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Parent-Child Moments of Meeting in Art-Making with Collage, iPad, Tuxpaint and Crayons

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Abstract

Previous research suggests that parent-child art making can foster opportunities for closeness between children and parents. Most studies however, have focused on art-making that involves paint and paper, or non-digital drawing technologies. There is a need for researchers to consider how a wider range of technologies, including digital technologies, might shape the interactions between children and parents during art-making. This is particularly important given current concerns that digital technologies are impacting negatively on children's social interactions and their intimacy with others. This study takes a social semiotic perspective to explore how child-parent closeness was supported by different technologies. A three year old child and her father were observed across eight episodes of art-making in the home using a range of four technologies (two digital and two non-digital). A multimodal

interaction analysis of the video data suggested that the different technologies were characterised by different types of interaction and distinct forms of closeness between the child and parent. These differences did not correspond neatly to a digital/non-digital divide, but instead related to a network of material factors, embodied actions and the participants' sociocultural investment in each technology.

Introduction

This paper considers whether different technologies afford and support closeness between children and parents during art-making in distinct ways. The following section offers a review of research on parent-child collaborative art-making; digital technologies in early childhood and parent-child closeness. It also outlines the main tenets of social semiotic theory that have informed the approach of this research. Following this, we outline the design of the observation study that was conducted in order to address the research question, and the main findings are reported. The final section of the paper discusses what the findings suggest about the influence of different technologies on parent-child closeness, but also what this means for our theoretical framing of emerging technologies in studies of different art-making contexts.

Background

Parent-Child Collaborative Art-Making

Studies of parents and children making art together suggest that the activity has the potential to offer opportunities for heightened levels of closeness and responsiveness (Proulx, 2003). For example, Hosea (2006) focused on the interactions of six mothers and their young children while making art together, and noted instances of particular attunement and understanding that occurred during the experience. Video analysis of the interactions suggested that through the colour, mess and symbolism involved in the art-making activity, the mothers had 'space to see their child as a thinking, creative being in his or her own unique way' (p. 70). Similarly, research in art therapy has suggested that the cooperation involved in collaborative art-making can play a key role in establishing opportunities for closeness (Liebmann, 2004). Other studies have stressed the special nature of collaboration in the context of art-making as a result of the physicality of the activity (Springgay, 2005). By foregrounding somatic rather than cognitive knowing, collaborative art-making can help to prompt nonverbal communication, which in turn leads to a fuller understanding of the other (Hosea, 2006). Thus far, studies on parent-child art-making have typically considered art activities that use non-digital technologies, like paint and drawing materials. However, digital technologies are increasingly prevalent in the lives of young children (Plowman et al., 2010; McPake et al., 2013; McTavish, 2009; Palaiologou, 2014) and concerns have been raised that interactions with digital technologies may stifle children's social engagement with others (Cordes & Miller, 2000; Turkle, 2011). Research is therefore needed to consider how a wider

range of resources, including digital technologies, might shape the child-parent interactions that unfold as part of art-making.

Digital Technologies and Social Interaction in Early Childhood

There is a concern, often portrayed in the popular media, that digital technologies are detrimental to children's social development and their everyday social interactions. Recent reports have highlighted the potential for a 'digital addiction' among children (The Guardian, February 2014) and have suggested that 'digital media erodes social skills in children' (Al Jazeera, August 2014). These concerns, echoed in academic literature to some extent (e.g. Cordes & Miller, 2000; Turkle, 2011; Greenfield, 2004), tend to focus on the possibility that children will become fixated on solitary engagement and that this will jeopardise their opportunities for 'real' social engagement with others.

On the other hand, research on children's interactions with technologies has demonstrated a wide range of situations in which the use of digital technologies supports young children's social interactions. For example, research with the iPad application Our Story, a tool for multimodal shared story-making, has suggested that digital technologies that are designed for the use of parents and children together can help foster experiences of closeness and positive affect between parents and children sharing digitally created stories at home (Kucirkova et al., 2014). Studies in the classroom involving digital photography have suggested that the introduction of such technologies can influence teacher-child dynamics, facilitating the sense of a classroom community where children can engage as co-investigators rather than remain within rigid hierarchies of social interaction (Carter-Ching et al., 2006). Similar disruption of the micro social order was found in a case study by Mavers (2007) which focused on the email exchange of a six-year-old child and her uncle, demonstrating how the use of digital online tools enabled the 'semiotic resourcefulness' of the child and a freer level of communication with her uncle.

