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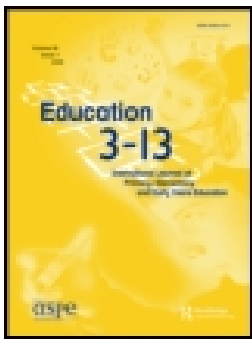
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## Where the Wild Things Are: understanding of emotions in a picture book

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### ABSTRACT

Maurice Sendak's picture book *Where the Wild Things Are* was investigated as a means of emotion recognition in preschool children. Sixty-six children and 60 adults participated in two tasks. The first was a book task, requiring identification of emotions in three target pictures, in three conditions. The visual condition presented the book with the text covered; the audio condition required listening to an audio recording of the book; in the combined condition participants were presented the book and audio recording simultaneously. The second was a traditional emotion recognition task. Children's performance in the audio condition was poorer than the in other conditions. Children had difficulty identifying anger and happiness and the positive and negative valence of emotions in the audio condition compared to the other conditions. Our findings suggest that showing the pictures or reading and showing the pictures simultaneously can help children recognise intense emotions.

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Children; emotion recognition; anger; *Where the Wild Things Are*

Understanding of emotions is linked to children's cognitive development. The ability to understand emotions assists preschool children's cognitive and linguistic development (Robinson and Acevedo 2001), emotional intelligence (Zeidner et al. 2003), school competence (Garner and Waajid 2008; Raver, Garner, and Smith-Donald 2007) and ability to adapt to different circumstances (Niedenthal and Brauer 2012). It is also vital for social relations and theory of mind (Grazzani et al. 2018; Kuhnert et al. 2017). Children use others' facial expressions to attribute mental states such as beliefs, and children who misinterpret facial expressions fail to infer understanding of feelings and expectations in themselves and others (Beeger et al. 2006).

Typically developing children can discriminate between facial expressions from infancy (Lawrence, Campbell, and Skuse 2015). They start recognising facial expressions and emotional situations during the preschool years (Pons, Harris, and de Rosnay 2004). Younger preschoolers (i.e. 3-year olds) are less able to infer others' facial expressions compared to older preschoolers (e.g. 5-year olds) (Boyatzis, Chazan, and Ting 1993; Philippot and Feldman 1990). By the sixth year, children can accurately recognise various facial expressions, and their emotion recognition could be similar to that of adults before children reach adolescence (Lawrence, Campbell, and Skuse 2015; Rodger et al. 2015).

Ekman (1994, 2004) proposed that there are six basic emotions (happiness, sadness, anger, fear, disgust, and surprise) which share characteristic facial expressions. Happiness describes happy emotions including contentment, amusement, and relief and those that render one proud, excited, and safe. Anger may involve frustration, rejection, and feeling mistreated and can co-exist with sadness, particularly in relation to loss (e.g. a treasured object) (Harmon-Jones, Harmon-

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Jones, and Summerell 2017). This suggests that in situations which involve losing something important, anger and sadness may be confused.

Previous work found that positive emotions are easier to recognise than negative ones, and happy, angry, and sad expressions are recognised earlier and more easily than other basic emotions (e.g. Widen and Russell 2003), with angry expressions being more difficult to recognise (Durand et al. 2007). This suggests that preschoolers may have difficulty recognising anger relative to happiness and sadness.

Two opposing theoretical perspectives explain how children understand facial expressions: the discrete category view and the dimensional view. The discrete view suggests that facial expressions communicate explicit emotions (e.g. Izard 2007; Panksepp 2007). The dimensional view argues that young children (around three years) place emotions in broad categories of pleasure and displeasure (e.g. Widen and Russell 2008). Here, emotions are recognised as either positive or negative, depending on the available cues. Preschoolers may find it easier to place emotions in broader categories (Widen 2013) and may also confuse anger and sadness because they judge these emotions based on their unpleasant valence (Widen and Russell 2003). This suggests that children are not necessarily inaccurate in their recognition but may recognise emotions based on how pleasant or unpleasant they are.

