Impact of Instructional Modality and Emotional Valence on the Reflective Emotion Regulation of Expression in Preschool Children

Helena Kromm, Vanessa Hettwer, Joscha Kärtner and Manfred Holodynski

Abstract

The current study investigates the impact of instructional modality and emotional valence on the reflective emotion regulation of expression in preschool children. Twenty-three boys and girls aged 3 to 5 years took part in a social dice game of expression where they were motivated to mask their felt emotion (joy when receiving a gift resp. disappointment when receiving no gift) with an opposed expression, presented either iconically (as a picture) or verbally (as a spoken instruction). Twelve adult naïve observers judged children's videotaped behavior according to the quality of emotion children seemed to experience. This impression analysis revealed that children masked their actually felt emotion more effectively when instructed iconically. In addition, 5-year-old children masked joy more effectively than disappointment, while no such differences were found for 3- to 4-year-old children.

Keywords

Emotion regulation; masking of expression; disappointing gift; modality of instruction; emotional valence; preschool

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1　Introduction

One of the major challenges as well as progresses in the socio-emotional development of preschool children are their first steps towards the acquisition of a reflective mode of emotion regulation (Campos et al. 2004: 386–388; Holodynski et al. 2013: 34–38). According to Holodynski et al. (2013), the reflective mode of emotion regulation is the ability "to volitionally inhibit or modify an elicited emotion so that the dominant action readiness linked to the emotion is not enacted but replaced by a subdominant one" (ib.: 35). Thus, this competence enables children to voluntarily inhibit or modify their emotional expressions (Holodynski et al. 2013: 35–37; Liebermann et al. 2007) and is an example of "hot" executive functions (cf. Zelazo et al. 2010). Empirical studies demonstrate the importance of reflective emotion regulation, relating it to social competence (Cole et al. 1994; McDowell et al. 2000; Miller et al. 2006) and early academic achievements (Herndon et al. 2013; Howse et al. 2003). As this ability is relevant to various crucial competences later on, this study further examines the reflective emotion regulation, focusing on the masking of emotional expression (Holodynski et al. 2013: 40–41).

So far, most of the studies on preschool children aimed at the masking of negative emotions (Cole 1986; Davis 1995; Garrett-Peters/Fox 2007; Hudson/Jacques 2014; Josephs 1994; Kieras et al. 2005; Kromm et al. 2015; Simonds et al. 2007; Tobin/Graziano 2011) by means of the disappointing gift paradigm of Saarni (1984), rather neglecting the masking of positive emotions such as pride (Reissland/Harris 1991) or schadenfreude (Baaken 2005). Thus, it is not yet clear to what extent preschool children can volitionally regulate the expression of positive emotions. In addition, previous studies on the reflective emotion regulation of expression were based only on verbal instructions. However, it is yet unclear to what extent the modality of instruction has an impact on the regulation of emotional expression. Thus, iconic and verbal instructions are contrasted in the present study.

1.1　The Reflective Emotion Regulation of Expression

Saarni et al. (1998) describe different causes for the reflective regulation of emotional expression in the sense that it might be necessary to volitionally inhibit or mask the impulse of showing the expression of an elicited emotion in order to satisfy one's motives and concerns in the long run (ib.: 278–280). These causes are: (1) *display rules,* either *cultural* (determining which emotion is appropriate and which is inappropriate in a certain situation based on a cultural consensus) or *personal* ones (referring to an individual feeling of adequate coping in an emotional situation), and (2) *direct deception* (the deliberate expression of a dissimulated emotional expression in order to mislead another

person and gain certain advantages or avoid certain disadvantages). Furthermore, according to Ekman/Friesen (1975), there are several expression management techniques that can be applied to regulate one's emotional expression: *qualification* (the element of a "nonfelt" emotion is added to the expression), *modulation* (the intensity of the expression is increased or decreased) and *falsification* (ib.: 140–143). The latter is in turn subdivided into three forms: (1) *simulation* (an expression is shown although no emotion is felt), (2) *neutralization* (no expression is shown although an emotion is felt) and (3) *masking* (a felt emotion is masked by the expression of a nonfelt one) (ib.: 141–143). Like previous studies on the regulation of emotional expression, the present study focuses on the masking technique.

