers to a style of communication whereby the caregiver talks about what is in their infant's current focus of attention. This style of talking can be facilitated when parents read books with their babies. The aim of this research was to establish whether asking parents to engage in contingent talk in the context of book reading promotes vocabulary learning. This study compared the effects of an intervention to promote contingent talk against a control where parents were given books but not given any training in how to read them in a contingent manner. The study included children from socio-economically advantaged and disadvantaged families. We anticipated that giving caregivers advice about promoting contingent talk in shared reading with infants would be more effective than book gifting alone in improving both child language and frequency of shared book reading.

# Study Design

This study (Work package 2, Study 4) is an educational intervention developed to promote caregiver contingent talk with their infant during picture book reading and to establish whether or not levels of caregiver contingent talk in this context have a causal relationship with later infant language outcomes. The study was pre-registered at <https://clinicaltrials.gov/ct2/home> (NCT02780557, Appendix A). Ethical approval was granted by the Department of Psychology Ethics Sub-committee at the University of Sheffield. Participants were recruited from a volunteer database maintained by the Cognitive Development group at the University of Sheffield’s Department of Psychology. Families are added to this database through 1) distributing leaflets at community events, 2) social media, and 3) the Bounty recruitment company (a parenting-focused marketing company).

## Participants

156 caregiver-infant dyads were recruited in and around South Yorkshire and North Derbyshire between August 2016 and September 2017. Infants were 11 months at baseline and 15 months at follow up.

Inclusion criteria: All Infants were first born and singletons; full term (i.e. born no more than 3 weeks prematurely) and with birth weight over 2.5 kg; Primary caregivers worked less than 24 hours per week (at the point of recruitment and for the month thereafter) and were raising their child as monolingual English speakers; Neither caregivers nor infants had any significant known physical, mental or learning disability.

122 participants gave permission of their data to be uploaded to the UK Data Archive (Appendix B). Participants were given 7 books (R.R.P. £50) at the 11-month visit, £30 gift vouchers at the 15m post-test visit.

## Materials

*Intervention video - Training Condition*

A 6-minute video introducing caregivers to the intervention was created. The script described contingent talk in clear, accessible language, explained why it might be important for language development and described how to incorporate it into book reading (Appendix C). Stills and video clips used to illustrate contingent talk were drawn from recordings of caregiver-infant interaction collected during piloting. All caregivers appearing in the video gave permission for their recordings to be used in this way.

*Support Materials*

All families where given 7 age appropriate picture books: Kittens: Watt & Wells; Animal Hide & Seek: Cartwright; Postman Bear: Donaldson & Scheffer; Tilly, What’s everyone doing?: Dunbar; Tilly, Where’s everyone hiding?: Dunbar; Touchy Feely Farm: Watt & Baggot; My first words: DK. These books contain interactive elements such as lift the flaps, cut out shapes and different textures to encourage the child’s active involvement.

Families randomly assigned to the intervention condition were given an intervention diary and asked to record each time they read each book (Appendix D).

## Procedure

Participants were visited at home when the infant was 11 months old. Informed consent was obtained. Prior to this appointment, the researcher posted participants an information sheet (Appendix E) and a questionnaire pack to complete. This pack included: a Family Questionnaire to measure demographic information (Appendix F); a Home Life Questionnaire to collect information about family routines and activities including frequency of shared book reading; (Appendix G); the UK-CDI (Alcock, Meints, & Rowland, 2017) to measure child expressive language.

*Randomisation*

Participants were randomised to either the training or control condition according to the Consolidated Standards of Reporting Trials guidelines (CONSORT; (Schulz, Altman, & Moher, 2010)). Randomisation was conducted by a statistician, Dr Tim Heaton, at the University of Sheffield’s School of Maths and Statistics. For each participant, condition allocations were placed in a sealed envelope, identified only by participant number, by a research assistant not involved in any other aspect of the project. A separate researcher who conducted baseline measures and administered the intervention became aware of condition allocation as follows. During the 11-month visit, once the final baseline video measure had been made, the research assistant opened the envelope with the appropriate participant number in order to find out which condition the participant had been randomised to and then administered the relevant intervention.

*Video- Recorded Book Reading Session*

The primary caregiver and their infant were then video recorded reading a book. All participants read the same book provided by the researcher (Animal Hide and Seek) for approximately 5 minutes. Recordings were made using two cameras on tripods set up to capture the interaction as fully as possible. After setting up and starting the equipment, the researcher left the room. Caregivers were asked to try to read the book in the same way that they normally would, and to sit s where they normally would to read together (e.g., sofa or floor). They were told to take as long as they would like to look at the book, and to let the researcher know when they were finished. Reassurance was provided that the recording could be paused if their infant needed feeding, changing or stopped entirely, should they become distressed.