While these studies suggest that children's micro-level interactions with digital technologies can support rather than hinder social development, there is little research comparing the interactions that arise when digital and non-digital technologies are used in collaborative creative tasks. By comparing social interactions that arise with both kinds of technologies and the same parent-child pair, there is an opportunity to consider in more detail the specific affordances of digital technologies which may shape particular types of social interaction and engagement, and notably their potential to nurture closeness between the parent and child.

Parent-Child Closeness: Its Definition and Importance

Parent-child closeness is often studied with older children and assessed with self-report

questionnaires (McNally, Eisenberg & Harris, 1991). With younger children, the emotional bond between parent and child is studied within the attachment field (Bowlby, 2008), which focuses on the development of a child's healthy or secure attachment to the primary caregiver. Studying parent-child closeness in terms of attachment involves using laboratory-based observations, including the so-called Strange Situation (Ainsworth, Blehar, Waters, & Wall 1978) whereby the child's response to brief separations and reunion with parent is observed and evaluated. In the present study, we needed to conceptualise parent-child closeness as an aspect of a relationship that remains in constant flux and is very much embedded within the particular context of activity. We therefore turned to Stern's (2000, 2004) notion of 'moments of meeting', which are conceptualised as instances of particular closeness and attunement between parents and children in a given time and space (or context). In such moments there is a 'mutual knowing of what is in the other's mind' (Stern et al., 1998, p. 4) and the parent and child 'achieve a new and higher level of activation and intensity of joy' (p. 6). Typical examples include explosions of mutual laughter during play and instances when a parent supports a child to do something that they might be fearful of, such as using the slide in the playground. These moments of meeting are considered important by psychotherapists since each can offer opportunities for psychic change and positive relationship development. Importantly, they are jointly constructed by the parent and the child and carry the potential to transform a given experience (Stern, 1998).

Social Semiotics: Dual Perspective on the Physical and Socio-Cultural Aspects of Resources

In our approach, we were keen to develop a multifaceted conceptualisation of how the resources used by the parent and child influence the physical, the embodied and the sociocultural aspects of the observed interactions; that is, how they are 'semiotized' (Bjorkvall & Engblom, 2010; Vannini, 2007) by the parent and child. Social semiotic theory adopts a dual focus on the physical resources with which meaning is made and the social environments in which these resources are used (van Leeuwen, 2005; Hodge & Kress, 1988). The concept of semiotic resources (van Leeuwen, 2005) can help to identify the potential of digital and non-digital technologies to facilitate distinct social interactions involved in episodes of meaning-making (Jewitt & Kress, 2003). Semiotic resources are the 'actions and artefacts we use to communicate' (van Leeuwen, 2005, p. 3).That is, they are both the material resources that are used to make meaning (i.e. the 'stuff' itself) and the embodied experiences (Jewitt, 2013) through which these resources are 'semiotized' (Bjorkvall & Engblom, 2010). When the materials used are digital, the semiotic resources constitute a physical-digital network of material and immaterial components (Burnett et al., 2014). A pack of crayons for example, has material properties and social associations that shape how the crayons are used. The material properties of the crayons – such as their size and weight - can be ascertained by examining the resources themselves. However, the social associations of the crayons – such as

their association with children's drawing – can only be discerned through observations of the crayons in use.

Together, the material properties and social associations of semiotic resources are described as 'affordances', a term used by Jewitt & Kress (2003), to refer to our perceptions of how resources should be used. Affordances become more 'fully and finely articulated' (p. 2) over time, as communities establish stronger conventions around how particular resources are typically used. This notion of affordances, though problematic given its application to both material and social factors (see Oliver, 2005), offers an important starting point for understanding how different semiotic resources can shape closeness in parent-child art-making.

The Present Study

An observation study focusing on one child and one parent was conducted in order to enable an in-depth examination of closeness in parent-child collaborative art-making with different technologies. To enable a focus on opportunities for closeness in parent-child art-making with various technologies, we used the analytical unit of 'moments of meeting', as specified by Stern (1998, 2000, 2004). In line with a social semiotic perspective, we explored the potential of different technologies, digital and non-digital, to shape moments of meeting by 1) observing and identifying moments of meeting in eight episodes involving four different sets of semiotic resources and 2) by observing and examining how each set of resources supported, through their affordances, moments of meeting that occurred in the interactions. Our research question was: how is closeness manifested in parent-child collaborative art-making with collage, crayons, the Our Story iPad app and *tuxpaint* laptop software? We used multimodal interaction analysis to examine how different semiotic resources shape the parent-child interaction during the activity of art-making.

