



Emotion recognition in children with Down syndrome: ability, influential factors and supporting development

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Background: Emotion Recognition



- central to successful social interactions.
- develops from infancy in typically developing children, and by ~ 10 years it is at adult levels for the six most common emotions (Bullock & Russell, 1985; Ekman, 1993; Serrano *et al.* 1995).



Background: Children with Down Syndrome



- emotion recognition develops more slowly compared to their peers of similar chronological age.
- *may* also have difficulty in comparison to their peers of similar developmental ability
(Kasari et al., 2001; Pochon & Declerq, 2014; Williams et al., 2005; Wishart & Pitcairn, 2000; **BUT SEE** Celani et al., 1999; Channell et al., 2014; Pochon & Declerq, 2013).
- There is some evidence of difficulties in recognising specific emotions.
(Kasari et al., 2001; Williams et al., 2005; Wishart & Pitcairn, 2000; Virji-Babul et al., 2012).



Study 1: Influence of emotion intensity and emotion label

Cebula, K., Wishart, J. Willis, D. & Pitcairn, T. (2017). Emotion recognition in children with Down syndrome: Influence of emotion label and expression intensity. *American Journal on Intellectual and Developmental Disabilities*, 122(2), 138–155.

Study 1: Influence of emotion intensity and emotion label



Background

- If children with Down syndrome do experience difficulties in emotion recognition, this might be due to difficulties in understanding:
 - the emotional expression
 - the emotion label
- Better understanding of these factors might provide insight into how best to support children's emotion recognition.

Study 1: Influence of emotion intensity and emotion label



This study

We used an emotion photo-matching task with manipulation of:

- the emotional expression (altering intensity)
- the emotion label.

We assessed the effect of these manipulations on the accuracy and speed of emotion recognition by:

- children with Down syndrome (DS)
- children with non-specific intellectual disability (NSID)
- typically developing children (TD).

Study 1: Influence of emotion intensity and emotion label



Participants	DS	NSID	TD
Chronological age	14;09	13;05	4;06
Developmental age	4;03	4;07	4;08
Language Comprehension age	5;03	5;10	5;05
Male/Female	8/13	9/12	12/9

N = 21 in each group (drawn from a total of 81 children). Mean values reported as years;months

Study 1: Influence of emotion intensity and emotion label



Methods

- Photo-matching task:
 - memory demands low ✓
 - expressive language demands low ✓
 - ecological validity low ✗

Study 1: Influence of emotion intensity and emotion label

24 trials:

half were regular
facial expressions
(Ekman, 1976).

half computer-enhanced
exaggerated expressions
(FEEST series: Young et al., 2002).



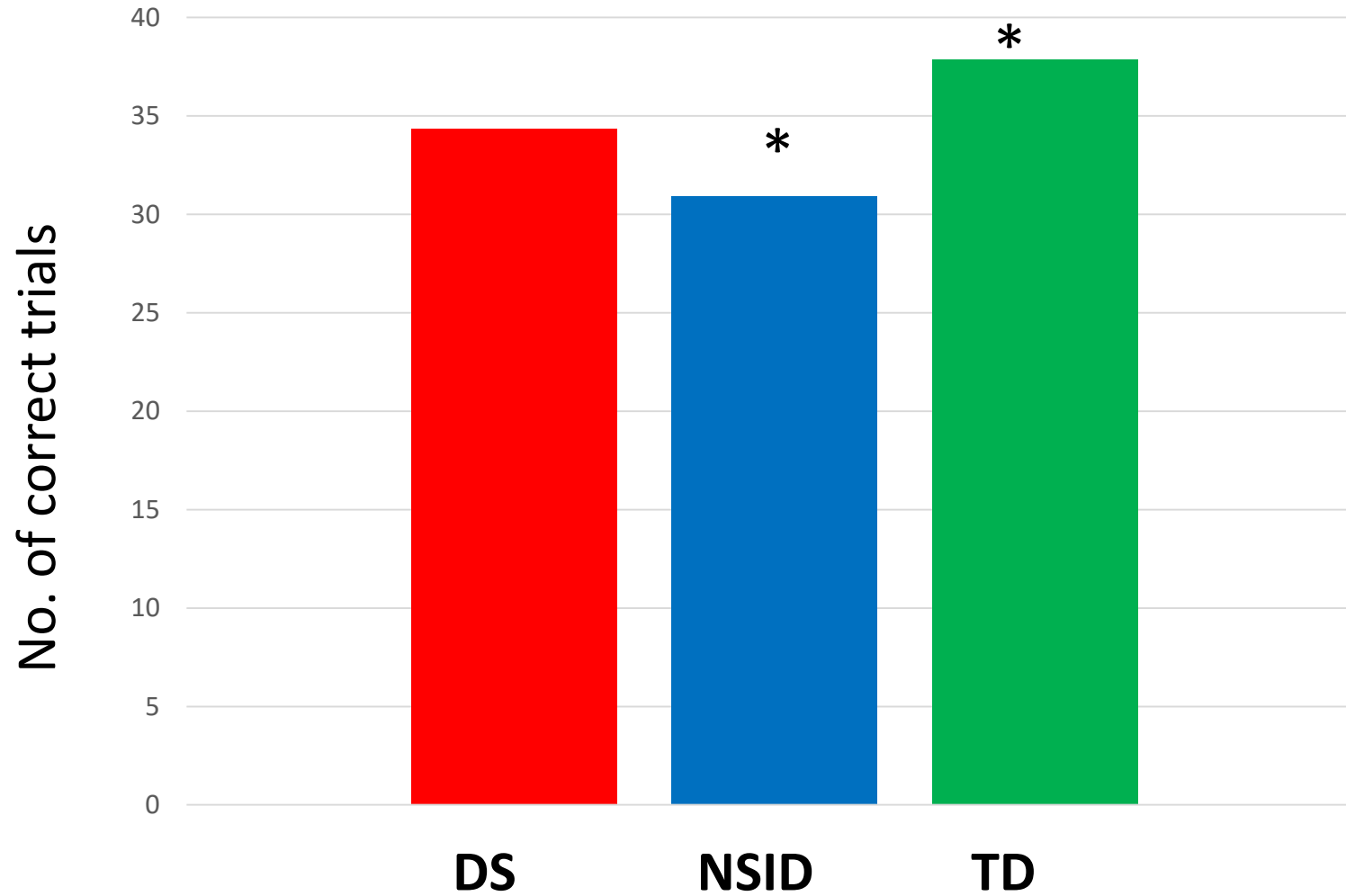
6 emotions
happiness
sadness
surprise
fear
anger
disgust