1.2   Development of the Emotion Regulation of Expression

The ability to control one's emotional expression has already been reported for 4-year-olds (Carlson/Wang 2007; Cole 1986; Josephs 1994). However, there is no consensus if there is an age-correlated development during preschool. While some authors did not find an age effect (e.g. Cole 1986; Kieras et al. 2005; Tobin/Graziano 2011), others reported an improvement with increasing age in preschool age and beyond (Carlson/Wang 2007; Garrett-Peters/Fox 2007; Hudson/Jacques 2014; Kromm et al. 2015; Saarni 1984; Simonds et al. 2007). Most studies up to now have focused on the *spontaneous* control of emotional expression (i.e. without an explicit instruction to control an expression) based on the disappointing gift paradigm by Saarni (1984) and assessed the degree of regulation by means of an objective, standardized analysis of expression, for example the *Facial Action Coding System* (*FACS*) by Ekman/Friesen (1978), or by means of self-developed, simplified coding systems (e.g. Carlson/Wang 2007; Cole 1986; Saarni 1984). In other studies, however, participants were instructed to volitionally mislead a real or imagined counterpart in an interaction about their felt emotion, followed by analyses of the impression that the child's emotional expression induced in naïve observers (e.g. Feldman et al. 1979; Kromm et al. 2015; Visser et al. 2015). Feldman et al. (1979), for example, asked 6-, 13-, and 19-year-olds to deceive an interviewer by acting as if they had tasted a delicious drink, regardless of the actual taste. Naïve observers then rated how much the participants really liked their beverage, detecting the deception in 6-year-olds, but not in older participants, corroborating the assumption of an age effect beyond preschool age. However, the age differences between the three groups were very large and do not allow detailed conclusions concerning the development of reflective emotion regulation of expression in early to middle childhood. Kromm et al. (2015) adopted this method of subjective impression analysis in their study of 4- to 8-year-old children and found that, while 4-year-olds were not able to mislead naïve observers, 6- and 8-year-olds were able to create a convincing impression of joy. Following this study, reflective emotion regulation of expression appears to develop especially between the ages of 4 and 6 (ib.).

1.3   Modality of Instruction in Tasks on the Emotion Regulation of Expression

In previous studies on the reflective emotion regulation of expression (e.g. Davis 1995; Kromm et al. 2015), children were verbally instructed to display a (false) smile. However, the modality of instruction might influence children's regulation of emotional expres-

sion, as may be concluded from studies on the simulation of expression[1]. Some simulation studies applied verbal instructions, too, asking children to "make a face" of a certain emotion (Buck 1975; Gosselin et al. 2011; Lewis et al. 1987). Other simulation studies, in contrast, used iconic instructions, presenting photographed or videotaped emotional expressions and asking the children to produce emotional expressions on this basis (Ekman et al. 1980; Field/Walden 1982; Hamilton 1973; Odom/Lemond 1972). Some of these included supplementary conditions, e.g. using visual aids such as mirrors (Ekman et al. 1980; Field/Walden 1982; Hamilton 1973), additionally presenting verbal descriptions of the iconic material (Ekman et al. 1980), or verbally encouraging children to imitate the depicted target expression (ib.). Field/Walden (1982) compared the simulation of emotional expression of 3- to 5-yearold children in different instructional conditions, containing either only a verbal label of the target emotion, only a photograph of the respective emotional expression, or a combination of these two. Adult raters then categorized children's videotaped behavior, attributing the simulated emotion to children's expressions less often when children were solely given verbal labels (ib.). Thus, children were able to produce emotional expressions more precisely when they had corresponding photographs at their disposal (ib.). But what makes the difference between an iconic and a verbal instruction? First, according to Peirce's *sign theory* (Peirce 1903), while *icons* (i.e. pictures) directly denote an object, *symbols* (i.e. verbal labels) first have to be interpreted. Thus, the decoding of a verbal emotion label might represent a cognitive demand on its own, given that it has to be referred to a concept of the corresponding prototypical expression of this emotion by the child before he or she can actually show the respective expression (Holodynski 2006: 63–64; Peirce 1903). Second, according to the concept of *emotional contagion* and spontaneous motor mimicry of expression (Hatfield et al. 1994; Lundqvist/Dimberg 1995), individuals tend to automatically mimic facial expressions of others to "converge emotionally" (Hatfield et al. 1994: 154), resulting in a corresponding emotional experience. This spontaneous motor mimicry may also function in an emotional masking task when a child is provided with an iconic instruction in the form of a picture of the target expression, leading to a more accurate production of the target emotion as well as eliciting the corresponding emotion. In addition, according to Field/Walden (1982: 1309), when children are provided with verbal instructions about the target expression in an expression management task, they have to transform the verbal input into an associated expression stored in memory at first. These individual memories might elicit more idiosyncratic displays of the target expression than a photographed prototypical one, thus resulting in more miscategorizations in an impression analysis of naïve observers (ib.: 1309).