*The Intervention*

After baseline measures were collected, the researcher opened the envelope containing that participant’s condition allocation and administered the appropriate intervention.

*Language Training Condition*

The researcher explained that the next part of the study would focus on infants’ language development. Caregivers were told about the importance of good language and communication skills for social, emotional and academic success and informed that this study was investigating whether talking with infants in a certain way while looking at picture books would help them learn words. The concept of contingent talk was then introduced in lay terms as a two-step process: (1) TUNE IN: noticing what your child is attending to and (2) TALK: talking to them about it. Researchers explained that the idea behind the study was to find out whether increasing this kind of naturally occurring talk while looking at books would benefit their child. To clearly illustrate the concept of contingent talk or ‘Tune in and Talk’, caregivers were shown a short video. The first portion of this video identified some of the different ways that 11-month-olds indicate that they are interested in something in a book (e.g., looking, touching/pointing or vocalising). These behaviours were illustrated using cartoon stills. The following segment featured video clips of caregivers engaging in contingent talk with their 11-month-olds while looking at books. Caregivers were asked to set aside 10 minutes a day, in any context, to look at picture books and practise talking about what their child was focusing on.

The researcher summarised the main intervention message orally and provided caregivers with the opportunity to ask questions. Caregivers were then asked explicitly if they felt they would be able to set aside 10 minutes per day for the next four months to engage in the types of activities demonstrated on the video. A similar level of engagement has been successfully adhered to in other studies of infant communicative development (McGillion, Pine, Herbert, & Matthews, 2017). Caregivers were given 7 picture books (see Materials) to look at with their infant and to use to practise the intervention.

Caregivers were given an intervention diary that reiterated the main “TUNE IN and TALK” message (Appendix D). This diary asked caregivers to record how often they had looked at each title and to give any other optional feedback. All participants were reassured that the researcher would be available to provide support and answer questions by phone or email.

*Control Condition*

Families randomly allocated to the control condition were given the same set of seven books as those in the training condition but received no additional advice to that typically given in the UK from health visitors and charities e.g., BookStart.

Weekly between 11 and 12 months and monthly thereafter caregivers in the intervention condition received a text message asking if they had time to look at books with their child that day. Participants in both conditions received a text message with congratulations on the child’s first birthday.

*Post Intervention Data Collection: 15 months*

All post-test data collection was conducted by a researcher blind to condition allocation. At 15 months, caregivers and their infants were invited to the University’s Cognitive Development lab. The Home Life Questionnaire and the UK-CDI were posted in advance of the visit. Participants were asked to bring them and their completed intervention diary (intervention condition only) to the university in a sealed envelope.

*Video- Recorded Book Reading Session*

Participants were video recorded reading a book following the same procedure as at 11-months.

*Looking-while-Listening (LWL)*

The looking-while-listening procedure (LWL) was used to measure individual differences in infants’ real-time processing of familiar words (Fernald, Zangl, Portillo, & Marchmann, 2008). On each trial, participants viewed two pictures of familiar objects while listening to speech naming one of the pictures. Gaze patterns were coded frame-by-frame, yielding a high resolution record of eye movements aligned with target noun onset. LWL was conducted in a darkened, sound-treated room divided by a ceiling-high partition. One side of the partition contained only a table with the LWL apparatus and a chair. Caregivers were asked to sit centrally on this chair, in front of and about 60cms away from the LWL screen with their child on their knee. Two speakers, for presenting the auditory stimuli, sat beneath the screen on either side of it. A video camera was mounted beneath the screen and focused on the infant’s face. All equipment was connected to a computer, on the other side of the partition, running Lincoln Infant Lab Package 1.0 (Meints, K. & Woodford, A., 2008).

*LWL Stimuli*

Infants were tested on four words (doggie, baby, ball, shoe), previously identified as being familiar to 15-month-olds (Fernald, Perfors, & Marchman, 2006; Fernald, Pinto, Swingley, Weinbergy, & McRoberts, 1998). Audio stimuli were recorded by a female native English speaker using Adobe Audition and analysed and edited using Audacity. Each stimulus consisted of a short carrier followed by a target word e.g., where’s the [target]? Look a [target]! Find the [target]. The same speaker also recorded generic encouraging phrases for use on filler trials e.g. “You’re doing really well!”

Visual stimuli consisted of digitized colour photographs of the target words. Two images were used for each target word. All images were matched for salience, size and brightness and were presented using the Lincoln Infant Lab Package 1.0 (Meints & Woodford, 2008). A colourful smiley face, presented centrally was used as visual stimuli on filler trials.