To facilitate emotion recognition, previous studies presented emotions to children and adults in different modalities (i.e. audio or face channels), with newer studies showing an advantage of multi-modal modes of presentation, combining face and audio stimuli (Gil, Hattouti, and Laval 2016; Klasen, Chen, and Mathiak 2012; Schirmer and Adolphs 2017). This is not surprising, as human interaction involves emotional expression through numerous means involving vocal, verbal, and facial channels (Gil, Hattouti, and Laval 2016). Vocal cues are generally more difficult to recognise than facial cues for adults and children, suggesting that visual emotion processing may precede audio emotion processing (Chronaki et al. 2014; Nelson and Russell 2011). This suggests that audio channels may be less effective in facilitating emotion recognition for young children than visual and combined channels.

Young children may depend on situational cues to recognise emotions (Aguert et al. 2013; Gil et al. 2014). Studies have examined the relationship between facial expressions and their context and produced equivocal results (Aviezer et al. 2008). Some showed insignificant effects (e.g. Nakamura, Buck, and Kenny 1990). Others exhibited robust contextual effects (e.g. Carroll and Russell 1996). The context emotions are presented may be helpful, particularly if children confuse their facial expressions such as anger and disgust and happiness and surprise (Gosselin and Simard 1999; Widen and Russell 2003). This is supported by research which shows that children perform better in emotion recognition tasks when provided with labels of emotions (Russell and Widen 2002; Widen and Russell 2004) or stories of emotional events (Widen and Russell 2002, 2004) than facial expressions alone (Widen and Russell 2007). Such findings indicate the utility of the context for improved emotion identification.

Picture books are frequently used as educational resources for discussions of emotion with children (Yu 2009) and provide a platform for emotion understanding, as they may address the characters' emotional disposition (Garner 2010). Through picture book reading children interact with a more knowledgeable adult who can help them understand emotions (Vandermaas-Peeler et al. 2012). This is supported by research showing that adults discuss emotions more often during book reading than other activities (e.g. play, Drummond et al. 2014). Children's emotion understanding in picture books per se has not really been tested. In related studies, books are read to children, and then other validated measures are used to assess emotion understanding (e.g. Colwell and Hart 2006).

One book which has been praised for its ability to acknowledge emotions (Gottlieb 2008, 2009), particularly anger (Kidd 2011; Spufford 2003) is *Where the Wild Things Are* (Sendak 1963). The book could potentially be a valuable tool for anger recognition for children, and it also addresses adults' repressed anger (Gottlieb 2008, 2009).

The aim of this study was to investigate whether preschool children can recognise strong emotions in *Where the Wild Things Are*. We chose to test preschoolers, as this period is marked by significant developmental changes in emotion recognition, and storybook reading happens regularly in children's lives (Salmon et al. 2013). If children can recognise emotions in this book, it could potentially be used as a means to facilitate emotion recognition by parents and teachers. The target emotions were those of anger, sadness, and happiness. We investigated if children would recognise these emotions in three pictures of the book. As multimodal presentation modes (face and audio stimuli) are considered more efficient than single ones (Charbonneau et al. 2013), we tested whether children could label and recognise emotions when portrayed via different book reading strategies used commonly at home and preschools. Children saw the pictures in the book only, listened to an audio version without the book, or saw the pictures whilst listening to the audio version. Children's emotion recognition was further tested with the Pictures of Facial Affect (Ekman and Friesen 1976), to investigate whether they confuse basic emotions (Gagnon et al. 2010). Performance in these two tasks was compared as an indication of developmental trajectory and validation of our book task. Given recommendations that the book is relevant to adults' emotion understanding (Gottlieb 2009), an adult sample was also used as a baseline measure.

We first hypothesised that children's recognition in the combined condition would be better. Given that positive emotions are easier to recognise than negative and angry expressions are more difficult to identify than happy and sad ones (Gil, Hattouti, and Laval 2016; Gosselin 2005), we hypothesised that children would have difficulty identifying anger in the book while happiness would be more easily identified than sadness and anger. Lastly, we hypothesised that, in contrast to adults, children would confuse the angry and disgusted and the happy and surprised expressions respectively in the Pictures of Facial Affect (Widen and Russell 2008).