In summary, the concept of a spontaneous motor mimicry of observed expressions and the presented empirical results lead to the conclusion that the modality of instruction influences the masking of an emotional expression in a way that the iconic presentation of the target expression facilitates its display in comparison to a verbal instruction.

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1   In contrast to studies on the emotion regulation of expression, simulation studies focus on the mere production of an expression corresponding to a specific emotion and do not include a requirement to mask another emotion.

1.4   Emotional Valence in Tasks on the Emotion Regulation of Expression

While studies on emotion understanding and display rule knowledge often included tasks on the masking of negative as well as that of positive emotions (Holodynski 2004; Hudson/Jacques 2014; Josephs 1994; Kromm et al. 2015), studies on the emotion regulation of expression in preschool children generally applied the disappointing gift paradigm (Saarni 1984), thus focusing on the masking of negative emotions and disregarding that of positive ones (Baaken 2005; Cole 1986; Davis 1995; Garrett-Peters/Fox 2007; Hudson/Jacques 2014; Josephs 1994; Kieras et al. 2005; Simonds et al. 2007; Tobin/Graziano 2011). One exception is the study of Carlson/Wang (2007), who included a task on the reflective emotion regulation of a positive emotion, asking 4- to 6-year-old children to keep exciting news a secret. Results showed that the suppression of a positive emotion did not correlate significantly with neither age nor expressive behavior in a disappointing gift task. However, their operationalization of a successful reflective emotion regulation of a positive emotion was based on children's actual behavior (i.e. whether they gave away the secret or not), not on their emotional expression (ib.).

In contrast, studies on the development of pride examined the spontaneous control of emotional expression in pride-eliciting situations. Reissland/Harris (1991), for example, reported that by the age of 5, children spontaneously tried to neutralize or mask their pride after winning a competitive interaction in the presence of younger siblings. However, since their study did not include a condition triggering disappointment, no conclusions can be drawn with regard to the comparison of the two emotional valences (ib.). Studies on the simulation of emotional expression, on the other hand, detected that the positive expression of joy is produced more easily than other, negative emotional expressions (Buck 1975; Field/Walden 1982; Odom/Lemond 1972). Sadness, most of all, seems to be difficult to produce even for school children and adults (Ekman et al. 1980; Lewis et al. 1987). Gosselin et al. (2011) compared the simulation of joy to that of sadness and found that preschool as well as school children were more successful in producing a full expression of joy than that of sadness, concluding that positive expressions seem to be easier to simulate.

However, masking does not only include the simulation of a certain emotional expression but also a simultaneous inhibition of the expression corresponding to the emotion actually felt. Therefore, although the simulation of joy is more easily managed by preschool children than that of disappointment, it remains unclear how effectively children can inhibit their expression of felt joy in comparison to that of felt disappointment and, thus, whether these results are transferable to the reflective emotion regulation of expression where both, simulation and inhibition are required at the same time. In addition, the abovementioned studies on positive expressions were all based on an objective, standardized analysis of expression. Therefore, it is not yet clear whether children's positive expressions indeed would convince naïve observers as being genuine.