Study 1: Influence of emotion intensity and emotion label



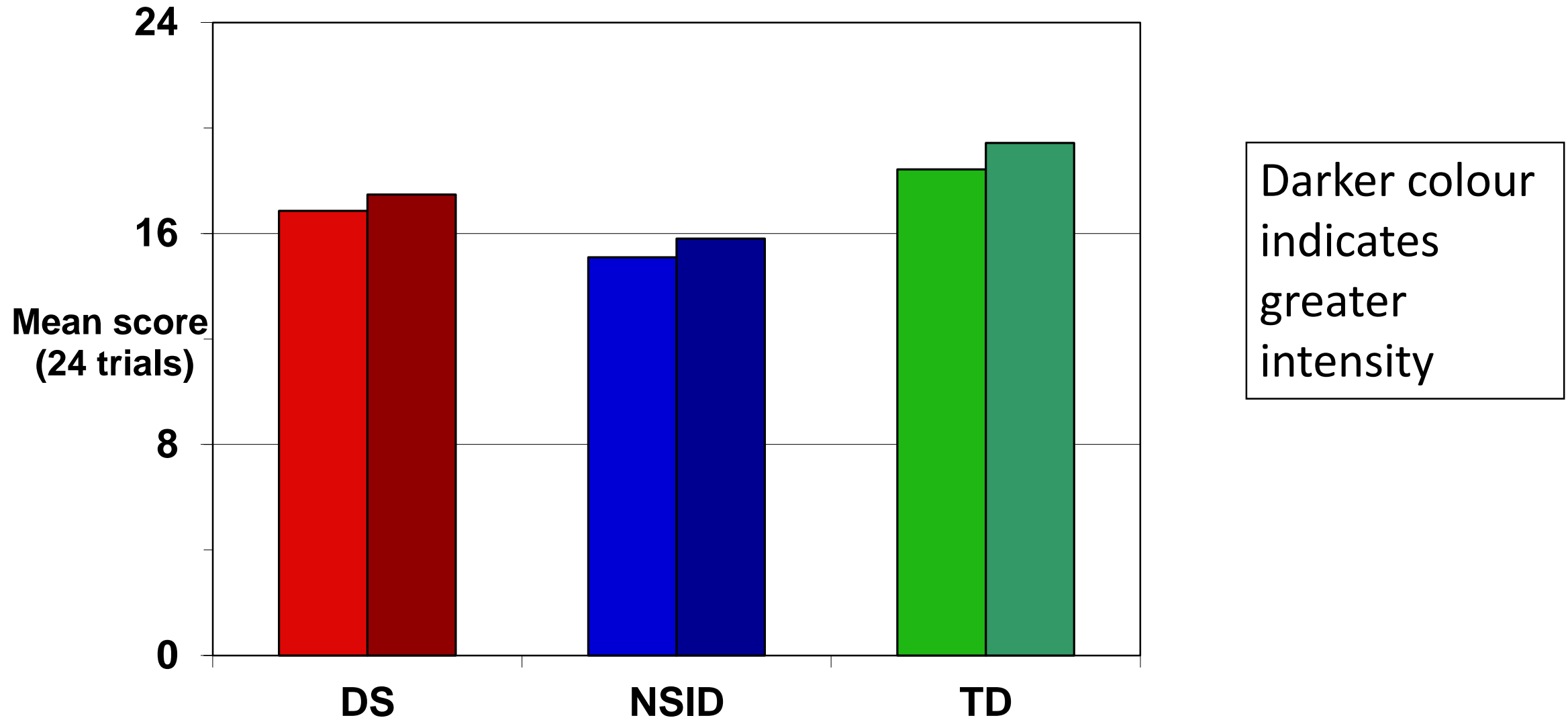
- 2 sessions each of these 24 trials:
 - emotions labelled
 - emotions not labelled
- Same stimuli used in each session
- Sessions counterbalanced