## Method

### Participants

Sixty-six preschool children (33 male, 33 female) aged 35–56 months ( $M = 46.06$  months,  $SD = 5.43$ ) and 60 adults (30 male, 30 female) and participated in the study. Given developmental differences in emotion recognition during the preschool period (Salmon et al. 2013), we further divided the children in two age groups: thirty-one comprised the younger group (35–45 months,  $M = 41.32$  months,  $SD = 3.10$ ), and 35 comprised the older group (46–56 months,  $M = 50.26$  months,  $SD = 3.04$ ). Adults were mainly undergraduate and postgraduate students in two UK universities. Their age ranged between 19 and 28 years ( $M = 24.07$  years,  $SD = 2.63$ ). The sample was predominantly Caucasian. All participants were English speaking and attended English speaking universities and nursery schools. Children and adults were unfamiliar with the book.

Children were recruited from and tested at one university-run and two private nursery schools in the UK. An additional three children were recruited; two declined to participate and one had recently seen the movie version of the book, thus her responses were excluded from the analysis. Children were given a sticker as a token for their participation.

### Materials

#### Picture book

*Where the Wild Things Are* (Sendak 1963) describes the story of Max, a child of four/five making mischief and sent to his room by his mother without his supper (Lanes 1980). The illustration here shows Max with a frown on his face and glaring eyes. He uses his fantasy to sail off to where the Wild Things of his fury live (Spufford 2003). However, Max becomes homesick and lonely, illustrated by a frown on his face, and decides to start his journey back home. He returns to his bedroom where he finds his dinner waiting for him. The smile on his face represents the end of his rage (Lanes 1980).

An audio version of the book performed by an actress (Sendak and Grimes 2007), and a Sony CD player with in-built speakers were used in the audio condition. The audio is 3.08' long and involves a dramatic reading and sound effects (i.e. music).

### **Pictures of Facial Affect**

A pilot study was conducted to determine which Pictures of Facial Affect (Ekman and Friesen 1976) would be used for the experiment. Fourteen adults were presented with six photographs of three female posers depicting facial expressions of all basic emotions and were asked to indicate the photos which exhibited an angry, sad, and happy expression. Photograph position and emotion were counterbalanced by shuffling the photographs each time before placing them in front of participants. A female face was used to counterbalance gender, as the book displays images of a boy. The photos that yielded the highest scores of correct responses across the three emotions were selected. We used photographs of the same poser to not distract participants with cues such as different hair styles. The pictures were black and white and yielded 70% agreement criterion of the emotions as judged by the raters.

### **Design**

We used a 2 × 3 between-subjects design. The independent variables were Age (adults, children) and Condition (visual, audio, combined [visual + audio]). The dependent variables were scores in the *book task* (picture book) and the *photograph task* (Pictures of Facial Affect). We ran similar analyses across younger and older children to investigate developmental differences in emotion recognition between preschoolers.

### **Procedure**

Prior to the study participant information sheets and consent forms were distributed to adults by the researcher and to parents by the nursery teachers. The information sheet stated that consent forms should not be signed if participants were familiar with the book or had seen the corresponding film. Participants were randomly assigned to one of three conditions which involved identifying emotions in the book. All participants then completed a photograph task which involved identifying anger, sadness, and happiness from an array of six photographs which included disgust, surprise, and fear.

In the Visual condition, participants were given the book and asked to look through it all to facilitate understanding. The text was covered so that understanding would rely solely on the pictures, and the experimenter did not narrate the story. Participants were then instructed to turn to each of the three target pages/pictures and were asked what they thought Max felt on each occasion. The first picture showed Max after he was sent to his room by his mother without supper (angry). The second portrayed him feeling lonely and wishing to return home (sad). The last one showed Max back in his room smiling (happy).

Children were invited to participate in a fun story book game. Instructions were as follows:

Let's play a game, shall we? This is a book about a boy named Max. I want you to look through each page and tell me what you think is happening in the story. After that, I will ask you some questions and then I will give you a sticker for playing with me. Do you want to do that?

After following these directions each child was presented with the three target pictures and was asked: 'How do you think Max is feeling in this picture?' for each one of them. Children were not corrected if they provided an incorrect response. Following this, the six Ekman photographs were presented. Photograph position and emotion were counterbalanced by shuffling the photographs each time before placing them in front of each child. The following instructions were given:

Do you see the photographs of this lady? Can you show me in which photo the lady is feeling angry? Good. And in which photo do you think she is feeling sad? Good. And in which do you think she is feeling happy? Well done.