1.5   Aims and Hypotheses

The present study examines whether the quality of reflective emotion regulation of expression in 3- to 5-year-old children is influenced by the modality in which the experimenter instructs the child to mask his or her emotion (verbal vs. iconic), by the valence of the emotion that the child is supposed to mask (joy vs. disappointment), and by chil-

dren's age. For this purpose, children were instructed to display a predetermined emotional expression while opening a box that either contains a gift (gift trials) or not (no-gift trials). Assuming that gift trials elicit joy and that no-gift trials elicit disappointment, children's task was to mask their actually felt emotion.

(1) With regard to the impact of instructional modality, we expected children to mask their actually felt emotions more successfully after an iconic than after a verbal instruction following previous studies on the simulation of emotional expression. (2) As to a potential effect of emotional valence, no distinct hypothesis could be drawn from previous literature. Therefore, the corresponding analyses were accomplished in an explorative way. (3) Furthermore, we expected an improvement in the masking of emotional expression in the course of preschool age, reflected in a successful deceit of naïve observers of one's felt emotion by convincingly showing an opposed expression.

Congruent trials requiring no masking and no reflective emotion regulation of expression were implemented as control conditions where children could authentically display their felt emotions that should be recognized successfully by the naïve observers. (4) Thus, we expected naïve observers to attribute joy to the children in congruent gift trials and disappointment in congruent no-gift trials above the chance level of 33% (one hit out of three alternative qualities of emotion that the child may feel: disappointed, neutral, happy).

2 Methods

2.1 Participants

Twenty-three children (16 girls, 7 boys) participated in the study, of which 13 were 3;5 to 4;8 years old (M = 49.08 months, SD = 5.07 months) and 10 were 5;5 to 5;11 years old (M = 68.10 months, SD = 1.85 months). The children came from two urban preschools which can be described as middle class districts with single and multiple family houses in Münster, Germany. The main language spoken at home was German for all children (100%). Two children were from bilingual families (8.7%), additionally speaking Arabic respectively Russian.

2.2 Materials and Procedure

The present cross-sectional study consisted of the dice game of expression "Masquerade" and the subsequent subjective impression analysis of children's expressive behavior with adult naïve observers. Children's examinations took place in a separate room specifically equipped for the study at the respective preschool. The described procedures were part of a widespread data assessment, consisting of two experimental blocks.

2.2.1 Assessment of children's gift preferences

In order to ensure that the gift in the box did indeed elicit joy, each child was presented two different, colorful toys (a dinosaur and a teddy) and asked which one he or she liked best.

2.2.2 Dice game of expression "Masquerade"

Based on the modified disappointing gift paradigm by Kromm et al. (2015), we developed a social dice game to assess reflective emotion regulation of expression. As children seem to be equally disappointed by an unattractive gift and by no gift when they expect an attractive gift (Kromm et al. 2015: 592), we confined the experimental paradigm to empty boxes to elicit disappointment and boxes containing toys to elicit joy.

The experimenter outlined the course of the experiment, making sure that the child understood what he or she had to do by means of queries. She told each child that the two of them would now play the game "Masquerade" on a tablet computer that would work like a dice, at first deciding who would be allowed to open a gift box and then which emotion one should express when opening the box: *joy* or *sadness* (as an alternative, more usual label than *disappointment* for children). Thus, the task consisted of showing the expression of the emotion presented by the tablet computer, regardless of what the box actually contained. In order to increase children's motivation to show the intended expression, they were told that the boxes could contain toys that they were allowed to keep. In addition, the task was embedded in a guessing game to motivate the children to show the target expression which differed from the elicited emotion on four of six trials. If the target emotion was displayed so that the fellow player guessed it right, one could choose a candy out of a candy bowl.

Children were familiarized with the experimental procedure by means of two test trials (one for each emotional valence) that were not included in further analyses. These trials allowed the experimenter to check whether the child was able to simulate the two target expressions to a sufficient degree. If he or she was not able to do so, the experimenter told him or her to pout (i.e. to purse his or her lips) as an additional aid to display sadness respectively to smile to display joy. That served to ensure children's understanding of how the labels *sad* respectively *happy* looked like as a facial expression.

