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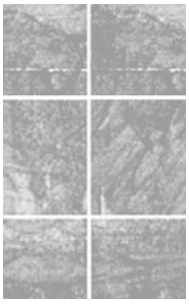

ARTICLE

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ABSTRACT

This article reports on the use of video to collect dynamic visual data in education research and proposes that using visual technologies to collect data can give new insights into classroom interaction. Video data unveil how young children use the full range of material and bodily resources available to them to make and express meaning, forcing a reconsideration of Vygotskian accounts of the relationship between thought and language by producing grounded evidence for a pluralistic interpretation of the construction and negotiation of meaning. In addition to challenging language-biased approaches to classroom interaction, using video to collect data also forces a reexamination of established methodological practices. Drawing on data from ESRC-funded ethnographic video case studies of 3-year-old children communicating at home and in a preschool playgroup, this article discusses methodological and ethical dilemmas encountered in the collection and transcription, or representation, of dynamic visual data, arguing that visual data gives insights into aspects of communicative behaviour previously unaccounted for in early years education research.

KEY WORDS

communities of practice • multimodal communication and learning • preschool • video • visual dynamic data

INTRODUCTION

The use of video to investigate preschool classroom interaction forces a reexamination of established methodological and ethical practices in education research, and has implications for the construction of knowledge theory in the field of education. Multimodal 'events' have always characterized children's learning in early years settings through the subtle interweaving of eye contact, body movement, facial expression and the

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manipulation of objects to supplement or replace talk. However, new visual technologies have increased educational practitioners' awareness of the potentials of learning in different modes and have changed the tools with which education researchers can collect, transcribe, represent, interpret and disseminate data. In this article, I draw on my experiences of conducting ethnographic case studies of 3-year-olds communicating at home and in preschool to focus on the following dimensions of using visual technologies in educational research:

1. Why is the study of visual communication important for understanding classroom interaction?
2. Linking visual, audio and written data
3. Ethical implications of visual data
4. Transcribing and representing dynamic visual data
5. Implications of visual data for theory building

1. WHY IS THE STUDY OF VISUAL COMMUNICATION IMPORTANT FOR UNDERSTANDING CLASSROOM INTERACTION?

The following extracts reflect different adults' perceptions of Tallulah, a 3-year-old girl in her first year of preschool:

> Mum: She chats a lot and she's got a good vocabulary . . . she can be quiet in groups but she's generally outgoing . . . she's getting very articulate . . . she talks all the time to us, her brother, herself and she's using adult phrases
>
> Staff: She uses very simple language . . . it's not complex at all . . . she's quiet and very self-contained . . . she doesn't socialize

These very different perceptions of the same child in different social settings reflect long-established research findings that young children talk far less in preschool than at home (e.g. Tizard and Hughes, 1984), yet research explanations for this phenomenon have been inadequate. For example, Tizard and Hughes attributed working-class children's comparative silence in nursery school to the incompatibility of their home communicative practices with school ways of talking, but were critiqued by Walkerdine and Lucey (1989) for their over-simplistic, middle-class misinterpretations of complex data. Links between home background and preschool cognitive and social/behavioural performance continue to be identified in children as young as 3 years (e.g. DfEE, 2001), but there is a dearth of research into the complex personal, institutional and socio-cultural factors that shape these outcomes.

Although aspects of young children's non-verbal communication have been investigated in the fields of psychology (e.g. McTear, 1985; McNeill, 1985; Trevarthen, 1995; Goldin-Meadow, 2000), and activity theory (e.g. Kendon, 1990), influential UK studies of preschool classroom interaction have prioritized the monomodal sign system of spoken language. For example, the Oxford Preschool Research Project (Sylva et al., 1980) recorded data chiefly in observation notes, thereby restricting analytic access to non-verbal data. Whilst recognizing that children used non-verbal behaviour systematically to communicate meaning intentions, The Bristol Study (Wells, 1981, 1985) made no attempt to 'describe such behaviour, on the grounds that in the (audio) recordings the evidence necessary for such a description was almost completely absent' (Wells, 1985: 61). Similarly, the recent large-scale, quantitative Effective Provision of Pre-school Education (EPPE) Project (Department for Education and Employment: DfEE, 1999, 2000, 2001) and its qualitative sister project Researching Effective Pedagogy in the Early Years (REPEY) (Department for Education and Skills: DfES, 2002) used predominantly systematic observation to collect data, making scant reference to peer learning through observation and imitation. Although verbal and non-verbal subscales were used in EPPE as predictor variables for attainment, non-verbal measures were only considered 'useful for considering cases where limited language experience or restricted language development may be adversely affecting the child's overall score for cognitive development' (DfEE, 2001: 22).

This focus on language in the study of early learning parallels the direction that different strands of linguistic research have taken over past decades. For example, structural linguists' notion of language as an autonomous mechanism for conveying meaning (Chomsky, 1965), and early systemic functional approaches to language development, where a communication system was only recognized as such if there was a 'constant relation between the content and the expression' (Halliday, 1975: 14), that is, if there were shared understandings of the representational or experiential content of a sign, where a 'sign' was most frequently taken to mean a sound or word. In contrast to words, nonverbal signs have often been excluded from study on the grounds that they are problematic for data collection and analysis, ancillary to learning through spoken or written modes and are idiosyncratic or arbitrary, characterized by personal and cultural variations with limited functional potential that render them unsuitable for systematic forms of analysis.