Study Participants

The study participants were a three-year-old girl and her father. At the time of the study, the girl was the only child of the family. She attended an inner-city London nursery each weekday between 8am and 5.30pm, where she was described by the nursery practitioners as making above-average levels of educational progress. Her father was 35 years-old at the time of the study and worked as a journalist. The father picked up his daughter most days from the nursery and the pair frequently engaged in shared activities when at home, and this sometimes, though not often, included making art together. More typically, according to the father's self-report, they engaged in physical play or text-making that they constructed as 'writing' rather than as 'art-making'.

The study was conducted in the child's grandparents' home over the course of three months. For eight weekday evenings, at roughly the same time and for between 10-30 minutes each time, the child and her father engaged in an art-making activity using one of the four sets of resources available to them. On each occasion, the first author of the paper (forthwith, the primary researcher) encouraged the father to use one of the four art-making resources: crayons and white paper; collage on coloured paper; the digital art-making software *tuxpaint* on a laptop and the digital application *Our Story* on the iPad.

All interactions with the resources were observed across two episodes in order to see a wider range of interaction patterns with the resources than if just a single episode had been observed. Each observation occurred on a different day, and the order in which the resources were presented was varied. The primary researcher video-recorded each episode using a videocamera mounted on a tripod or via a handheld videocamera when movement of the participants made this necessary.

The primary researcher was a member of the participants' family – the father's sister, and the child's aunt. As a result of these connections, the research had particular characteristics that might not have been the case had the researcher been less close to the participants in the study. As Adler and Alder (1996) note, when family members act as researchers, there is 'ease of entrée' (p. 37), which is enabled by the established relationship between the participants and researcher. The child and father in this study were used to the presence of the researcher, and as a result, sought little information about the specifics of the observation that was being conducted. In line with ethical guidelines for educational research, they were fully aware of the overall aims of the study, but were not interested in the particularities of the observation – such as the interest in moments of meeting. The researcher's familiarity with the child enabled a high degree of sensitivity to the child's wishes and access to important contextual information surrounding each episode of art-making (for example, whether the child had had a special event at nursery that day, or whether she was particularly looking forward to seeing her mother). The primary researcher was careful to interrupt the parent-child collaborative art-making as little as possible, though she was sometimes drawn into the interaction by the child and responded sensitively to this.

The study was approved by the Ethics Committee at The Open University, UK and followed the BERA's Revised Ethical Guidelines for Educational Research (2004) and NCRM's Guidelines for Visual Research.

Analysis

As a first step in the analysis, we created rough multimodal transcripts of all of the episodes of the activity. These included verbal and nonverbal action documented against time stamps. The

transcripts were annotated with reference to Stern's (2000, 2004) understanding of moments of meeting in order to interpret when such moments had occurred. Each researcher looked separately for instances of particular closeness, attunement and responsiveness, and then compared their annotations. In instances where a moment of meeting had only been identified by one of the researchers, the researchers discussed and re-viewed the example and came to an agreement about whether it would count or not. Furthermore, as part of this analysis, there was an exploration of what moments of meeting could look like with the specific technologies used in this study, and a broad categorisation of how moments might differently manifest, that is, what behaviours they could and did involve. Table 1 shows when moments of meeting were documented across the eight episodes, and how these moments manifested in different ways with the four technologies.

Table 1.

'Moments of meeting' across all episodes

Behavioural characteristics of the 'moment of meeting'	**Collage**	**Crayons**	**iPad**	**PC**
Scribing – parent follows child instructions and physically carries out the art-making		Episode 2		Episode 1 (1)
Physical guidance in how to manipulate the resources – parent helps the child to manipulate the resources			Episode 1 (1)	Episode 2 (3)
Intent observation and demonstration – child watches the parent as they demonstrate how to complete a particular action		Episode 1 (2) Episode 2 (1)		Episode 1 (1), Episode 2 (1)
Awareness of an 'other' – child and parent whisper about an imagined audience or recipient of the artwork	Episode 2 (1)	Episode 1 (1) Episode 2 (1)		
Shared physical humour – child and parent laugh together about an action involved in the art-making activity	Episode 1 (2)			
Rhythmical verbal or physical exchange of ideas – child and parent build on each other's ideas through verbal dialogue or physical manipulation	Episode 1 (2) Episode 2 (1)	Episode 1 (1)		Episode 1 (1), Episode 2 (2)
Responding to an urgent or changing environment – child and parent respond together to something happening in the art-making environment			Episode 1 (1)	

Physical affection – physical closeness between the parent and child	Episode 2 (1)	Episode 2 (1)	Episode 1 (2)	

Returning to the research question, further analysis focused on how moments of meeting manifested differently depending on the technologies being used. This relied on an in-depth analysis of particular segments of the video data in order to see how the technology was drawn into the unfolding moment, and how, through their specific affordances, the four technologies contributed to the specific moment of meeting.