In the Audio condition, participants first listened to an audio version of the story (Sendak and Grimes 2007) in the absence of the picture book and were then asked how they thought Max felt on three occasions. Instructions were as follows: ‘... You will listen to a story on the CD player about a boy named Max and then I will ask you three questions about him. Do you want to listen to the story?’ After the story was over each child was asked:

How do you think Max felt when he was sent to bed without eating anything? Good. How about when he was with the wild things and wanted to be where someone loved him best of all? How do you think Max felt then? And how about when he returned to his room and found his supper waiting for him and it was still hot? How do you think he felt then?.

The questions were asked using the exact book phrases. Children were allowed to listen to the story again if they wished to, as we did not test memory. The photograph task followed as per the visual condition.

In the Combined condition, participants listened to the story (audio presentation) and observed the book simultaneously (the researcher turned the pages in line with the audio presentation). All text was covered. Instructions were given as follows: ‘... You will listen to a story about a boy named Max and you will also see the pictures of the story in this book. Then, I will ask you three questions about Max. Do you want to do that?’. After the story was over the researcher went back to the key pictures and asked: ‘How do you think Max is feeling in this picture?’ for each one of them. The photograph task followed as per the first two conditions.

In all conditions, directions to adults were given in a similar age-appropriate manner.

The book task preceded the photograph task, which served the purpose of verifying that participants were aware of the three emotions under investigation. Questions in the photograph task were asked in the same order as the pictures in the book were presented (i.e. angry, sad, happy). Each task took approximately 10 min.

## Scoring

Participants’ scores were determined based on the correct identification of emotion.

Accuracy was calculated as the percentage of participants’ correct answers. Based on previous research (e.g. Ekman 2004; Widen and Russell 2003), a broader coding scheme was adopted for the freely chosen labels of the book pictures and was developed deductively. A second coder was consulted regarding classification of responses and agreed with the first coder. Responses such as ‘angry’, ‘frustrated’, ‘cross’, ‘wild’, ‘mad’, ‘annoyed’, and ‘grumpy’ represented anger. ‘Sad’, ‘lonely’, ‘solitude’, ‘alone’, ‘homesick’, ‘regret’, ‘upset’, and ‘disappointed’ represented sadness. ‘Happy’, ‘relieved’, ‘content’, ‘satisfied’, ‘proud’, ‘fine’, ‘good’, ‘better’, ‘smiling’, and ‘comfort’ represented happiness. Some words represented states (e.g. solitude) rather than emotional words and were placed in respective categories based on the emotion most relevant to such a state (e.g. solitude can induce sadness; Ekman 2004). ‘I don’t know’ answers, no answers (nodding), and wrong responses (e.g. happy for an angry face) were coded as incorrect.

## Results

### *Differences in the book and the photograph task*

An alpha level of .05 was used for the statistical tests of the study. A 2 (age) × 3 (condition) Multifactorial Analysis of Variance was performed to determine the effects of age and condition on participants’ scores in the book task and the photograph task. A significant main effect of age was found for the book task  $F(1,120) = 14.05, p < .001, \eta^2 = .10$  and the photograph task  $F(1,120) = 52.60, p < .001, \eta^2 = .30$ . Adults’ percent correct score was higher in both tasks (book task:  $M = 79.44\%$ ,  $SD = 23.84$ , photograph task:  $M = 93.33\%$ ,  $SD = 14.78\%$ ) than children’s (book task:  $M = 61.11\%$ ,  $SD = 35.37\%$ , photograph task:  $M = 61.11\%$ ,  $SD = 30.71\%$ ).



**Table 1.** Means (Ms) and Standard Deviations (SDs) for adults' and children's percent correct scores in the book task across three conditions.