However, sociocultural understandings of negotiating and constructing meaning through talk (Vygotsky, 1962[1934], 1978) and of how sociocultural forces shape mediational means (Bakhtin, 1986) permit a pluralistic perspective of communication and learning, where not only language but also images and physical activity can be viewed as socially organized, sign-making activities and as key components in the construction of meaning. As Christie (2002) remarks regarding the development of

linguistic theories, language has come to be understood 'not as some discreetly independent entity, but rather as part of complex sets of interconnecting forms of human semiosis' (p. 3).

Although Halliday's functional linguistics was developed as a tool for analysing verbal language, Kress and Van Leeuwen (1996) and Kress et al. (2001) discuss how it can be applied to other communicational modes to describe human semiosis in a functional semiotic approach. For example, in their discussion of the potentials of a grammar of colour, Kress and Van Leeuwen (2002) argue that colour operates metafunctionally, simultaneously fulfilling Halliday's ideational, interpersonal and textual metafunctions, thereby constituting a mode in its own right, which cannot exist on its own but combines with other modes to realize 'different meanings, different uses and distinctly different ideological positions' (p. 366). In social semiotics, a sign is the basic unit of meaning, where sign is defined as a form, chosen from a range of possible forms, to carry meaning:

In social semiotics, in contrast to the dominant view, the assumption is that the relation between form and meaning, signifier and signified, is never arbitrary, but that it is always motivated by the interests of the maker of the sign to find the best possible, the most plausible form of the expression of the meaning that she or he wishes to express (Kress et al., 2001: 5).

This approach adds a new dimension to understandings of learning processes by investigating how and why learners *actively choose* different modes to explore and express meaning. Research in this field has begun to investigate the attributes of forms of meaning-making other than language, including drawing (Anning and Ring, 2001; Ring, 2001; Anning, 2003; Kendrick and McKay, 2004), model making (Pahl, 1999, 2002, 2003), physical actions (Franks and Jewitt, 2001) and combinations of 'modes', such as pictures, diagrams, gesture, words (Kress, 1997; Kress et al., 2001; Jewitt and Kress, 2003). Ormerod and Ivanic (2002) illustrate how the materiality of children's meaning-making reveals the richness and complexity of literacy development. The findings of this growing body of visual research suggest that:

> . . . a serious look at the multiplicity of modes which are always and simultaneously in use shows conclusively that meaning resides in all modes and that each contributes to the overall meaning of the multimodal ensemble in quite specific ways. (Kress et al., 2001: 1)

From a multimodal perspective, meanings made with language are interwoven with meanings made in other modes, highlighting the interdependent assemblage of different semiotic modes. However, in educational settings different modes carry hierarchically differentiated currencies, with the verbal modes of first speaking, then writing, being prized most highly. These values have penetrated UK early years policy and practice, particularly since the introduction of early years assessment schemes that have placed an

increased focus on young children's talk, with a correspondingly increased tendency to 'pathologize' the absence of talk (Walkerdine and Lucey, 1989) rather than investigate the ways young children express meaning through combinations of diverse modes.

Rather than focusing on a single mode, such as spoken or written language, using video to collect data reveals the multimodal dynamism of classroom interaction, giving new insights into how children and adults co-ordinate different modes as they negotiate and jointly construct meanings in different social settings. However, combining visual, spoken and written media used for data collection presents the researcher with new practical, ethical and methodological challenges in terms of making links between data from different sources, the relationships between data collected in different media, the transcription or representation of dynamic visual data and multimedia possibilities for research dissemination.

2. LINKING VISUAL, AUDIO AND WRITTEN DATA

To problematize some of the challenges that emerge from the use of multimedia tools for data collection, this article draws on data from a longitudinal study of 3-year-old children at home and in preschool using digital visual, digital audio and written methods of data collection for the following epistemological and practical reasons:

- to explore how young children use a range of resources to mediate through words, noises, gaze, facial expression and body movement at home and in preschool during their first year of education
- to provide multiple avenues to arrive at multiple 'truths', reflecting different participants' perspectives
- for triangulation to gauge the reliability and validity of emerging findings
- to overcome the considerable technical difficulties of recording young children's quiet voices in an active, noisy environment
- to use lightweight, relatively unobtrusive equipment that would cause minimum disruption to the participants and settings

The choice of visual media reflected the researcher's belief that focusing exclusively on audio recordings not only creates a false impression of young children as communicatively limited but also fails to portray how children and adults combine communicative modes and how personal and institutional factors impact upon individuals' choices of modes. An overview of the features and purposes of these methods is set out in Table 1.

Combining visual, audio and written methods in this way does not simply create a mosaic of data, offering an 'added extra' visual dimension to more traditional research methods. Rather, it generates a new multisemiotic dynamic, creating relationships between different data sets, with the inherent tensions and contradictions of all relationships, and producing conflicting

Table 1 Data collection methods (adapted from Silverman, 2000: 90)

Method	Features	Purpose
Initial observation	Extended period of contact as helper and observer	Become familiar with setting and local meanings; become a familiar presence in setting; gain confidence of participants
Audio and video recordings	Precise record of naturally occurring interactions	Understand complexities and dynamics of processes of interaction
Field notes	Memo-like, noting: own and others' comments; details of interaction beyond narrow video lens	Supplement audio/video data, document thoughts and comments; identify themes as they emerge in the field
Research diary	Reflective journal written mostly at home	Document development of study and subjective values; reflect on field notes
Interviews	Semi-structured group and individual interviews, plus informal 'chats'	Gain insights into different perspectives over time; record (in)consistencies in participants' views
Documents	Background information and curriculum details	Gain understandings of wider societal and cultural contexts
Consultation	Structured meetings and informal conversations with participants during data collection, transcription and analysis	Respondent validation, develop analytic themes, incorporate different perspectives

evidence that challenges and eventually strengthens emerging themes. In addition to providing unique, situated insights into the dynamics of classroom interaction on the micro level of individual children and individual classrooms, video data reflect broader institutional and socio-culturally situated discursive and ideological practices as embodied in classroom layouts, furnishing and fittings, wall displays, staff and child movements.