To interrogate these segments of the data, we used multimodal interaction analysis which focuses on various communicational modes (including body position, movement, gaze, body posture, gesture, speech) in order to develop insights into how activity is organised sequentially (Bezemer & Mavers, 2011) and the 'semiotic work' that particular resources – both bodily and technological – were doing in the wider context of the interaction (Goodwin, 2000; Sakr et al., 2014). Multimodal approaches emphasise the wide range of communicational forms that individuals use when interacting with each other (Jewitt, 2009; Kress, 2010). Applying multimodality is particularly important in this context because of the wide range of previous research that has highlighted the importance of nonverbal modes of communication in understanding parent-child interactions (Engdahl, 2011; Dodici et al., 2003).

The findings from this analysis are presented as 'impressionist tales' (van Maanen, 1988) involving the chosen moments. These tales, or short vignettes, are designed to draw the reader into the 'story world' (p. 103) of the unfolding interaction. Accompanying commentaries relate the vignettes to the wider question of the relationship between each of the four technologies and the interaction. In each of the vignettes, we focus on the affordances of the four technologies and how these affordances shaped the observed interactions (Vanini, 2007; Bjorkvall & Engblom, 2010).

Findings

Collage

Activity in the collage episodes was typically 'on the go', with both the parent and the child contributing ideas verbally and physically and a mutual active involvement in the activity. Decisions about the content and nature of the visual representation were made as the activity unfolded, rather than developing according to fixed ideas that were established prior to 'hands-on' engagement. This is similar to MacRae's (2011) description of the 'lines of flight' observed in children's junk-modelling, where creative acts follow on from each other rather than being componential in an overarching representational intention.

> *The child is cutting shapes out of the paper and the father is preparing the paper onto which they are going to stick these shapes. The child says 'I'm cutting a wiggly worm'. 'So this is the earth?' the father asks, referring to the paper in front of him. The child agrees. During this conversation, the cutting and sticking continues.*

As illustrated above, the resources involved in collage afforded 'on the go' interactions with parent-child simultaneous involvement because of the capacity for physical engagement to occur through multiple access points for both participants. The parent and child did not need to take turns in their interaction with the resources and this contributed to the sense of constant physical activity. Furthermore, the access points were differentiated: while the father was sticking, the child would be cutting, or vice versa. When they decided to change roles in the activity, the child insisted on changing seats as well, suggesting that each activity – cutting and sticking – was clearly distinct in her mind and associated with a different physical location.

In the second episode of collage-making, the pair assumed a similar set-up (see figure 1).

> *The father is cutting circles. As each circle is cut, the child sticks it to the paper in front of her. The child is quicker at sticking than the father is at cutting. She dramatically sighs as she waits for the next circle and the father laughs in response. He asks the child how many circles that she wants and she replies saying 'ten'.*

Figure 1. Simultaneous differentiated activity during collage-making

The vignette above suggests again how activity can unfold 'on the go' through simultaneous engagement with two types of activity that are kept physically distinct by the child and the father. In order to make this type of collaboration successful, the child and the father needed to maintain a similar pace of activity with each other. As described above, attention was drawn to instances of pace mismatch and the effort to bring pace in line with each other fostered closeness between the child and parent. The opportunity to manage pace in relation to another person's activity is afforded through the differentiated access points of collage. The management of pace makes an important contribution to the potentials for closeness between the participants, since it is one kind of attunement that is physically observable and can be monitored and modified in an ongoing way (Stern, 2000; 2004).

Crayons

Interaction with the crayons involved moments of intense observation, where the child would closely watch her father engaged in a particular action. Linked to this, in other moments, the child would 'scribe' through the adult's mark-making, watching as the father created and offered ideas for how the visual activity should unfold. The situation of observation and scribing created an intense closeness between the parent and child because they were joined in one act of art-making, but adopted different and complementary roles in relation to it, as in the example below.

> *The child asks her father to finish off colouring the large rectangle he drew on the page. He pulls the paper towards him saying 'It's quite a lot to colour, so I'm just going to colour like this'. He makes big strokes across the paper, while the child watches closely. When the paper is placed in front of the child, she looks at it intently and smiles.*

Intense observation and scribing are afforded through a network of physical and sociocultural factors at work in drawing with crayons. Compared with the collage, crayons were used on a smaller area of physical space – a single side of A4 paper – and involved a single type of activity (drawing) rather than multiple activities (as with the cutting and sticking involved in collage). This afforded sequences of turn-taking rather than simultaneous interaction with the resources. While turn-taking seems to flow from the physical organisation of bodies, the environment and the resources, this physical organisation stemmed from sociocultural expectations and the participants' agential choices around the use of crayons and paper for art-making. In both episodes of interaction with the crayons, the child and father decided to work on the same piece of paper rather than contributing simultaneously to two (or more) separate products. This organisation of the activity can be interpreted as part of their shared sociocultural interpretation of what it means to be involved in collaborative art-making with these particular semiotic resources.