Condition	Adults ( $n = 60$ )		Children ( $n = 66$ )	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Visual	73.33	27.78	68.25	37.23
Audio	80.00	22.68	38.09	33.81
Combined	85.00	20.16	75.00	24.57

For the book task, a significant main effect of condition,  $F(2,120) = 5.77$ ,  $p = .004$ ,  $\eta^2 = .09$  and a significant age  $\times$  condition interaction,  $F(2,120) = 5.12$ ,  $p = .007$ ,  $\eta^2 = .08$  were found. A post-hoc Tukey HSD test showed that performance in the combined condition was significantly higher than in the audio ( $p = .003$ ) but not the visual condition ( $p > .05$ ). This result was driven by children's performance, as adults' score in the audio condition was very high (Table 1). No other significant differences were found (all  $ps > .05$ ).

A similar analysis was performed to determine differences between younger and older children's percent correct scores in the book and the photograph task respectively. A significant main effect of age was found in the photograph task,  $F(1,60) = 5.49$ ,  $p = .023$ ,  $\eta_p^2 = .08$ . Older children's percent correct score was significantly higher in the photograph task ( $M = 69.52\%$ ,  $SD = 24.75\%$ ) than younger children's ( $M = 51.61\%$ ,  $SD = 34.25\%$ ) but not in the book task (older children's score:  $M = 63.81\%$ ,  $SD = 31.70\%$ , younger children's score:  $M = 58.06\%$ ,  $SD = 39.41\%$ ). A significant main effect of condition was found in the book task,  $F(2,60) = 9.57$ ,  $p < .001$ ,  $\eta_p^2 = .24$ . A post-hoc Tukey HSD test showed that children's percent correct score in the audio condition was significantly lower than in the visual ( $p = .008$ ) and the combined condition ( $p = .001$ ) respectively (See Table 1 for children's mean scores). No other significant differences or interactions emerged (all  $ps > .05$ ).

### Assessment of identification of emotions in the book task

Pearson's chi square analyses of the correct responses to the three target book pictures were performed to determine the proportion of participants who accurately identified emotions. The analyses revealed a significant association between age and anger (Picture 1),  $\chi^2(1) = 15.20$ ,  $p < .001$ . A greater proportion of adults accurately identified anger in Picture 1 than children (see Table 2). No significant associations between age and sadness or happiness emerged (all  $ps > .05$ ). Identical analyses were performed on younger and older children's scores (correct label) in each picture of the book task and revealed no significant differences (all  $ps > .05$ ).

We performed similar chi square analyses of the correct responses to the three pictures in the book for each condition (separately for adults and children). For adults, no significant relationship between conditions for any of the emotions were found (all  $ps > .05$ ). For children, we found a significant relationship between conditions for anger (Picture 1),  $\chi^2(2) = 10.15$ ,  $p = .006$  and happiness (Picture 3),  $\chi^2(2) = 10.03$ ,  $p = .007$ . A significantly lower proportion of the children in the audio condition identified anger and happiness correctly compared to children in the visual and combined conditions (Table 3). There was no significant association between conditions for sadness, ( $p > .05$ ).

As a great number of children labelled Max's facial expression in Picture 1 *sad* instead of *angry*, an extra chi square test was performed with sadness as a label for Picture 1. A significant

**Table 2.** Proportion of participants who accurately identified emotions in the book task.

	Adults ( $n = 60$ )	Children ( $n = 66$ )	Total ( $N = 126$ )
Anger	76.7%	42.4%	58.7%
Sadness	80.0%	68.2%	73.8%
Happiness	81.7%	72.7%	77.0%



**Table 3.** Proportion of children in each condition who accurately identified anger, sadness, and happiness.

	Visual ( <i>n</i> = 21)	Audio ( <i>n</i> = 21)	Combined ( <i>n</i> = 24)	Total ( <i>N</i> = 66)
Anger (pic. 1)	52.4%	14.3%	58.3%	42.4%
Sadness (pic. 2)	71.4%	52.4%	79.2%	68.2%
Happiness (pic. 3)	81.0%	47.6%	87.5%	72.7%

Note. pic = Picture.

association between conditions was found,  $\chi^2(4) = 12.63, p = .013$ . In the audio condition, 42.9% of the children labelled Max's expression sad and only 14.3% correctly labelled it angry. In the visual condition, 14.3% of the children labelled the expression sad and 52.4% labelled it angry. In the combined condition, 29.2% identified sadness, while 58.3% correctly identified anger. These findings suggest that children grasped the emotion's negative valence in Picture 1 but not the exact emotion.