Combinations of visual, audio and written data therefore permit multilevel analysis, allowing the researcher literally and metaphorically to 'zoom in' on individual children's uses of different communicative modes with different people, at particular activities in particular moments of time, to 'pan out' by observing the children over time and across different social settings and to explore the relations between these different perspectives.

3. ETHICAL IMPLICATIONS OF VISUAL DATA

Ethical issues enshroud all research, but are particularly salient when studying vulnerable members of society and, in this study, collecting visual data on very young children in the privacy of their homes and experiencing change as they enter preschool. As Denzin (1989) suggests:

> . . . our primary obligation is always to the people we study, not to our project or to a larger discipline. The lives and stories that we hear and study are given to us under a promise, that promise being that we protect those who have shared them with us. (p. 83)

3.1 Visual data and provisional consent

In education research, 'informed consent' has become associated with good ethical practice, but in exploratory ethnographic research the notion of 'informed' is problematic as the precise course to be taken by the research is unpredictable. Using visual images of vulnerable participants' lives makes issues of consent even more sensitive. For young children, who have not reached the age of 'consent', it is customary to seek permissions from legal guardians. Yet, as Harcourt and Conroy (2004) argue, the rights of *all* participants must be respected regardless of age. Young children's 'assent' to participate in research cannot be presumed, and procedures should be followed that involve children in decision-making processes, as stated in the UN Convention on the Rights of the Child (Limber and Flekkoy, 1995).

A more fitting description for adult consent, and child assent, in longitudinal visual research is 'provisional', that is, the participants' agreement is understood to be provisional upon the research being conducted within a negotiated framework and continuing to develop within participant expectations. 'Provisional consent/assent' can therefore be defined as ongoing and dependent on the long-term network of researcher: researched and interparticipant relationships built upon sensitivity, reciprocal trust and collaboration. Through these relationships, children's implicit assent can also be continually assessed by the vigilance of adult participants and the researcher's own sensitivity to children's behaviours. This flexible approach may result in time-consuming rescheduling and the loss of some data, but far from endangering research projects, any such setbacks can serve indirectly to increase the remaining participants' confidence in the reciprocity of the researcher/researched relationship.

Rather than following a detailed, preconceived code of conduct imposed upon participants by the researcher, 'provisional consent' assumes an ethical stance that evolves out of researcher/participant relationships, where ethical dilemmas are resolved as they emerge in the field, in their local and specific contexts, on a minute-by-minute basis. Not adopting a coherent set of values does not imply neglecting ethical considerations, but responding variously and reflexively to complex situations, which Simons and Usher (2000) refer to as 'situated ethics'.

Decisions about when to stop observing participants as intimate details of their lives unfold before the video camera, or about when not to transcribe or present data, relate to individual researchers' personal understandings of privacy and respect. Thus epistemological beliefs about *what* can be known are not only linked to ontological beliefs about *what exists* but also to ethical beliefs about *how* the researcher can find out what can be known and *what the researcher should do* with the information divulged.

3.2 Visual data and anonymity

Protecting participants' interests also includes protecting anonymity, unless participants choose to be identified (British Educational Research Association: BERA, 2004: 7–8). Changing participants' names and withholding precise personal details are standard research practice, but visual images make participants easily recognizable not only whilst in the public sphere of work but also in the privacy of their homes. This puts children at particular risk and renders parents and practitioners vulnerable to criticism, anxiety and self-doubt. Even if adult participants give signed consent for visual images to be reproduced at the outset of a research project, participants' life circumstances and attitudes to consent may change over time. As young children grow, physical changes in their appearance make them less recognizable, but this does not negate the researcher's responsibility to protect the privacy of their younger selves. Furthermore, even if the researcher makes positive comments in a research text, readers of texts interpret or 'judge' participants from their own inevitably diverse standpoints. Yet the display of visual images is sometimes integral to the research report. This study attempted to find workable solutions to these contradictory interests.

Figure 1 Video still of fuzzed image from PhD CD.

Talking to staff and parents informally during the pilot trial revealed that participant anxiety about being filmed was associated with a loss of control. All participants, adults and children, were therefore encouraged to choose their own pseudonyms, to view and comment on the video data and to make their own recordings, backed up by an all-risks insurance policy for the camera. In practice, the process of participant consultation placed considerable demands on participant time, so consultation sessions focused on cross sections of data – some selected by myself and others by participants. This open approach helped to overcome participant concerns and to build trusting, cooperative relations that are essential for longitudinal research.

With regard to image reproduction, digital technology has made possible the obscuring of on-screen images, such as 'fuzzing' participants' faces to protect identity in the public domain, or using a relatively simple technique to obscure onscreen images by reducing pixel count, as illustrated in Figure 1.

Although obscuring image detail in this way may be unsatisfactory for portraying gaze co-ordination or facial expression, it is extremely effective for less focused representation of body movements, such as construction activities and imitation. Alternatively, sketches of video stills can be drawn to indicate body positioning and direction of movement (see Figure 2).

It is also possible to restrict access to video data on CDs and/or websites using encryption and secure passwords issued only to known users, although here control over access to data becomes dependent on a broader section of research, practitioner and policy-making communities. Each research project creates its own sets of compromises, but new technologies offer an increasing range of alternatives with their own as yet relatively unexplored advantages and pitfalls.