Observation and scribing practices also suggest that the interaction is constructed as an exchange between a skilled user of the technologies (the adult) and a willing apprentice (the child). This contrasts with the interactions involved in collage-making, which were characterised by parity in the contribution made by each participant. It suggests that when using the crayons, the activity was influenced by a stronger sense of 'standards' to which the product of the art-making was aspiring. The father was perceived to be a skilled user because he was more easily able to construct a discernible representation through drawing, and thereby achieve the 'standard' of 'visual realism' (Duncum, 1999) to which they were aspiring. While the child and father may have been equal in other terms – for example, their exploration of colour and pattern – this appeared to be less important than fulfilling the overarching representational intention. This was particularly the case in the second episode of interaction with the crayons, where the child made a drawing and then expressed feelings of shame in relation to the representation included in the drawing:

> *The child has become increasingly frustrated with the drawing of herself that she has been making. She quietly says 'I think everyone will laugh'. The father laughs suddenly but then asks in a serious voice 'Will they laugh at our drawing?' The child smiles and nods. The father replies: 'We need to change it into something else… shall we just…' and he drags a nearby teddy bear onto the top of the drawing so that the drawing is covered over (figure 2). The child visibly enjoys this and her eyes widen. 'No' she says more loudly and reaches for a crayon: 'We're just gonna scribble it'. The father removes the soft toy and says 'ok, good idea'. The child is smiling as she scribbles over the drawing. She explains: 'And then no one can see it…the children in the picture, they won't see anyone!'. Looking down at the picture, she says: 'We're gonna scribble on you ok?'*

Figure 2. Child and father preparing to scribble over the drawing

The interaction above demonstrates the child's perception that others will see and judge the drawing that she creates. What leads to the sense of closeness in the moment above is the despair of the child in imagining others' responses to the visual product and the father's sympathetic and problem-solving reaction to this situation. The father and the child enjoy hiding the visual product from an imagined other. He suggests covering the drawing with a soft toy, and she goes further by suggesting that they scribble over it. This idea is understood and endorsed by the father, who participates in the construction of an imagined audience that will negatively assess what they have created. In this interaction, the act of destruction – of scribbling over the drawing the child had created – is proactive and productive in constructing a sense of closeness between the child and father. The sense of an audience that will judge the product against standards of visual realism leads to the child and father's shared initial aspiration to create a discernible representation through drawing, but also sets up a situation in which they can subvert the expectations of the imagined other and come closer together in an act of destruction of the drawing.

iPad App Our Story

Engagement with the iPad involved a high proportion of instances involving joint manipulation of the device by the child and father. The pair were often both physically involved with the device at the same time, for example with the child touching the screen, and the father holding the edges of the device. This kind of bodily interaction created a mediated physical connection between the child and father, which in turn facilitated a sense of constant closeness. In addition, the practice also suggests that the child had less autonomy in her interactions with the iPad, since her father was often supporting her to handle the device in a particular way, as in the following example.

> *The father is holding the iPad and the child is leaning in towards it, looking down at the screen. The father asks: 'Shall we tap it?'. The child whispers 'yeh'. He has turned the camera so that it is looking up at them both. He says: 'That's me and you, shall we take a photo?' She whispers 'yeh'. 'Press the button then' he replies, and she presses the button.*

Using the iPad involved joint simultaneous input, often dominated verbally and non-verbally by the father. This is unlike interaction with the collage, where action was typically simultaneous but differentiated. It is also unlike interaction with the crayons, where the activity was typically characterised by turn-taking. A network of physical and sociocultural factors influenced the presence of this joint simultaneous input. Physically, iPads are designed – in terms of size, shape and weight - to be lifted rather than to be used on a surface and this may encourage parents to get involved in helping their children to hold the device 'carefully'. Linked to this, the need for 'careful' handling is a sociocultural expectation associated with

expensive digital resources. Non-digital resources, like crayons, are more likely to be thought of as durable and easily replaceable materials and children are therefore given more autonomy in their handling. As with the crayons, the child and the father adopted the roles of apprentice and expert respectively. In this case however, rather than relating to the participants' abilities to create discernible drawn representations, the apprentice-expert roles with the iPad related to the notion of 'technological skill', as enacted particularly through the act of taking photographs. In the interactions with the iPad, the father repeatedly offered advice and instruction to the child as she took photographs; 'stand still', 'don't go too close', 'keep the camera steady' and 'why don't you take a picture of that?'. Through these instructions, the adult demonstrated a strong sense of what constitutes 'good' photographic practices with the iPad, and there was little potential for the child to develop her own set of photographic practices distinct from her father's expectations.