Total accuracy scores (conditions collapsed)



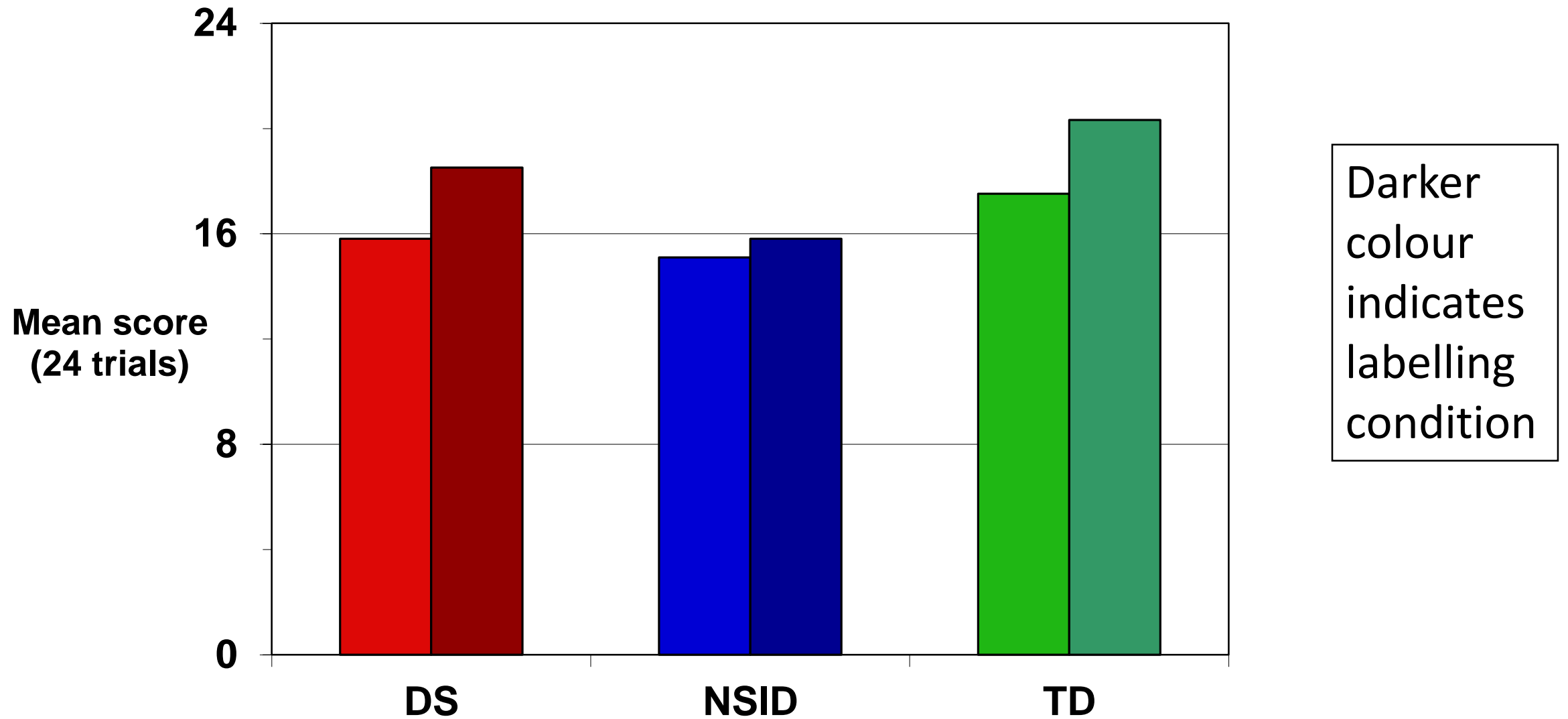
* TD significantly more accurate overall than NSID: $F(2,60) = 3.26$, $p = 0.045$, $\eta^2_p = .10$