Figure 2 Outline image (adapted from Lin, cited in Graue and Walsh, 1998).

Approaching ethical issues in visual research in this manner builds on the principles underpinning BERA ethical guidelines requiring researchers to respect 'person, knowledge, democratic values, quality of education research and academic freedom' (BERA, 2004: 4).

4. 'TRANSCRIBING' OR 'REPRESENTING' DYNAMIC VISUAL DATA

> All representations are misrepresentations. (Stake and Kerr, 1994: 2)

Any kind of transcription, whether of audio or video data, is by definition a process of transformation, where complex, richly situated phenomena are reduced for the purpose of analysis. As Ochs (1979) argues, transcription is theory: the mode of data presentation not only reflects subjectively established research aims, but also inevitably directs research findings. Yet some form of systematic transcription is needed to make data readily accessible to the researcher and to ensure accounts of data are accurate and credible representations of the phenomena studied. Although this process is traditionally referred to as 'transcription', the term 'representation' is a more fitting description of the interpretive processes involved in the transformation of visual, multimethod data resources into the written forms required by academic writing. In this section, I identify key challenges that arise in the portrayal of dynamic visual data, argue for the need for some transparency of researcher subjectivity in interpretive research, briefly discuss different solutions found by different education researchers and finally, using one short data extract, illustrate how the different methods of data collection used in my own ethnographic study contributed differently to the construction of the research text.

4.1 Defining 'dynamic texts'

Historically, linguistic uses of the word 'text' have implied some kind of finite boundary around a data extract, with stated criteria for deciding where extracts begin and end. Yet boundaries are far from clear in dynamic visual data. Extracts may be bounded by 'natural' breaks, such as turning/moving away, or by interruptions that change the topic and/or direction of interaction, yet these boundaries also 'lead to some kind of conjunction with adjacent grouping' (Burn and Parker, 2003: 63). Boundaries inevitably limit what gets included in data presentation and are often imposed somewhat arbitrarily through a process of researcher interpretation that reflects particular research aims and data collection methods. For example, a silence during talk might define the boundary of spoken elements of an exchange, yet in the analysis of moving visual images, the presence of exchanges in other modes during spoken silences becomes apparent. Boundaries may also be perceived differently by research participants. For example, during a given exchange, words may be of less relevance to participants than actions, or an

exchange that appears to have clear boundaries could continue hours or days later, or be a resumption of previous exchanges – the researcher cannot know all parts of the exchange.

Furthermore, as Kress et al. (2001) discuss, the temporal descriptive terminology used to transcribe and analyse linguistic 'texts' is often inappropriate for representing the spatial simultaneity of visual images and physical movement. Visual and audio data representations often need to portray co-occurrence, yet juxtaposing multisensory, dynamic spatial events in two-dimensional written research reports can result in cumbersome formats that text readers struggle to interpret. Thus, in addition to faithfully representing the multimodally expressed meaning intentions of the participants and their sociocultural situatedness, the researcher must also consider readers of the research text, and the advantages of exploiting familiar transcription conventions. For these reasons, I use the term 'dynamic texts' not only to reflect the temporal, spatial and kinaesthetic nature of visually recorded interaction but also the multilevelled interpretive processes of the researcher, participants and readers.

4.2 Researcher subjectivity in the construction of 'dynamic texts'

Given that ethnographic research evidence derives mainly from the researcher's personal experiences of contexts and participants, it follows that the researcher's subjectivity should be problematized in the selection of theory, choice of data collection methods, construction of research texts and of academic knowledge. By adopting a reflexive stance, researchers can locate how their own social, political and personal beliefs are reflected in the research aims and findings.

Keeping a reflexive diary throughout the research process (see Table 1), and including diary extracts in research write-ups helps to make visible how the researcher's subjective values are woven into the texture of the research writing, and to heighten the reader's awareness of the processes of data distortion and projection as they are filtered through the researcher's 'eye'. Raising the reader's consciousness of researcher subjectivity allows a research text to 'escape the thwarting biases that subjectivity engenders, while attaining the singular perspective its special persuasions promise' (Peshkin, 1988: 20–1). Documenting participant/researcher discussions during respondent validation and consultation also makes more transparent the multiplicity of meanings attributed to the data by different participants.

This approach to academic text construction counters the characteristic 'strategic vagueness' (Myers, 1996: 3) of much academic writing, allowing the research text to be read as one of many possible interpretations of 'reality', but one that is constructed in a way that enables the reader to trace how threads of meaning are drawn from the different sources and woven into the texture of the analysis.

4.3 Representing dynamic texts

In educational research, many different solutions have been found to the transcription or 'representation' of dynamic visual texts: for example, adding gestures, gaze, descriptions and video stills to historically established discourse analysis transcription to give cohesion to otherwise incomprehensible representations of five boys playing a computer game (Norris, 2002); multimodal grids with outline sketches of stills combined with extracts from book texts, oral transcripts, descriptions of action and pace/tone of utterances to compare written and on-screen portrayals of character in literature (Jewitt, 2002); multimodal grids with verbal descriptions of movements, gaze direction, vocalization and oral transcripts to represent a 2-year-old's interpretation of an illustrated written text through reasoned and motivated actions (Lancaster, 2001); descriptive narrative accounts of South African children making 3D child/doll figures, supported by still photographs of the children's dolls, traditional Southern African fertility dolls and brief extracts of the children's talk to illustrate how cultural memory and situated communicative practices are reflected in the context, process and production of children's material representations of meaning (Stein, 2003).