### **Assessment of identification of valence in the book task**

In view of these findings, further chi square analyses were performed with Pictures 1 and 2 representing negative valence and Picture 3 representing positive valence. A significant association was found between age and Picture 1,  $\chi^2(1) = 6.12, p = .013$  and age and Picture 2,  $\chi^2(1) = 5.43, p = .023$ . A significantly greater proportion of adults identified the negative valence of Max's facial expressions (Picture 1: 95.0%, Picture 2: 93.3%) than children (Picture 1: 80.3%, Picture 2: 78.8%). No significant relationship was found between age and Picture 3 (positive valence), ( $p > .05$ ).

Similar analyses were performed taking condition into account, separately for adults and children. For adults, there was no significant associations between conditions for any of the pictures (all  $ps > .05$ ). For children, a significant association between conditions was found for Picture 1,  $\chi^2(2, N = 66) = 6.35, p = .042$ , and Picture 3,  $\chi^2(2, N = 66) = 7.95, p = .019$  but not Picture 2,  $\chi^2(2, N = 66) = 1.85, p = .39$ . A significantly lower proportion of children identified the negative and positive valence of Picture 1 and Picture 3 respectively in the audio condition than the other two conditions (see Table 4).

### **Assessment of confusion between anger and disgust, and happiness and surprise in the photograph task**

Pearson chi square analyses were performed to inspect the degree of confusion between anger and disgust and happiness and surprise. We found a significant association between age and confusion of anger and disgust,  $\chi^2(2) = 27.41, p < .001$  and happiness and surprise,  $\chi^2(2) = 10.46, p = .005$ . 83.3% of the adults identified the angry photograph while 15.0% confused it with disgust. In contrast, 37.9% of the preschool children accurately recognised the angry photograph while 48.5% confused it with disgust. 98% of adults accurately identified the happy photograph and only 1.7% confused it with surprise. In contrast, 80.3% of the children recognised the happy photograph while 13.6% confused it with surprise.

**Table 4.** Proportion of children in each condition who accurately identified the negative and positive valence in the book task.

Valence	Visual		Audio		Combined		Total	
	Adults <i>n</i> = 20	Children <i>n</i> = 21	Adults <i>n</i> = 20	Children <i>n</i> = 21	Adults <i>n</i> = 20	Children <i>n</i> = 24	Adults <i>N</i> = 60	Children <i>N</i> = 66
Pic 1 (-)	90.0%	76.2%	95.0%	66.7%	100.0%	95.8%	95.0%	80.3%
Pic 2 (-)	85.0%	76.2%	95.0%	71.4%	100.0%	87.5%	93.3%	78.8%
Pic 3 (+)	90.0%	81.0%	90.0%	52.4%	80.0%	87.5%	86.7%	74.2%

Note. pic = picture; (-) = negative valence; (+) = positive valence.

## Discussion

The aim of the present study was to investigate whether preschool children can recognise emotions in *Where the Wild Things Are* and whether they confuse basic emotions in a Pictures of Facial Affects task. Our first hypothesis, that children would show higher performance in the combined condition compared to the other two conditions was supported. Children identified emotions more accurately in the combined compared to the audio condition. Our second hypothesis was that children would have difficulty identifying anger in the book while happiness would be more easily identified than anger and sadness. We found that children had difficulty identifying anger in the audio condition. This was also true for happiness. Our third hypothesis, that compared to adults, children would confuse the angry and disgusted and the happy and surprised expressions in the photograph task was also confirmed. We will discuss these findings in turn.