Effect of intensity



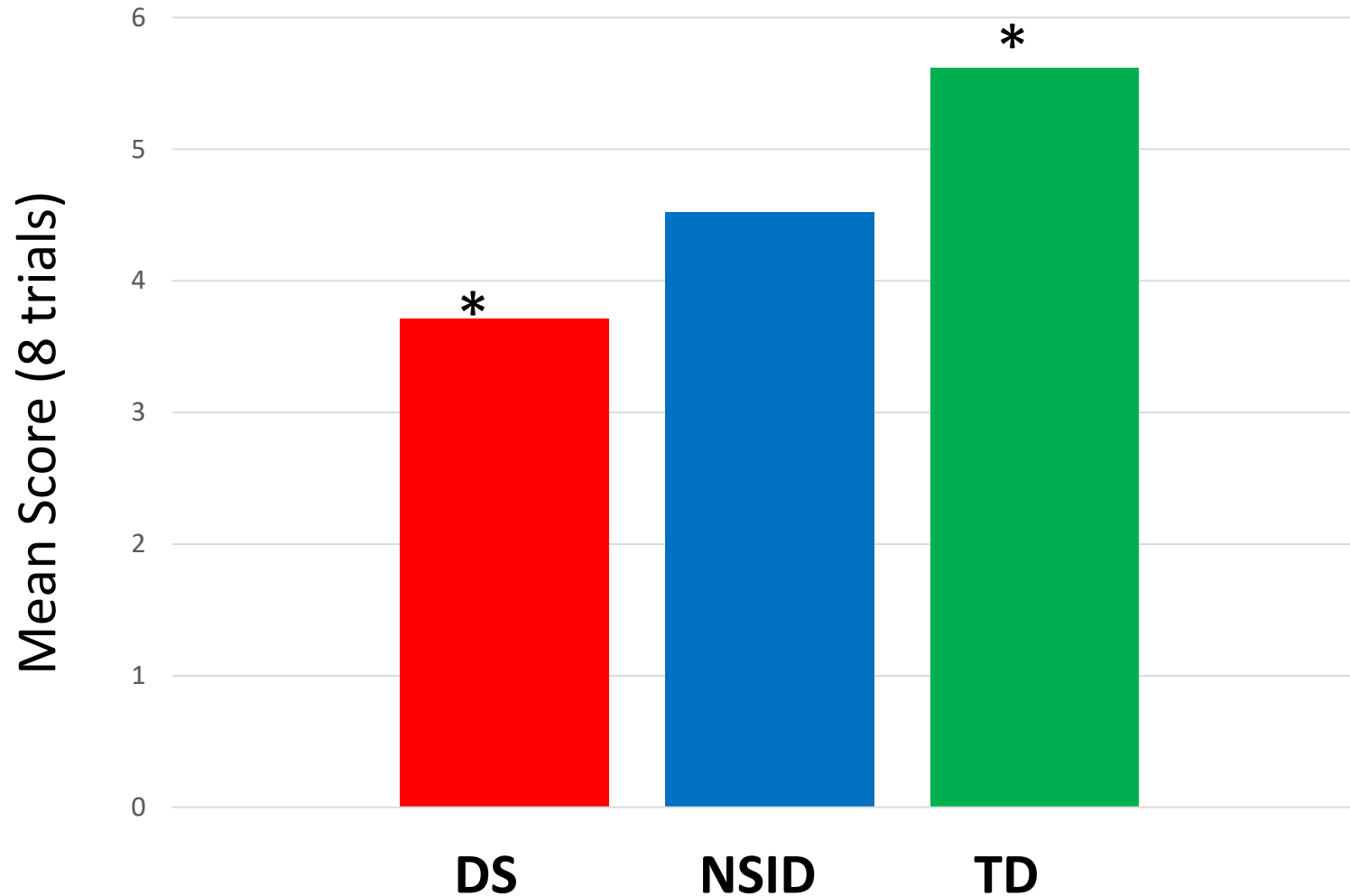
Children signif. more accurate overall for intense emotions: $F(1,60) = 9.48, p = 0.003, \eta^2_p = .14$

Effect of labelling



Children signif more accurate overall when labels given: $F(1,60) = 18.79, p < 0.001, \eta^2_p = .24$

Fear recognition: total accuracy score (conditions collapsed)



* DS significantly less accurate than TD at recognition of fear, $F(2,60) = 4.02$, $p = 0.02$, $\eta^2_p = .12$



Fear recognition: effect of intensity and labelling

- Fear recognition amongst children with Down syndrome was not facilitated by:
 - increased intensity
 - labelling
- Explanation for difficulty?