These representational systems involve the selection of key attributes of research data, with the ultimate criteria for selection decided by the researcher, whose interpretations reflect the theoretical approach adopted, the culture(s) in which that theory was constructed and interpreted, the researcher's subjectivity and perhaps also the agenda of any research funding body. To give more insight into these interpretive processes, here I discuss how the representation of one event evolved in the construction of my own ESRC-funded but independently constructed PhD thesis.

4.4 The evolution of a dynamic text

As outlined in Table 1, using visual, audio and written methods of data collection results in reams of complementary but differently conceived data in different formats that must be made accessible for systematic analysis. A comparison of how different methods of data collection and organization portrayed one 2-minute data extract illustrates many of the representational and interpretive issues encountered in my study of preschool classroom interaction. The extract features Tallulah (3 years, 10 months) with Jemima (4 years, 7 months) and Rachel (4 years, 5 months) at the craft table. As indicated by the quotations in section 1, although extremely talkative at home, in preschool Tallulah tended towards silent, lone activity and staff feared she would not adapt to the rigours of full-day primary school, which she was due to start aged 4 years, 1 month.

The first stage of data representation involved making a 'log' of video recordings as soon after data collection as possible, first watching the video data without and then with sound. The video log included time codes,

Tallulah Playgroup

Time & activity	Researcher comments	Time (detail)	Description
10:50[1] paint table	*T observes but recoils from activity*		Taken by adult (Sarah) to paint table, where children are spreading tapioca 'goo'. Adult puts apron on T; T watches others.
		10:51	T steps back, looks around table, lets apron slip.
	T invited to activity by adult	10:52	Leaves apron on floor, glances up, turns away. Adult at craft table (June) invites and directs T to space at craft table.
10:52 craft table	*T takes part in activity*	10:52	Moves to space + starts to glue box. *Tallulah Adult Hannah* [craft table] *Isobel Jo Danny*
		10:53	June points out glue is coloured. Sarah checks T ok. June passes T different coloured glue. T putting glue on box, selecting shapes to stick.
	June encourages interaction between Jem and T	10:55	Jemima approaches space next to T. June
		10:57	shows T Jemima's pink-stained hands from tapioca goo. T pulls face. Jem settles to gluing.
		10:58	Michael comes to space opposite T, begins to take glue, looks around, glues. T watches Jem.
	T initiates exchange by watching Jem	11:00	All 3 children busy gluing.
		11:01	Jem asks June why different colour glues
	Jem>ad June >Jem but addresses T & Jem, facilitating ch>ch.	11:02	June >T & Jem, Jem>June, June>Jem, Jem> June, June>T = no response, Jem responds Rosa arrives,
	Jem & T work in synchrony. Rosa half ignores Jem	11:03[2]	Jem & T stirring, Jem>T, Jem & T synchronized stirring, Rosa>June, Jem>Rosa, Rosa>June, Jem>Rosa. T smiles >Jem,
	T smiles >Jem	11:04	watches Jem & Rosa, Jem>T, T accepts offered glue from Jem, Jem & T swop glue. Rosa leaves, returns (fetched something); T & Jem mixing, Jem takes some of T's glue, T takes
	Jem & T mutually involved in colour mixing, stirring and gluing with reciprocal, synchronized actions	11:05	some of Jem's glue Jem & T stirring & swapping glue Jem>T, T smiles>Jem, Jem & T working in synchrony. Jem suggests swap pots; swap pots

[1] Time code indicates actual time.
[2] Shading indicates section of data analysed in detail.

Figure 3 Sample page from video log.

diagrammatic layouts of the participants' physical positioning and movements with outline descriptions of interaction and a wide margin for researcher comments (see Figure 3). The log therefore gave a relatively concise overview of all activity within each observed preschool session, setting individuals' activities within preschool sequential and spatial procedures and relating individual children's movements to the movements of other group members.

The second stage involved traditional linguistic transcription of the audio data, recorded digitally through a mike worn by each case study child and transcribed using free online digital transcription software (SoundScriber, 2004). This gave a different perspective to the sounds and images of the video by homing in on individual child utterances and exchanges, adding greater clarity to the audio soundtrack of the video. The audio transcript of this data extract clearly showed that Tallulah made no verbal utterances (see Figure 4).

Tallulah joins Jemima at the craft table, where June (adult) is attending, noise from climbing activity nearby.

23	Jemima:	would you like some more purple Tallulah? . . . (*very quietly*)
24		I'll have this one . . . Tallulah put some purple in here
25		. . .
26	June:	that's ok you can mix it together see what would happen if you put
27		some/
28	Jemima:	/I'm gonna put some purple in . . .
29	June:	look (?) what's that there Tallulah? . . . have they changed colours
30		again? . . .
31	Jemima:	(we're?) really mixing (it all?)
32		. . . (*talk from distant tables*)
33	Jemima:	would you like some of mine Tallulah? . . . (?) put purple in here
34		together . . . we need the purple don't we? . . . and then we will
35		probly have two purples

Figure 4 Audio representation.

After reviewing the corresponding video sequence several times, with sound, without sound, in real time, slow motion and fast forward, the same extract expanded to include details of the girls' movements. The ellipses that had indicated pauses between words gradually disappeared as moments of silence on the audio recordings were replaced by the actions visible on screen (see Figure 5).

When participant gaze direction and/or movements were key to portraying the meaning intentions and exchanges of participants, these representations were reconfigured in a multimodal matrix to break down the interaction into separate components of language and action/gaze (see Figure 6).