First, we found that adults outperformed children in facial expression recognition in both tasks. This finding may be related to differences in cognitive development. Emotion labelling tasks (i.e. the book task) require language production and emotion recognition tasks (i.e. the photograph task) require language comprehension (Izard 1994), in which adults are more advanced than preschoolers. Further, the ability to recognise emotions from facial expressions improves with age (Leime et al. 2013; Thomas et al. 2007). Children's poorer performance could be due to their inability to attend to all the facial cues adults use for understanding emotions. They may have also paid attention to one facial feature (e.g. lips) than a combination, which could have facilitated emotion understanding (Walden and Field 1982). This could also explain why older preschoolers performed better in the photograph task than the younger ones. Nonetheless, older children's superior performance was not evident in the book task. This finding supports previous work showing that children may rely on situational cues to recognise others' emotions (Aguert et al. 2013; Gil et al. 2014). Here, the context (i.e. the story) may have helped younger children recognise the protagonist's emotions to a better extent than photographs presented in isolation.

In support of the first hypothesis, we found that children were more accurate in the combined than the audio condition. This finding is in line with previous work which did not use a book reading interaction yet showed that combined channels allow for better emotion understanding than single modalities (Charbonneau et al. 2013; Paulmann and Pell 2011). Facial expressions combined with emotional cues provided by audio stimuli may be stronger signals for emotion recognition than audio stimuli alone. We also found that children's accuracy in the visual condition was higher than the audio condition. Our finding supports that visual cues may be easier to recognise than audio cues and that visual emotion recognition may precede audio recognition in preschoolers (Chronaki et al. 2014; Nelson and Russell 2011).

Diminished performance in the audio condition could be indicative of children's inability to recall Max's emotional dispositions. Here, children were not presented with visual cues which could potentially create a pictorial context for the audio presentation, suggesting that in the absence of a visual narrative, the meaning of the story may be distorted (Clark 2003). In the visual and combined conditions, children were presented with the target pictures again after the story was over and were asked to label the emotions. Here, the presentation of the pictures could have acted as a memory cue which activated episodic memory (Tulving 2002). From an applied perspective, our findings suggest that reading stories aloud to children at home or in the classroom may not help facilitate emotion recognition to the same extent as combining it with pictures.

Our analyses revealed that a greater proportion of adults identified anger in the book than children. We found that less than half the children identified anger, supporting previous work showing that anger may be more difficult to recognise than happiness and sadness (Durand et al. 2007). Adults may be more proficient in recognising emotions than children (Ekman 1973), and children as young as five years may be less exposed to angry than other facial expressions compared to older children, which may prevent them from recognising anger in others (Gao and Maurer 2010). Further, it would be easier for adults to understand that the 'wild things' is a metaphor/figurative

language for the boy's anger compared to young children who may not have this nuanced understanding (Colston 2018). Given that Sendak's book has been praised for its ability to portray anger (Spufford 2003), further work is needed regarding its capacity to facilitate understanding of anger.

As children confused anger and sadness in the book task, we investigated their understanding of the valence of emotions. A significantly greater proportion of adults identified the valence of Max's facial expressions in Pictures 1 and 2 (negative) but not in Picture 3 (positive valence). This confirms previous findings that young children find it easier to recognise positive facial expressions than negative ones (e.g. Widen and Russell 2003). Of the negative-valenced facial expressions, approximately 42% of the children in the audio condition identified Max's facial expression in Picture 1 as *sad*, three times more than the children who correctly identified anger (approximately 14%). This pattern was not observed in the other conditions. It is possible that some of the children empathised with Max's disposition and interpreted the expression in Picture 1 as *sad* instead of *angry*. This may be because children may focus on inner processes within themselves to understand others' emotions rather than on the character's situational factors (Hughes, Tingle, and Sawin 1981). Further, children may have recognised Max's frown in Picture 1 and grasped his distress without being able to identify the exact emotion. This is in line with Ekman's proposition (2004) that rejection or loss (here, Max's mother deprives him of his playtime with his dog and supper) can make one either angry or sad. Our findings support previous work showing that anger and sadness may be present in many situations and may be confused because they are interpreted as different aspects of distress rather than discrete emotions (Gao and Maurer 2010; Widen 2013).