*LWL Procedure*

A video of an aquarium was playing on the screen when participants entered the room to attract the infant’s attention and allow the experimenter to set up the camera. When the child was attentive and camera angle set, the experimental session began. Images were presented as yoked pairs (ball-shoe, baby-doggy). Trials were presented in a quasi-random order, with side of presentation of target and distracter objects counterbalanced across trials. Each object served equally often as target and distracter. On each test trial, two pictures were shown in silence for 2 seconds prior to the speech stimulus, continuing for 4seconds after onset of the sound stimulus. The screen was blank for a 1-second inter-trial interval. Each target was presented 4 times. 4 filler trials were interspersed amongst test trials. The entire test session lasted 2 min. Caregivers were asked not to point to or name any of the objects that would appear on the screen, but to give generic feedback if the child became fussy. Trials where caregivers named the images on screen were excluded from analyses.

# Documentation

The documentation has been organised into the following sections

 Questionnaires & Support Materials (contains questionnaires, intervention script and diary)

 Data (contains the list of variables)

Data is stored in this file: WP2\_STUDY4\_DATA. XLS (N=122) containing the following data:

1. Demographic information including gender, age, socio-economic status (parental education, household income and neighbourhood deprivation).

Due to the homogeneity of the sample as described above (Section 2.1 Participants) information at the level of individuals has not been included for variables indexing gestation, birth weight/order, or home language (collected using the Family/Demographic Questionnaire). Furthermore, any data that could be used to identify individual participants collected using this questionnaire (either in isolation or in tandem with other variables) has been redacted.

1. Intervention information including condition allocation and dosage
2. Outcome variables including frequency of shared book reading and child language scores at baseline and post-test

Variables have been extracted from questionnaires, transcriptions of a naturalistic shared-book reading at 15 months and derived e.g., measures of language processing calculated from LWL performance and SES i.e., Index of Multiple Deprivation. Missing data is indexed with the code ‘999M’.

# Notes on Individual Variables:

1. Study Site & Study Number

This project was broken down into 3 work packages and 7 studies. All data for this study (Work package 2, Study 4) was collected in and around Sheffield, South Yorkshire by a team based at the Department of Psychology at the University of Sheffield

1. Participant Number

156 participants took part in this study, of which 122 agreed for their data to be uploaded to the UK Data Archive. Participant numbers therefore run from 1 – 156.

1. Gender (v1\_gender)

This variable records infant gender. Females are indicated by 1; Males by 0.

1. Indices of Multiple Deprivation (v2\_IMDD)

This is a derived variable. The English Indices of Multiple Deprivation (IMD 2015) ranks every lower layer super output area (LSOA, n=32,844) or neighbourhood according to is level of deprivation relative to that of other areas in England. This statistic, produced by the Office of National Statistics considers Income; Employment; Health and Disability; Education, Skills and Training; Crime; Barriers to Housing and Services; and Living Environment to calculate statistics. Deciles are calculated by ranking LSOAs in England from most deprived (1) to least deprived (32,844) and dividing them into 10 equal groups or deciles. These range from the most deprived 10 per cent of small areas nationally (decile 1) to the least deprived 10 per cent of small areas nationally (decile 10). The Ministry of Housing, Communities and Local Government provide an interface to find IMD data for any English Postcode. We used this tool <http://imd-by-postcode.opendatacommunities.org/> to find the related IMD decile.

1. Maternal and Paternal Education (v3\_maternal\_ed, v4\_paternal\_ed)

The highest level of education for both caregivers was collected using the Family Questionnaire during baseline data collection when infants were 11 months on a 7-point scale (1 = no formal education, 7 = postgraduate level education).

1. Household Income (v5\_income)

Household Income was collected using the Family Questionnaire during baseline data collection when infants were 11 months on a 4-point scale (1 =<£14,000, 4 = >£42,000).

1. Expressive and Receptive Language (v7\_blcdi\_us, v8\_blcdi\_u, v14\_ptcdi\_us, v15\_ptcdi\_u)

The UKCDI (<http://www.lucid.ac.uk/resources/uk-cdi/>) is a checklist of words. For each item on the list, caregivers tick if their child understands (receptive language) or can say that word (expressive language). Participants completed the UKCDI at baseline when their child was 11-months old (v6\_bl\_age\_qs – gives the exact age of the child in days). All words that a child was indicated to say at baseline were summed to produce an expressive language score (v7\_blcdi\_us) and all words they were indicated to understand were summed to produce a receptive language score (v8\_blcdi\_u). At post-test, when infants were 15 months old (v13\_pt\_age\_qs – gives the exact age of the child in days) caregivers again completed the UKCDI to measure post-test expressive (v14\_ptcdi\_us) and receptive Language (v15\_ptcdi\_u).