22 Tallulah: (*approaches table, watches Jemima, moves to space next to*
23 *Jemima, begins to glue*)
24 Jemima: would you like some more purple Tallulah? (*offers glue*)
25 Tallulah: (*shrugs, smiles, reaches forward, takes glue stick from gluepot*)
26 Jemima: (*holds glue pot nearer to Tallulah*)
27 Tallulah: (*takes purple stirrer from pot*)
28 Jemima: (*very quietly*) I'll have this one (*reaches in front of Tallulah to take*
29 *her pink glue pot, but adjusts purple pot instead*)
30 Tallulah &
Jemima: (*exchange pots & stirrers, stir glues, Jemima watches Tallulah*)
31 Jemima: (*to June*) Tallulah put some purple in here (*points to own pink pot*)
32 June: that's ok you can mix it together see what would happen if you
33 (*points*) put some/
34 Jemima: (*putting stirrer in Tallulah's purple pot*) /I'm gonna put some purple in
35 Tallulah: (*takes her stirrer out of pot, making room for Jemima*)
36 June: look (?) what's that there Tallulah? (*leans forward, points Tallulah's pot*)
37 Jemima: (*gaze to where June pointing*) (red?)
38 June: (*leans forwards, gaze to Tallulah's then Jemima's pot*) have they changed
39 colours again?
40 Rachel: (*approaches table*)
41 Jemima: (*to Rachel? stirring glue*) (it's?) really (mixable?)
42 Rachel: (*turns away, finds space at table*)
43 Tallulah &
Jemima: (*stir glues, exchange glues*)
44 Holly: (*passes by*) raspberries and cream . . . or blueberries and cream
45 Tallulah: (*glance to Holly, moves Jemima's pot so the two pots are closer*)
46 Jemima: would you like some of mine Tallulah? (*to June*) (?) put purple in
47 here together (*continues stirring*)
48 Tallulah &
Jemima: (*continue stirring glues, taking glue from each others' pots,*
49 *bringing pots closer together until they are almost touching*)
50 Jemima: we need the purple don't we and then we will have 2 purples
51 Tallulah: (*glances to Jemima, smiles, stirs glue*)

Figure 5 Audio and video representation.

This multimodal matrix reveals much more about the sequencing and simultaneity of speech, gaze and movement. The separate columns display how different modes operate simultaneously as interwoven rather than sequentially separate elements in the discursive practices of the setting. The multimodal representation clearly illustrates how Tallulah and Jemima exchange ideas on mixing and sticking glue through combinations of actions, gaze direction and words. For example, lines 2–12 (in Figure 6) show not only how the two girls considerately negotiate sharing the use of the differently coloured glues, glue pots and stirrers through gaze and actions,

Video code	Participant	Language	Action/gaze	
50:25[1]	Tallulah		watching Jem stirring glue	1
50:30	Jemima	would you like some more purple Tallulah?	turns to face T, picking up glue pot and offering to T	2
	Tallulah		averts gaze, shrugs one shoulder, glance to Jem, smiles, reaches forward and takes glue stick from proffered gluepot	3
	Jemima		holds glue pot nearer to T as she takes purple stirrer from pot	4
	Tallulah		puts purple stirrer in own pink gluepot	5
50:40	Jemima	(*very quietly*) I'll have this one	reaches in front of T to take her pink glue pot, adjusts purple pot instead	6
	Tallulah		stands back, making room for Jem to take pink pot	7
	Jemima		takes pink pot	8
	Tallulah		puts pink and purple stirrers in pink pot for Jem to use	9
	Jemima		passes purple stirrer back to purple pot for T to use	10
	Tallulah Jemima		standing very close to each other, both facing pots, both stirring	11
	Jemima		starts to watch T, glance to June, stirs glue in pink pot, gaze to June, smiling taps pink pot	12
51:00		Tallulah put some purple in here		
	June	that's ok you can mix it together see what would happen if you put some/	pointing to purple pot	13
51:10	Jemima	/I'm gonna put some purple in	puts her stirrer in T's purple pot, gaze always to pot	14
	Tallulah		takes her own stirrer out of pot, making more room for Jem	15
	Jemima		repeatedly takes small amounts of purple glue and stirs it into her pink glue	16
	June	look and what's that there Tallulah?	leaning forwards, pointing to T's pot	17

Video code	Participant	Language	Action/gaze	
	Tallulah		continues stirring glue, watching Jem, stops stirring to allow Jem to take glue every time she reaches over	18
51:16	Jemima	(red?)	reaches to take glue from T's pot	19
51:24	June	have they changed colours again?	gaze to T's pot, glance to Jem's pot, leans forwards	20
	Rachel		approaches, reaches in front of Jem to take stickers from pile on table	21
51:30	Jemima	(it's?) really (mixable?)	glance to June, stirring glue	22
	Rachel		glance to Jem, averts gaze, takes sticker, returns to the work space she had left earlier	23
	Jemima & Tallulah		both stir own glues, glancing at each other's glue pots	24
51:39	Holly	raspberries and cream or blueberries and cream	(out of view) passes behind table, gaze to pots	25
	Jemima & Tallulah		both glance to Holly, continue stirring	26
	Jemima		takes glue from T's pot	27
	Tallulah		takes glue from Jem's pot	28
51:50	Jemima		reaching over, brings T's pot nearer	29
	Tallulah		reaching over, brings Jem's pot so the two pots are even closer	30
52:00	Jemima	would you like some of mine Tallulah? (?) put purple in here together	stirring glue, gaze to glue, continues stirring glue	31
	Tallulah		gaze to Jem's pot, takes glue from Jem's pot	32
	Jemima & Tallulah		continue stirring own glue, taking glue from each others' pots, bringing pots closer together until they are almost touching	33
52:20	Jemima	we need the purple don't we? and then we will probly have two purples	taking glue from T's pot leaning forwards and inclining head to get eye contact with T	34
	Tallulah		glances to Jem, smiles, stirs glue	35

[1] Video code indicates minutes:seconds of time from beginning of recording sesion, not real time.