Study 1: Influence of emotion intensity and emotion label



Influential Factors

Variable	Emotion-matching task score		
	Group ($N = 21$ per group)		
	Down syndrome	Nonspecific intellectual disability	Typically developing
CA	0.11	-0.36	0.47*
MA	0.54*	0.78**	0.53*
PMA	0.46*	0.75**	0.41
VMA	0.45*	0.67**	0.46*
Benton	0.44*	0.73**	0.17
Vocabulary comprehension	0.75**	0.60**	0.64**
Emotion label production	0.38	0.42	0.24

Note. CA = chronological age; MA = mental age; PMA = performance mental age; VMA = verbal mental age.
* $p < .05$; ** $p < .01$.

Study 1: Influence of emotion intensity and emotion label



What do the findings tell us about...

- **emotion recognition accuracy in children with DS?**
 - no sig. difficulties compared to developmentally similar peers
 - fear recognition difficulties compared to TD. Not primarily language-related...perhaps perceptual?
- **influential factors?**
 - emotion recognition associated with cognition and language
- **supporting development?**
 - labelling and exaggerating are broadly helpful, BUT...!



Study 2: Understanding the causes of emotion



Study 2: Understanding the causes of emotion

Background

- Relatively little research has focused on how children with Down syndrome come to understand the *causes* of emotion (though work in autism, e.g. Baron-Cohen, 1991, and work on context of emotions more broadly, e.g. Murray et al., 2018).
- Understanding the causes of emotions is important for social interaction with others.
- This study used a cartoon task to explore children's understandings of the causes of physical versus emotional events.

Study 2: Understanding the causes of emotion



Participants	DS	NSID	TD
Chronological age	14;09	13;03	4;06
Developmental age	4;03	4;07	4;08
Language Comprehension age	5;03	5;11	5;05

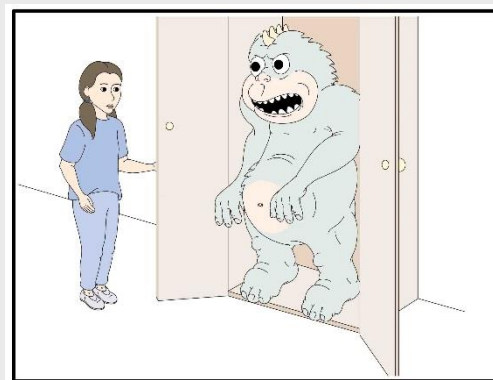
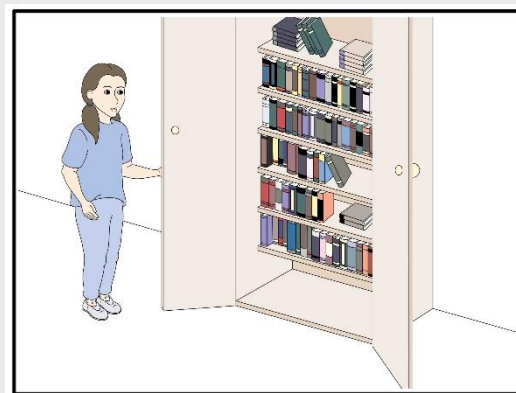
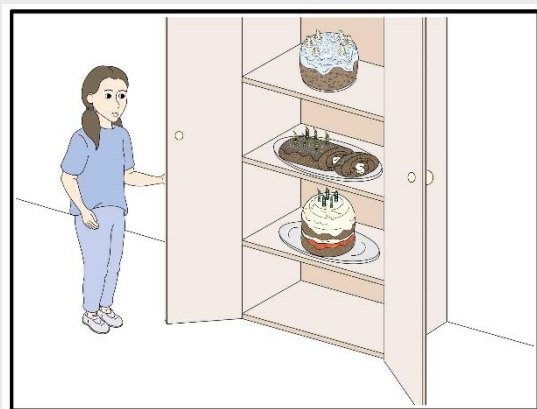
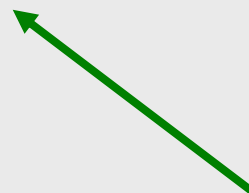
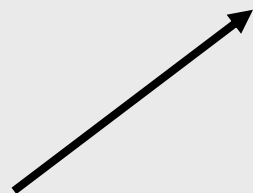
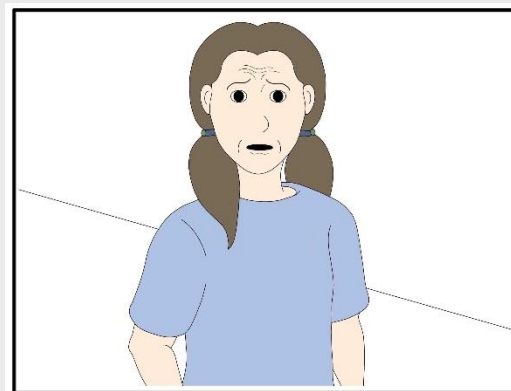
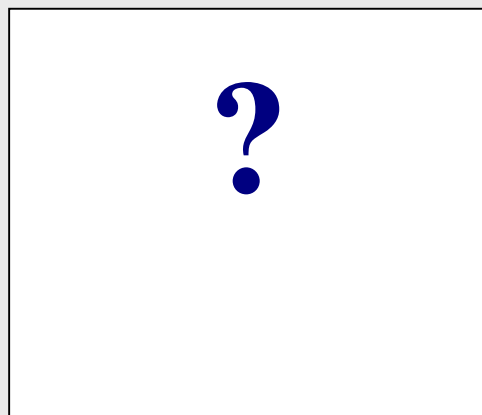
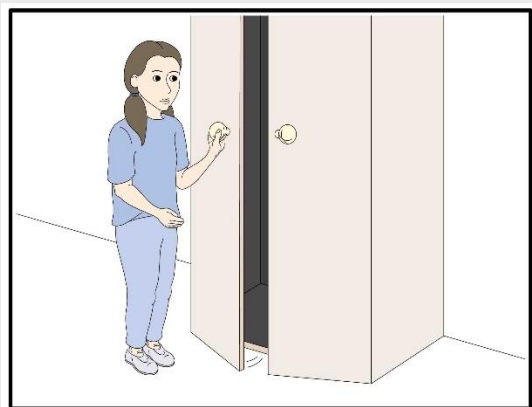
All measures given as means; N = 21 in each group