Another typical and important aspect of the child-father interactions with the iPad was the presence of immediate mutual responses to changing elements in the external environment. In the following vignette, the pair are shown to be responding to a ringing phone in the house. They documented the event of the researcher picking up the phone through iPad photography. Their whispering and quick physical movement suggested a sense of urgency in capturing the action as it unfolded around them, thus highlighting the potential for photographs to capture events in an immediate way. In taking photographs around the house with the iPad camera, the child and father could monitor and quickly respond to fleeting developments in this wider environment. The lightweight and portable nature of the iPad, together with the presence of two inbuilt cameras, which enable images to be taken from both the front and back of the camera, are physical properties that are conducive to these types of experience.

> *The child and the father follow the researcher who has gone to pick up the phone. The child walks right up to the researcher, holding the iPad out in front of her. The father puts a hand on her shoulder and whispers 'that's it, stand here'. He is moving the child backwards by a couple of steps. The child's gaze is on the iPad screen. The father crouches and helps the child to position the iPad and they take a photograph.*

The mobility of the iPad enabled the child and father to respond to the external environment, including changes that were unfolding in that environment. In this way, the exploration of the home environment became the subject of the collaborative art-making, and the shared response to action in the external environment was a source of closeness for the participants. Rather than relying on ideas that were imagined or hypothetical situations that were conjured through discussion, when using the iPad, the pair made art – in the form of photographs – that were in dialogue with the wider environment. The child's interest waned considerably in the second part of the experience with the iPad, which involved organising the photographs that

had been taken into a narrative. Her lack of engagement seemed to be related to the static nature of this part of the experience, which contrasted sharply with the experience of taking photographs around the house. While the father tried to lead the activity of organising the photographs into a chronological order, she physically engaged with off-screen aspects of the environment, such as the father's watch or a soft toy nearby. Overall, the interaction with the iPad suggests that mobility can open up new types of child-parent closeness during art-making, in the form of shared explorations of the wider environment.

The mobility of interactions with the iPad also allowed for heightened levels of physical affection and closeness between the child and father (see figure 3). This was due not just to the frequent acts of joint manipulation, but also occurred as a result of the use of the iPad in typically informal contexts, such as on the sofa or on the bed. The child often cuddled her father, or leaned on him, while they looked through the photographs they had taken. The sensory nature of this physical closeness is important when we consider the emphasis placed on somatic interaction in previous literature about parent-child art-making (see e.g., Heydon, 2011; Warburton et al., 2014). In these studies, it is often through the bodies and nonverbal responses that parents and children are able to respond particularly sensitively to one another, and thereby strengthen the connection that exists between them.

Figure 3. Physical affection while using the iPad

Tuxpaint on the laptop computer

As with the crayons, moments of meeting involving *tuxpaint* often occurred through the child's intent observation of her father while he demonstrated using the art-making tools. Furthermore, and again similarly to the interactions with crayons, moments of meeting with *tuxpaint* also sometimes manifested when the father was scribing on behalf of the child. These

moments typically arose when the child had become frustrated with the tools and the difficulties she had in manipulating the mouse. The father would take over the activity at these points but attempt to draw the child into the art-making activity by gauging her impressions of what was on screen, and by suggesting ways that it could be developed further.

> *The father is demonstrating how to use the 'paintbrush' tool. The child leans in to see the screen. The father says 'I'm going to draw something and you're going to tell me what it is, ok? Are you watching?' She nods, still looking at the screen. He draws something on the screen then looks at her and asks: 'What does it look like?'. She replies 'Mm' [the sound made by the letter M]. The father breaks into a grin and says 'clever girl'. He tickles her neck and she smiles.*

The behaviours of observation and scribing were afforded through the construction of the adult as a skilled user of the resources and the child as an apprentice, who lacked in the skills needed to successfully navigate the digital art-making environment independently. As with the iPad, part of this expert-apprentice role development was related to the physical skill required to manipulate the device. In this case, the adult supported the child to use the mouse. The apprenticeship model was not only related to technical skill though. As with the crayons, the desire to create a discernible representation through drawing influenced the social dynamic between the child and the father, and the child felt that her father was better able to produce drawings that accurately portrayed objects in the 'real' world. Through interactions with *tuxpaint*, the child was rendered deficit both in terms of controlling the mouse as accurately as she would have liked to, and in creating recognisable drawn images on the screen. The physical and social aspects of this deficit interacted with one another. The physical difficulty of the mouse became more important as a result of the sociocultural emphasis placed on visual realism. Moments of closeness between the child and the father with *tuxpaint* thus often stemmed from the frustration of the child with the resources, and the father's efforts to assuage this frustration.