The instruction which emotion was to be expressed was presented iconically in one experimental block and verbally in the other experimental block. Children were randomly assigned to a specific order of experimental blocks, balanced for both age groups. Fourteen children (61%) were first instructed iconically and then verbally, while the other nine (39%) were instructed in reverse order. Since joy is more easily displayed than disappointment, the two emotional valences were arranged in a predetermined order so as to enable shy children to get involved in the task, thus always starting with the expression of joy.

Masking trials. To assess the ability to reflectively regulate an emotional expression for each of the two modalities of instruction, elicited emotion and target expression were opposed in four trials. Thus, children were to express disappointment when receiving a gift (*masked joy*) and joy when receiving no gift (*masked disappointment*), previously instructed iconically or verbally for each emotion.
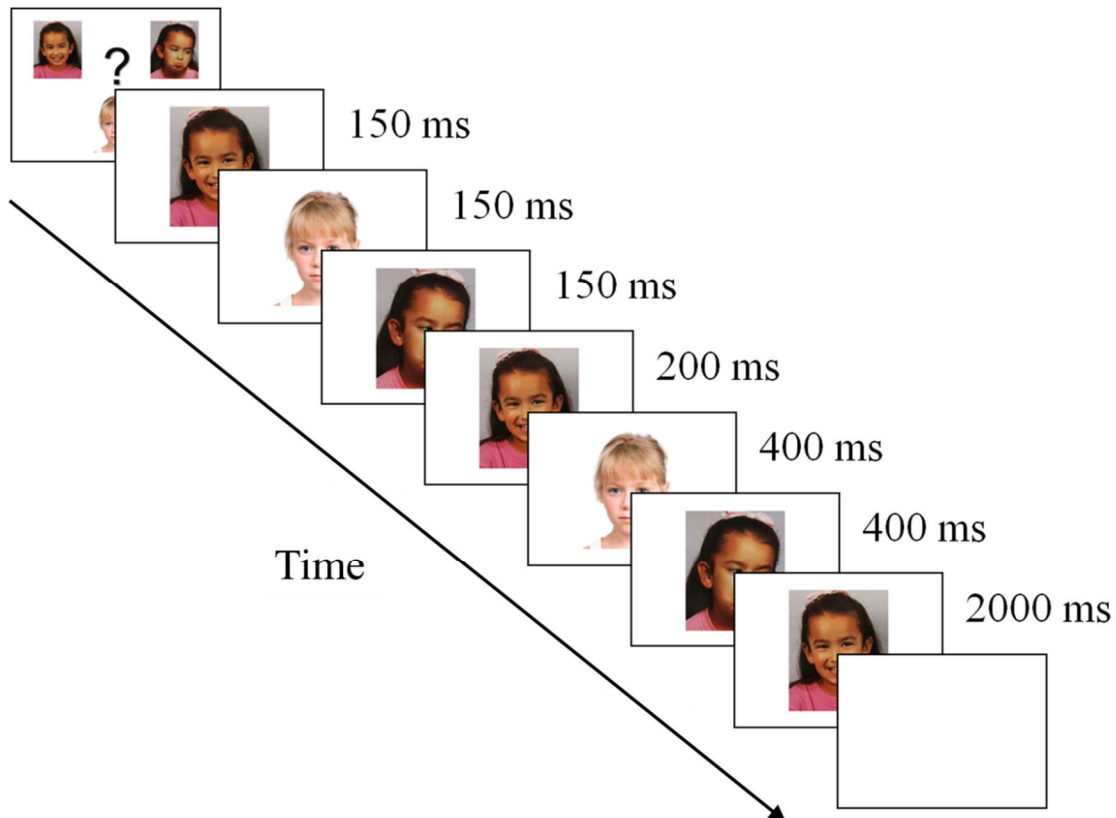
Iconic instructions. In these trials, target emotions were presented in form of photographs of happy, neutral[2], or sad facial expressions (ca. 10 x 13 cm) of boys or girls (depending on the sex of the participating child). Photographs had been taken from *Bigstock* (Shutterstock, Inc d/b/a Bigstock 2004–2016a, 2004–2016b), an online market-

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2   In the interaction with the child, the neutral facial expression was labeled as *normal* for both instruction modalities as an alternative, more common term than *neutral* for children.

place for stock images, and the "Feelings and Faces Games" (Lakeshore Learning Materials 1994). Each trial included the presentation of several photographs to elicit the impression that the game respectively the target expression was indeed decided by chance. However, the distractor photographs changed rather rapidly so that the child knew that this was only the "dicing procedure". Lastly, the target emotion appeared for 2 seconds, followed by a blank screen (to run parallel to the verbal instruction). The "dicing procedure" lasted for about 7 to 8 seconds and is illustrated for the target emotion joy in Figure 1.