Figure 6 Multimodal representation.

Figure 7 Video stills.

but also highlight how it is the younger, silent Tallulah who invents the activity of mixing the pink and purple glues together (line 5), then provides Jemima with the materials for her to experiment with colour mixing (line 9). Jemima checks verbally with the attending adult that it is ok to mix the glues (line 12), before copying Tallulah's actions (line 14).

Multimodal representation of visual data also facilitates close scrutiny of children's 'peripheral participation' (Lave and Wenger, 1991), detailing how some children move from initially peripheral involvement in activities to more intensive inclusion, and how others engage in physical activities but do not enter into social exchanges. For example, Rachel does not appear in the audio transcript in Figure 4, as she is not involved in the talk, but her actions and participation are included in Figure 6, where it becomes clear in line 23 that she opted to avert her gaze and return to her 'space' at the table rather than respond to Jemima's utterance in line 22. When compared to other data extracts, it emerged that Jemima was extremely responsive to both Rachel and Tallulah's subtly different uses of gaze direction to indicate their willingness to share activities. This format therefore allows documentation of the sensitive, precarious, multimodal development of friendships in an

institutional setting. By drawing attention to physical and verbal processes of symbolic action, multimodal representations not only display how young children use the full range of expressive resources available to them, but also illustrate the multifunctional nature of physical modes, where the interpersonal/affective and the representational/ideational overlap.

Another way of conveying detail from this brief data extract is through still images of particular moments 'frozen' in time, as in Figure 7, where a wealth of information is conveyed to the reader about the positioning of Tallulah, Jemima and Rachel around the table, their gaze directions, postures, synchrony of action, facial expressions, activity, the resources available to them on the craft table, the models they are making and the layout of the institutional setting, as visible in the background.

The accompanying field notes, although brief, depict a yet wider perspective, indicating staff actions outside the visual range of the video:

> At end of milk time, Holly (playgroup leader) selects Tallulah as one of six children for the 'new experience' of playing with pink tapioca goo on the paint table in Room 2. At paint table, Sarah (Tallulah's key worker), puts aprons on children and encourages them, by showing, that it is fun to move 'goo' around and make shapes. Some join in; Tallulah stands back, watches. Lets apron fall, moves to crafts, begins to glue. Sarah checks she's ok, exchanges glances with June (adult at crafts), returns to paint table. Jemima seems to want to share activity. Tallulah silently cooperates. June allows children freedom to explore glues on their own. (Craft table field notes)

These notes showing how Holly (playgroup leader) selects Tallulah to take part in an activity run by her key worker (Sarah), and that Sarah checks Tallulah is settled at the craft table, echo staff comments during interviews that Sarah was dedicating time to build up a trusting relationship with Tallulah in an attempt to encourage her to talk in playgroup. This comment therefore relates to staff planning and institutional practices, linking the data extract to their institutional and sociocultural contexts. The note that Tallulah passively and silently 'cooperates' reflects how my spontaneous interpretation of the data in the field was influenced by previous staff interviews that had coloured my own assumptions during early analysis, to be disconfirmed by the multimodal analysis showing that Tallulah 'silently initiated' interactions, as discussed earlier.

The diary entry for this day (see next page) allows cross-case and cross-activity comparisons, and the data is taken into the realm of theory when Tallulah's persistence at the activity is related to affect and a developing empathy with Jemima. Gender issues are raised, reflecting the impact of years of feminist struggle and research on gendered behaviours, and reference is made to other data sources (staff and mother interviews) revealing how particular approaches to analysis begin to take form as soon as the researcher's pen hits paper.

> Unusually, Tallulah stayed for ages at crafts today – maybe because activity was less adult-directed than usual. Check this against T at craft table on other days. Mostly girls at the table – did this make a difference? Check for gendered uses of crafts/different activities. Look for other examples of T with Jemima at crafts and elsewhere. Staff don't seem to be conscious of T and Jem's developing cooperation, maybe a key factor in why T stayed at activity. Read last parent interview – Mum thought T settling better now, check why. (Extract from research diary)

If readers of this article were able to watch the corresponding video clip, they would see how the complex dynamics of interaction are narrowed through the video lens, and how the children's words are largely inaudible on video. They would clearly be able to observe the developing synchrony and empathy of the children's actions, hear snippets of talk from other tables, adults calling across the room, children playing on climbing cubes nearby, etc. – all details that for the sake of clarity have been omitted from the transcripts but which in themselves convey so much about cultural understandings of preschool education and care in the UK.

These separate methods of collecting and representing data reveal how different facets of the institutional setting of one particular preschool playgroup shaped the case study children's learning and development, enabling the researcher to produce a well-documented argument about *how* and *why* children make and express meaning in different modes and how institutional settings directly and indirectly both impose constraints on and offer possibilities for children's access to learning in different modes. The different data sources added complexity to traditional research categories of gender, age and class by revealing how combinations of factors contributed towards children's behaviours, such as: peer friendships; child status within the cohort; peer responses to younger and older children's different communicative strategies; activity type; control of activity; length of time in setting; individual children's social and cognitive strengths and weaknesses, and adults' perceptions of them (Flewitt, 2003).