Study 2: Understanding the causes of emotion

Methods

- Children were given 20 three-part cartoon stories:
 - 4 depicting physical events ('PHYSICAL')
 - 8 depicting emotions caused by a physical event ('EMOTION')
 - 8 depicting emotions caused by a person ('PERSON')
- Each of the emotion conditions had 2 stories representing either happy, sad, surprise or fear-invoking events.
- Children were asked to select the correct cause from a choice of 3. They were then asked to tell the story (see Segal & Pesco, 2015).



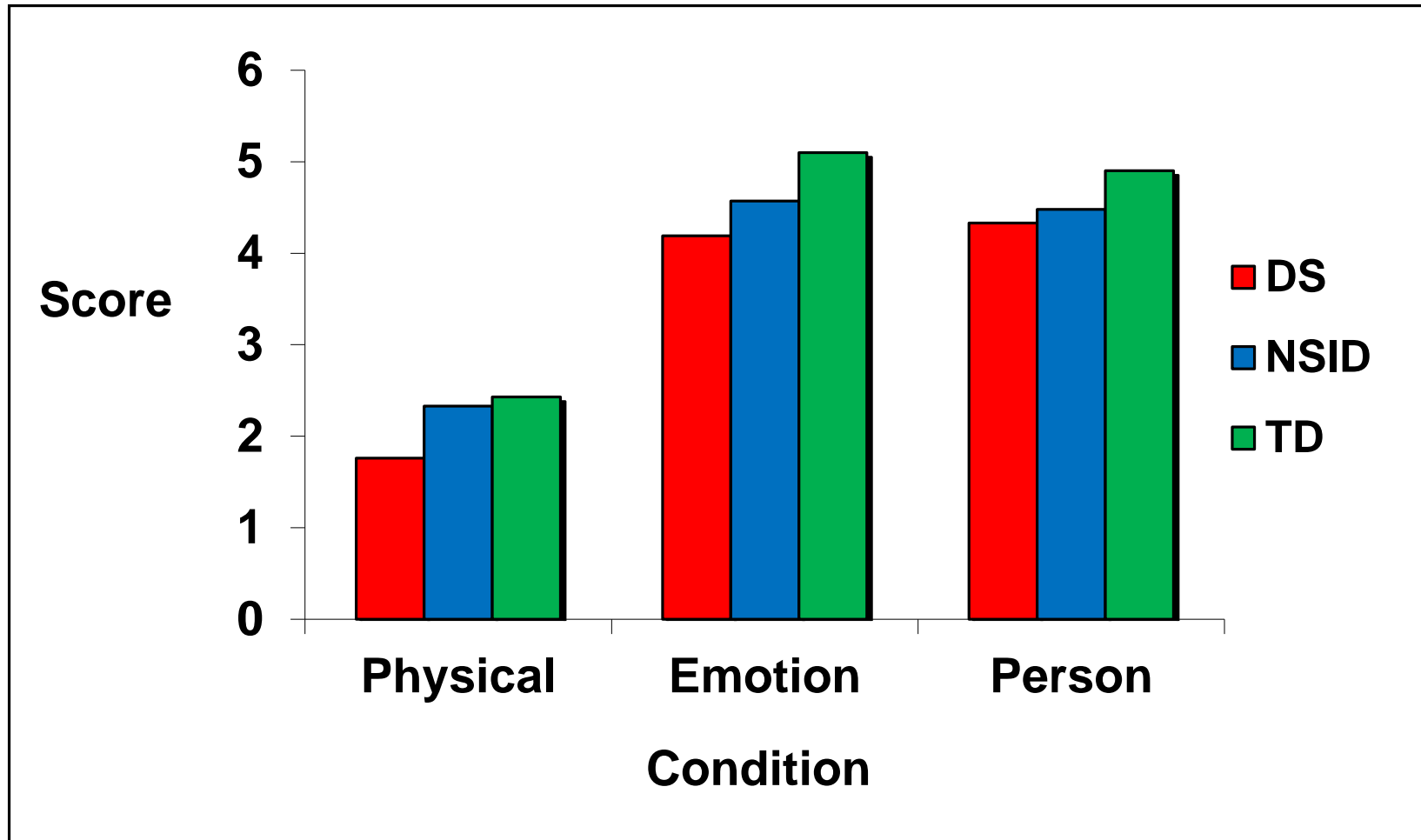


Study 2: Understanding the causes of emotion

Findings

- No significant group differences in ability to select the correct causes in any of the conditions
($F(2, 60) = 1.71, 1.16, 0.45$ respectively, all ns).