Figure 1: Schematic illustration of a trial with an iconic instruction of the target emotion joy for girls

Source: Own representation.

Verbal instructions. In these trials, target emotions were presented by means of an audio recording of a female voice speaking different emotional labels aloud and in an emotionally neutral mode for about the same length as the iconic instructions, e.g. "*happy – normal – sad – happy*" for the target emotion of joy. Again, distractors were used to elicit the impression that the target expression was decided by chance. Analogous to trials with iconic instructions, children's task was to show the expression corresponding to the last-named emotion when opening the next box.

   Congruent trials. In two additional trials, elicited emotion and target expression were congruent, aiming at authentic expressions. Thus, children were to express joy when receiving a gift (*congruent joy*) and disappointment when receiving no gift (*congruent disappointment*). Since we did not assume that the modality of instruction had an impact on these trials, they were only instructed in either an iconic or a verbal way,

balanced for both age groups. Two-sample, two-tailed t-tests indeed yielded no significant differences between iconic and verbal instructions for neither joy nor disappointment ($t(16.22)= -0.09$, $p = .993$ resp. $t(21)= 0.40$, $p = .696$). Thus, further analyses of congruent trials based on the means of iconically and verbally instructed trials for each emotional valence.

2.2.3 Impression analysis

In order to examine how successful children are in volitionally masking their felt joy respectively disappointment, an impression analysis was carried out with adult naïve observers. This method can be regarded as a strong and ecologically valid test method, assessing to what extent a person is able to mislead naïve observers about his or her felt emotion by displaying an opposed expression. For that purpose, children's emotional expressions were videotaped during the experiment by using a hidden, remotely controlled video camera, angled so that a child's face and upper body were always seen frontally, whereas the content of the boxes could not be seen.

Preparation of the video material for the impression analysis. The 138 individual video episodes of the children's expressions during the dice game (6 trials x 23 children) were arranged in a pseudorandomized order, balanced with respect to condition, age, and sex (no more than five episodes of the same type in succession). No child appeared in two successive episodes. The duration of an episode was usually about 3 to 6 seconds. Each video episode started as soon as the child lifted the lid of a gift box and ended when the child closed the lid or when the emotional expression receded.

Sample of observers. 12 adults (six male, six female), undergraduate psychology students at the university of Münster aged between 22 and 33 years ($M = 26.50$, $SD = 3.12$), took part in the impression analysis. Afterwards, participants completed the "Emotional Competence Questionnaire" (*EKF*, Rindermann 2009), which is a self-report inventory of one's ability to recognize, express and regulate emotions that can be considered reliable (Cronbach's alpha coefficients of .88 to .92 for the four subscales; ib.: 42–43) and valid (ib.: 44–51). The subscale "recognition of emotion in others" was of particular interest, assessing the ability to recognize and understand feelings of others by means of verbal and nonverbal signals. Observers' mean standard score was 107.27 (*SD* = 8.84), indicating no deviation from the average of the normal population of the same age and sex. No observer had a standard score below average, and four observers (33%) had standard scores above average. Thus, all observers can be assumed as being able to recognize emotions in others on an average or above-average level. Participation in the study was voluntary and each participant received € 20.00.

Conducting the judgments. For each video episode in each block, the 12 naïve observers judged the quality of emotion the child seemed to experience (*disappointment [-1], neutral [0], joy [+1]*). Interrater-reliability was estimated by means of internal consistency analyses (with observers as items) for each of the six experimental conditions, indicating good to excellent consistency (Cronbach's alpha coefficients of .89 to .96, *Mdn* = .94).