The task of combining data from these diverse sources is gargantuan, but workable solutions must be found. In my study, since it was not always practicable or relevant to convey the different textualities, overlaps and contradictions of different data sources, data were presented in a range of styles in the research write-up. For example, the transcript presentation style illustrated in Figure 5 was used predominantly during narrative writing in the research text, and the style in Figure 6 when focusing on multimodality. Still images were used selectively, with staff and parental permission, particularly during descriptive accounts to convey the richness of information. 'Fuzzed' sample video extracts were included as a CD to accompany the thesis.

Although different representations of dynamic texts offer diverse ways to portray and analyse the spatial simultaneity of multimodal meaning-

making, they still fall short of capturing all the elements of situated human interaction, particularly given that video data is saturated with multi-functional, multimodal semiotic systems (ideational, interpersonal and textual) operating on different levels (immediate/personal, institutional, socio-cultural). The processes of representation always involve processes of selection, limiting what the reader of a research text can know about the dynamic event. How systematic then should these processes of selection be?

4.5 Should dynamic visual data representation be systematic?

The answer to this thorny question lies chiefly in the understandings and motivations of different readers working in different research paradigms with particular methodologies and understandings of research validity and reliability. As discussed, highly systematic transcription schemes developed for linguistic analysis do not accommodate the complexity of dynamic visual data. The researcher cannot reproduce all observed interaction, but must analyse all data so that the passages selected for presentation are informed by analysis and interpretation of the complete data set. Furthermore, the credibility of an ethnographic research text pivots not only on the robustness of the conclusions drawn based on a broad body of data acquired over time but also on the transparency of the criteria for data selection, the depth and accuracy of data representation, and the need to convince readers of the research that the conclusions drawn are consistent with the evidence provided. It is therefore the responsibility of individual researchers to be crystal clear about why certain choices have been made, in order to be accountable for the implications of those choices and justify the legitimacy of the chosen research philosophy that the study is attempting to further.

5. IMPLICATIONS OF VISUAL DATA FOR THEORY BUILDING

Ethnographers have been divided in their approaches to the role of visual data in the construction of knowledge. For example, Wright (1998) argues that subjective visual images may become the basis for knowledge when translated into written text, but the images themselves do not necessarily have a place in the research text, other than as occasional illustrations. What I have aimed to illustrate in this article is not only how the juxtaposition of different representations of the same data tell different stories about different participants' lived experiences and researcher subjectivity, but also how including the visual in research analysis and making links between the different media used in data collection builds up 'thick descriptions' (Geertz, 1973) that afford readers of the research text complex understandings of educational processes. As Pink (2001) proposes, rather than always translating visual evidence into verbal knowledge or attempting to piece different representations together to form a 'complete' picture, the researcher should

articulate how different representations produce different strands of knowledge and different 'truths'.

For the study cited in this article, the use of video to track how young children make and express meanings multimodally in different social settings captured and recorded for analytic scrutiny the subtle, dynamic orchestrations of interaction, and how they were played out over time. By studying in minute detail the complexities of the children's lives through interviews, audio and video observations in the two settings of home and playgroup, the study revealed how the children began to grasp unconsciously the rationale of series of patterned behaviours that corresponded to pre-school structures and routines, activity types and interpersonal relationships, illustrating how they became apprenticed in particular communities of practice largely through observation and imitation rather than through discourse (Lave and Wenger, 1991; Wenger, 1998). The combinations of data sources unveiled how certain home practices carried over into the children's interpretations of playgroup practices and how these interpretations, combined with the communicative practices of the preschool setting, shaped the different communicative and meaning-making modes the children used, sometimes literally and physically embodying their learning and their emerging identities as pupils. From the brief data extract in section 1, it is possible to see how Tallulah's confident *verbal* behaviour at home was reflected in her *actions* in preschool, providing a clear platform for staff to support her multimodal expressions of meaning rather than 'pathologizing' her silence.

Thus, using video recordings to investigate classroom interaction revealed how children use the full range of material and bodily resources available to them to make and express meaning, forcing a reexamination of Vygotskian accounts of the relationship between thought and language by producing grounded arguments for a pluralistic interpretation of the construction and negotiation of meaning. The data presented clear evidence that language is only one tool in a range of human semiosis, and that individuals' choices of semiotic modes are motivated by a complex web of interconnecting personal, institutional and social factors.

6. CONCLUSIONS

This article has discussed methodological challenges and some substantive outcomes from the use of video to collect data on classroom interaction. The proposal has been made that the visual, dynamic properties of video data challenge established research conventions of transcription and data representation. Video data is not a simple 'add-on' to traditional data collection methods, and does not convert unproblematically into two-dimensional verbal formats. Nor can video data be considered as a 'stand alone' tool, or as one component of multimethod data collection that produces a neatly patterned mosaic of educational activity. Rather, the use of video produces

'messy' data, where the researcher, and potentially readers of the research text, can explore links between different media, and problematize how different data representations produce different strands of knowledge.

In my own research, the use of video, combined with more traditional methods of data collection, created a rich data resource that allowed close scrutiny of young children's multifunctional uses of different modalities in their constructions of the symbolic world, resulting in an evidence-based claim that rather than pathologizing the absence of talk, early years research can derive much from the analysis of children's uses of different semiotic modes as intentional, socially organized activity in the construction of meaning. This approach offers new potentials for understanding how children's home communicative practices blend with or become silenced by institutional practices – issues that lie at the very core of understanding how young children make and express meaning in early years institutions.

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BIOGRAPHICAL NOTE

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