Children in the audio condition were less accurate in identifying anger and happiness but not sadness. Our finding is congruent with previous work which found that children were more accurate in the recognition of happy and angry faces and voices than sad ones (Chronaki et al. 2014). Compared to Chronaki et al. who used non-word vocal stimuli (i.e. interjection 'ah') and still photographs of facial expressions, children in our study listened to an audio version of the book and saw the pictures in it. Situational cues relevant to sadness in the book could have enabled children's recognition. The book (and its audio version) states that Max was feeling *lonely* and wanted to be where he felt loved. Loneliness is related to sadness, which could justify why children labelled Max's emotion sad in the audio condition (Ekman 2004). The lack of images and emotional words describing Max's emotional state when he was sent to his room (Picture 1) and when he returned and found his dinner (Picture 3) could have made it difficult to identify anger and happiness in the audio condition. The actress's dramatic performance may also relate to this finding. Children may have perceived the actress's reading in Pictures 1 and 3 as more neutral compared to the description of Picture 2 (sadness). The effects of the book's dramatic reading on emotion recognition could be explored in future research.

Similarly, children in the audio condition had more difficulty inferring the negative and positive valence of Pictures 1 and 3 compared to Picture 2. In the audio condition the contextual cues relevant to Picture 2 may have provided a stronger indication of the protagonist's feelings. When visual cues were provided and were also combined with the vocal ones, children were able to infer the valence of all emotions. Overall, the proportion of children who correctly identified the valence of Max's facial expressions in Pictures 1, 2, and 3 was higher compared to the proportion of children who accurately identified the exact emotions. Our finding supports Widen and Russell's (2010) argument that children may use a smiling or a frowning facial expression or a script about a character to identify emotions on the basis of valence, offering evidence for the prevalence of the dimensional view of emotion recognition in children around five years (see Widen 2013, for a review).

In the photograph task, the hypothesis that children would confuse *anger* and *disgust* was confirmed, with almost half the children pointing to the *disgust* photograph when asked to indicate the angry one and less than 40% indicating the correct one. As these two emotions are quite similar in valence (Widen and Russell 2003) and their facial expressions are very alike (Aviezer et al. 2008), this finding is not surprising. The common facial characteristics of anger and disgust could explain why children confused these emotions (Gosselin and Laroque 2000). Finally, compared to adults,

children confused *happy* with *surprised*. The proportion of children who confused these emotions was fairly small (approximately 13%), presumably because children understand surprise as a pleasurable state (Wellman and Banerjee 1991).

Our study has several limitations. First, we used a picture book which has not been assessed for validity and reliability of emotional content, and we did not attempt to do so in this research. Additionally, the facial expressions explored in the book were not validated as measures of emotion, as per the Ekman faces. Future research could validate this book as a measure of emotion recognition, to determine its ability to capture particular emotions and its use in real life settings (e.g. preschools, at home). Given the rise in the prevalence of podcasts, e-books, and audio-books (Dobler 2015), it is important to determine how emotions are being recognised and understood by child and adult users. Further, a broader coding scheme was utilised in line with previous work (e.g. Ekman 2004; Widen and Russell 2003).

We chose to test whether *Where the Wild Things Are* can be used as a tool of emotion recognition because of the book's ability to help children and adults understand anger (Gottlieb 2008, 2009). Children had difficulty identifying anger in the book compared to adults. Anger may be more difficult to identify compared to sadness because of societal norms which dictate the suppressed expression of intense emotions (Izard 1994). Nonetheless, demonstrations of anger are common and normal in younger children (Potegal, Kosorok, and Davidson 1996), therefore a carefully chosen book could potentially help them understand anger better (Garner and Parker 2018). Future studies could investigate this further. If children can benefit from this book's ability to portray anger, it could potentially be used by parents and educators to help children identify anger and understand the situational context.

To our knowledge, our study is the first to investigate young children's emotion recognition in *Where the Wild Things Are*. Our findings suggest that preschool children may have difficulty recognising anger in the book when unsupported by discussion of the character's feelings. Presenting the book visually as well as vocally and visually facilitated children's emotion recognition than an audio presentation alone. Our findings suggest that the book could be used by individuals who spend time with children to help them recognise basic emotions and as a platform for discussing the main character's feelings. By drawing attention to the character's facial expressions which show how he is feeling, educators and parents may facilitate children's development of emotion recognition. Such discussions could further help children clarify intersecting emotions (e.g. confusion of anger and sadness in situations when loss is involved). Future research could investigate how this book could be combined with parent or teacher led discussions of emotions to facilitate children's understanding of emotions.

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