Study 2: Understanding the causes of emotion



Max possible score:
Physical = 4
Emotion = 8
Person = 8

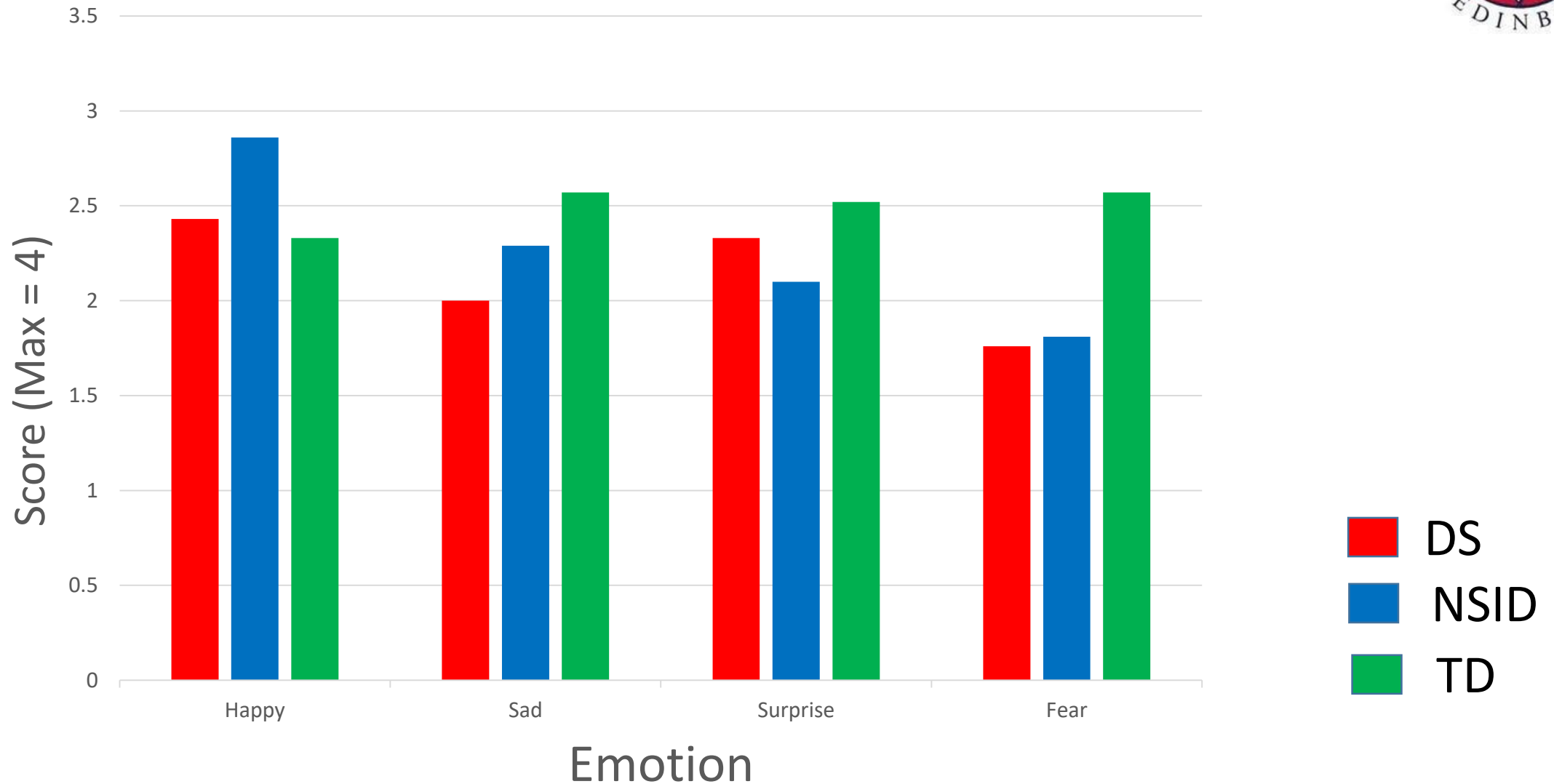


Study 2: Understanding the causes of emotion

Findings

- No significant group differences in ability to select the correct causes in any of the conditions
(F (2, 60) = 1.71, 1.16, 0.45 respectively, all ns).
- 4 emotions (happy, sad, surprise, fear):
No group differences were found in ability to select correct causes, although fear trials approached significance
(F (2, 60) = 2.88, p = 0.06).

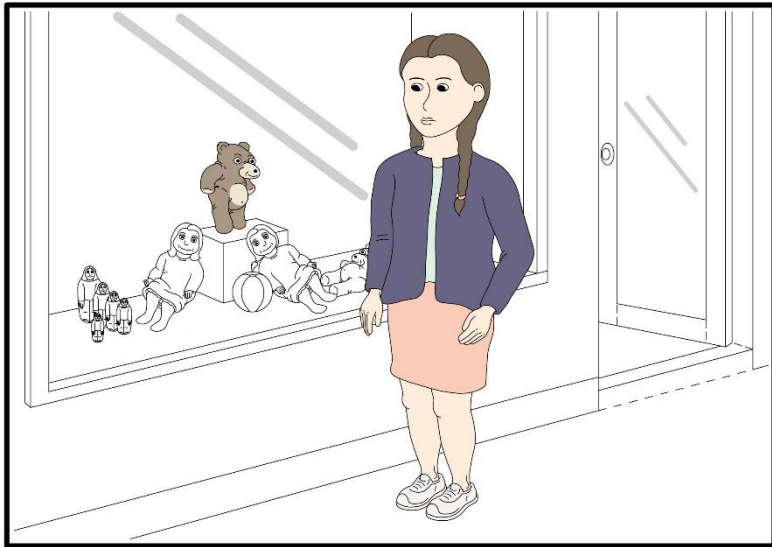
Study 2: Understanding the causes of emotion



Study 2: Understanding the causes of emotion



Examples of narrated stories





Study 2: Understanding the causes of emotion

Examples of narrated stories

- Lady, teddy, lady walking, teddy, lady, door
- The girl goes in the shop, she looking herself, she can buy something, a bear, and outside she's happy as well
- Girl, walking to the shop, the girl buys a teddy and she's happy
- Once upon a time, one of the twins got grounded and then the other twin got grounded. She went to the shop with her pocket money, she went to buy a teddy. She went to the till, 4p please, 3 fivers and 4 pence and she gets 3 pence and a fiver and a tenner, off she goes smiling
- The girl is looking at toys and she's going for a walk
- Once upon a time a girl went to the shops and a man gave her a hundred dollars and she gave him a hundred and sixty dollars and she was pleased!.



Study 2: Understanding the causes of emotion

Summary

- Children with Down syndrome were as able as developmentally similar peers to recognise the causes of emotion.
- This is true regardless of the emotion (happy, sad, surprise, fear), or whether the cause was a physical event or a person. However, difficulties in understanding the causality of fear approached significance.



Next steps

- Exploring children's understanding of emotion in more naturalistic environments (home, playground etc.)
- Understanding how social interactions and teaching can support the development of emotional understanding.
- Understanding how young people with Down syndrome themselves feel about their understanding of emotions in social interactions.



With thanks to....



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- Clinical co-ordinators: Debra Bowyer & Judith Scott
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