Other moments of meeting with *tuxpaint* came about through mutual reactions to a visual surprise on the screen (see figure 4). The child and the father were drawn together when images appeared on the screen that they had not intended to use. Their shared surprise was often followed by positive affect, demonstrated through smiling and laughing together. These events were visually humorous because the photographic images that would suddenly manifest on the screen (when the wrong button had been pressed) created the effect of an actual object appearing before them. For example, when the image of a frog appeared suddenly on the screen, as in the following vignette, it gave the visual impression of a frog hopping out in front of them. The ease with which additional copies of the same image could be applied, through simply clicking the mouse button again, created a sense of dynamism,

immediacy and excitement about possibilities for representation; as the child expressed in the first session of art-making with *tuxpaint*, 'shall we do a million cuckoos?'. In such moments, interaction with *tuxpaint* was more similar to the interactions with collage, where art-making unfolded through spontaneous and constantly re-negotiated 'lines of flight' that allowed for diversions and divergence.

Figure 4. Mutual reaction to a visual surprise

> *The father is directing the child to press the button: 'Yeah and now press the button'. He points at the button. She looks down and positions her finger on the mouse. She presses down, missing the button she was aiming for on the screen and hitting another one instead. The father says loudly: 'Woah!' and she looks taken aback. He looks down at her smiling and asks 'What is it?' She smiles and responds: 'Frog'.*

Moments of shared surprise in response to unexpected visual activity were afforded by the difficulty of manipulating the mouse in order to control the on-screen cursor, and the likelihood of accidentally selecting ready-made images that would then be rapidly applied to the screen.

Moments of surprise are not only afforded by the difficulty of manipulating the resources, but are also supported by the nature of the digital environment itself. The environment of *Tuxpaint* is full of ready-made visual stimuli. Much of these visual stimuli are photographic, and cover a wide range of topics and themes – from flowers through animals to man-made objects, such as plasters and jugs and nutcrackers. The bank of stimuli creates the impression of an inventory of everyday items that can be drawn into the art-making experience. As with the iPad, the wider environment appears to be playing an important role in supporting the art-

making that occurs within this particular digital interface. In both digital environments, response to external flux is an important part of the closeness that manifests between the child and father. However, while the iPad guides users to turn their gaze outward, to the physical world around them, *Tuxpaint* offers a condensed version of the external physical world through the available bank of ready-made visual imagery.

Discussion

We used a multimodal interaction analysis to study instances of particular closeness and attunement between a three-year-old child and her father during art-making at home with four different technologies. In particular, we explored how closeness might manifest and be supported differently in parent-child collaborative art-making depending on the technologies used. We found that collage supported mutual 'on the go' activity, with moments of meetings where the child and father worked together through differentiated and simultaneous activity to produce a shared product. Interaction with the crayons was characterised by an apprentice-expert dynamic between the child and father, which related to a sociocultural emphasis on creating products that contained a discernible representation. Closeness between child and father in this context arose through their shared efforts to create such a representation, but in other moments it stemmed from their subversion of this emphasis through the destructive act of scribbling. An apprentice-expert relationship was also assumed when using the iPad, particularly when taking photographs. The mobility of the iPad supported moments of meeting in which parent and child dynamically responded to flux in the external environment, with high levels of joint manipulation, touch and physical affection. Finally, interactions with *tuxpaint* were characterised by the child's frustration and the father's support with the difficult manipulation of the mouse, though there were also moments of shared positive affect when ready-made imagery appeared 'by accident' on screen.

There were similarities and differences among the digital and non-digital technologies in terms of the moments of meeting they fostered between a child and her father. For example, interactions involving *tuxpaint* on the PC and the crayons on the paper both involved moments of intense observation and scribing behaviours, and this was linked to the way that both technologies were accessed - through a single point of action, rather than multiple access points (in contrast to the collage). An important difference between the technologies seemed to be the presence of an 'imagined audience' and expectations of overarching representational purpose: while the latter characterised interactions with the crayons and *tuxpaint*, this was much less significant in the context of the iPad and collage. Kolbe (2005) notes that in the context of children's art-making, the abstract and experimental dimensions of the art-making experience are often side-lined, while the creation of discernible representations is prioritised.