In addition, as part of the 15m university visit, participants completed a 5-minute video-recorded shared book reading session. All child words in this session were transcribed and a type (or number of unique words produced) (v18\_pt\_chtype) was calculated for each child using CLAN (MacWhinney, 2014). For video recorded sessions that lasted less than 5mins (but more than 2.5 minutes) a projected type count was calculated based on the observed data ((type count/session length)\*5).

1. Frequency of Shared Book Reading

How often caregivers read or looked at books with their infants was measured using the Home Life Questionnaire at baseline (v9\_bl\_sbr\_freq) and post-test (v16\_pt\_sbr\_freq). Caregivers ranked how frequently they shared books with their children on a scale of 1 to 5, where 1 indicated never and 5 indicated daily.

1. Condition

Following baseline data collection, participants were randomised to either a book gifting + contingent talk intervention (1) or a book gifting only control (0) according to CONSORT guidelines.

1. Dosage (v11\_sms\_dose, v12\_diary\_dose)

Participants in the intervention condition (n=62) received an intervention diary to note every time they had practised the “Tune in and Talk” technique. The number of times a caregiver had completed intervention activities was summed to produce a dosage score (v12\_diary\_dose). Intervention participants also received 7 text messages across the course of the four months of the intervention, asking them to reply if they had had the time to complete “Tune in and Talk” activities that day (v11\_sms\_dose).

1. Language Processing (v17\_pt\_age\_lwl, v19\_pt\_lwl\_acc\_trials, v20\_pt\_lwl\_acc, v21\_pt\_lwl\_rt\_trials, v22\_pt\_lwl\_rt)

At post-test, when infants were 15 months (exact age: v17\_pt\_age\_lwl), they completed a LWL procedure. Eye gaze behaviour was coded using the Lincoln Infant Lab Package (Meints, & Woodford 2008). Two measures of language processing efficiency were derived - Accuracy and Reaction Time. Accuracy was calculated as the mean proportion of looking to the named picture on target- and distracter-initial trials, averaged over 300-1800ms from noun onset.

Reaction time was calculated only on those trials where the child was looking at the distracter picture at the onset of the target word and shifted to the target picture within 300-1800ms from word onset. Reaction time (RT) was the mean latency (in milliseconds) of shifts from the distracter to the target image after target noun onset on distractor-initial trials.

Trials were excluded if the caregiver named or pointed to the target or distractor. The number of included trials for each derived measure is reported in variable v19\_pt\_lwl\_acc\_trials for Accuracy and v21\_pt\_lwl\_rt\_trials for reaction time.

# References

A Fernald, R Zangl, AL Portillo, & V Marchmann. (2008). Looking while listening: using eye movements to monitor spoken language comprehension by infants and young children. In *Developmental Psycholinguistics: On-line Methods in Children’s Language Processing.* (pp. 97–135.). Amsterdam: John Benjamins.

Alcock, K. J., Meints, K., & Rowland, C. F. (2017). UK-CDI Words and Gestures - Preliminary norms and manual. Retrieved from http://lucid.ac.uk/ukcdi

Fernald, A., Perfors, A., & Marchman, V. A. (2006). Picking up speed in understanding: Speech processing efficiency and vocabulary growth across the 2nd year. *Developmental Psychology*, *42*(1), 98–116. https://doi.org/10.1037/0012-1649.42.1.98

Fernald, A., Pinto, J. P., Swingley, D., Weinbergy, A., & McRoberts, G. W. (1998). Rapid Gains in Speed of Verbal Processing by Infants in the 2nd Year. *Psychological Science*, *9*(3), 228–231. https://doi.org/10.1111/1467-9280.00044

MacWhinney, B. (2014). *The CHILDES project: Tools for analyzing talk, Volume II: The database*. Psychology Press.

McGillion, M., Pine, J. M., Herbert, J. S., & Matthews, D. (2017). A randomised controlled trial to test the effect of promoting caregiver contingent talk on language development in infants from diverse socioeconomic status backgrounds. *Journal of Child Psychology and Psychiatry*.

Meints, K., & Woodford, A. (2008). *Lincoln Infant Lab Package 1.0: A new programme package for IPL, Preferential Listening, Habituation and Eyetracking.* Retrieved from URL: http://www.lincoln.ac.uk/psychology/babylab.htm

Schulz, K. F., Altman, D. G., & Moher, D. (2010). CONSORT 2010 statement: updated guidelines for reporting parallel group randomised trials. *BMC Medicine*, *18*(1), 8–16.