The act of drawing is typically constructed as an intersubjective phenomenon, in which

'success' is measured through the response and recognition of others. On the other hand, activities such as collage (as in this study) and junk modelling, may allow for a greater degree of intra-subjectivity, where individuals prioritise decisions or take actions that are pleasing and meaningful to themselves rather than the instant recognition of others.

There were differences between the two digital technologies and differences between the two non-digital technologies in terms of how they supported closeness. For example, the mobility of the iPad led to physical and verbal affection in informal spaces, while this was not the case with tuxpaint. Collage supported 'on the go' activity contributed by two equal and autonomous participants, while interaction with the crayons involved the development of an apprentice-expert dynamic between the child and father. It suggests that when using the crayons, the activity was influenced by a stronger sense of 'standards' to which the product of the art-making was aspiring.

These findings suggest that the distinction between digital and non-digital technologies is not a neat one when it comes to studying parent-child closeness in art-making. In any sociotechnical environment (Bruce, 1997), there is a wide and complex range of factors that influence the unfolding interaction. Burnett et al. (2014) describe individuals' interactions with technologies as a physical-digital network of interwoven material and immaterial components. This also resonates with actor-network theory which defines all interactions in terms of networks, thus allowing the notion of associations and connections to replace traditional conceptualisations of top-down or bottom-up approaches to studying children's and adults' activities (Latour,1995, 2011).

In our previous work (Kucirkova & Sakr, 2015), we have shown that different technologies have a distinct potential to shape a child's creative expression and the adult support for it. This study builds on these findings by suggesting that different technologies play a distinct role in parent-child moments of meeting and outlines how these differences relate to the material resources that are used to make meaning and the social, agential and embodied experiences through which these meaning-making experiences unfold. In discussing each set of resources, we have considered material factors (e.g. the size of the technology) and social factors (e.g. whether the duo constructed the activity according to an apprenticeship model). Although at one stage of the analysis, we needed to analyse these aspects separately, we highlight that all important properties, or affordances, have a material and a social dimension. For example, the notion of 'mobility', so important when considering how interactions are supported by the iPad, can be seen as simultaneously a material and a social phenomenon. Materially, mobility is shaped by the size, weight and shape of the device; socially, mobility arises as a result of sociocultural expectations and assumptions about the device and what it is intended for. Evidence of this constant material-social interplay suggests that affordances themselves

cannot be conceived of as singular; they are a network of links between the technology itself and the way the technology is 'articulated' (Kress & Jewitt, 2003, p. 2) or 'semiotized (Bjorkvall & Engblom, 2010) through use in 'a continuous tracing of action' (Latour, 1995, p.380). To understand how emerging or under-researched digital technologies might be supporting social interactions that unfold as part of meaning-making, we need to consider this complex network of the material and social – both what the resources can physically do and how they are perceived by those using them.

Our findings have implications for learning, caring and therapeutic settings, where art-making has typically been limited to 'traditional' technologies. While paper and paint facilitates closeness between parents and children through explorations in touch and colour (Heydon, 2005; Hosea, 2006), less established technologies – such as photography through the iPad camera – might bring individuals together in new ways. We argue that these connections and opportunities for closeness can happen with digital as well as non-digital technologies and are linked to the socio-material affordances of the technologies being used, rather than their 'digitalness'.

This study afforded insights into the moments of meeting in a small, opportunistic sample, in which the the observed pair closely known to the first author. This means that our findings cannot be generalised. Instead, we have offered insights into the potential of digital and non-digital technologies to bring children and their parents closer together, offering opportunities for careful cooperation and intense communication (Hosea, 2006; Warburton et al., 2014). We have also enriched the theoretical discussions around how digital technologies are shaping art-making and meaning-making more generally, by applying a social semiotic approach and considering the specific socio-material affordances of particular technologies.

Conclusions

Through the analysis of data from an observation study of parent-child art-making across eight episodes, we found that closeness manifested and was supported differently depending on the affordances of the technologies that were used in the art-making. We traced the influence of the technologies through multimodal interaction analysis, which enabled us to consider both material and social factors relating to four different technologies, which shape how interactions involving the technologies unfold. We argue that a neat distinction between the digital and the non-digital cannot be made in terms of how closeness is afforded, but rather that interactions with each particular technology depend on the interplay of various material and social factors that are differently and inextricably intertwined for each technology. As a result, understanding the influence of digital technologies on parent-child art-making depends on a multi-faceted approach that celebrates and investigates their material, embodied, agential and social affordances.

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