For masking trials, the measures of interest were (a) the percentage of observers who categorized children's expression as disappointed when he or she had received a gift and the target emotion was disappointment, and (b) the percentage of observers who categorized children's expression as happy when he or she had received no gift and

the target emotion was joy. Thus, a successful reflective emotion regulation of expression was characterized by misleading naïve observers in such a way that they did not attribute the actually felt, but the target emotion to the respective video episode.

For congruent trials, the measures of interest were (a) the percentage of observers who categorized children's expression as happy when he or she had received a gift and the target emotion was joy, and (b) the percentage of observers who categorized children's expression as disappointed when he or she had received no gift and the target emotion was disappointment.

2.2.4   Manipulation check: self-report of felt emotion

In order to ensure that the intended emotion was elicited and that the present experimental paradigm did indeed require the masking of joy respectively disappointment, children were asked to state their actually felt emotion and its intensity after each opened box on a bipolar 5-point Likert-type emotion scale. The scale was introduced as an "emotion thermometer" and ranged from *very sad* (–2), *slightly sad* (–1), *neutral* (0) and *slightly happy* (+1) to *very happy* (+2). The measure of interest was the quality and the intensity of emotion that the child indicated.

3   Results
3.1   Impact of Instructional Modality, Emotional Valence and Age on the Reflective Emotion Regulation of Expression in Masking Trials

The means and standard deviations of attribution rates of gift trials to disappointment and of no-gift trials to joy are shown in Table 1.

Table 1: Attribution Rates (in %) of Gift Trials to Disappointment and of No-Gift Trials to Joy by 12 Naïve Observers for Masking Trials, Depending on Children's Age and Modality of Instruction

			Masked emotion			
			Joy[a]		Disappointment[b]	
Modality of instruction	Age	*n*	*M*	*SD*	*M*	*SD*
Iconic	3 to 4 years	13	41.03	42.00	30.77	32.70
	5 years	10	78.33***	29.44	40.83	32.02
Verbal	3 to 4 years	13	16.67	24.30	26.92	36.03
	5 years	10	62.50*	42.36	35.00	38.25

Note. p-values are based on one-sample one-tailed *t*-tests examining whether the mean attributions are significantly higher than the chance level of 33% (one hit out of three alternatives: disappointed, neutral, happy). * *p* < .05. ** *p* < .01. *** *p* < .001.
[a]Attribution rate of disappointment. [b]Attribution rate of joy.

Source: Own representation.

A 2 x 2 x 2 (Age [3- to 4-year-olds, 5-year-olds] x Modality of Instruction [iconic, verbal] x Emotional Valence [joy, disappointment]) repeated measurement ANOVA revealed a significant main effect of instructional modality in the expected direction (F(1, 21) = 6.24,

p = .021, η^2 = .23), with higher attribution rates to the respective target emotion in iconically instructed trials. This main effect did not interact neither with age (F(1, 21) = 0.11, p = .747, η^2 = .01) nor with valence (F(1, 21) = 1.29, p = .269, η^2 = .06). No second order interaction was found, F(1, 21) = 0.15, p = .699, η^2 = .01. In addition, a significant interaction effect of age and valence was revealed (F(1, 21) = 5.84, p = .025, η^2 = .22), as illustrated in Figure 2. Therefore, the significant main effects of age (F(1, 21) = 6.30, p = .020, η^2 = .23) and valence (F(1, 21) = 5.84, p = .025, η^2 = .22) cannot be interpreted independently. In order to examine the interaction effect between emotional valence and age, simple effect analyses were conducted. Comparing the two age groups, attribution rates of gift trials to disappointment were significantly higher for 5-year-olds compared to 3- to 4-year-olds (p = .002, Bonferroni-corrected). In contrast, no age-related difference was found for attribution rates of no-gift trials to joy (p = .486). Comparing the two emotional valences, a significant difference of attribution rates of trials to the respective target emotion was found for 5-year-olds (p = .004, Bonferroni-corrected), but not for 3- to 4-year-olds (p = 1.000).

Figure 2. Attribution of gift trials to disappointment and of no-gift trials to joy, depending on children's age
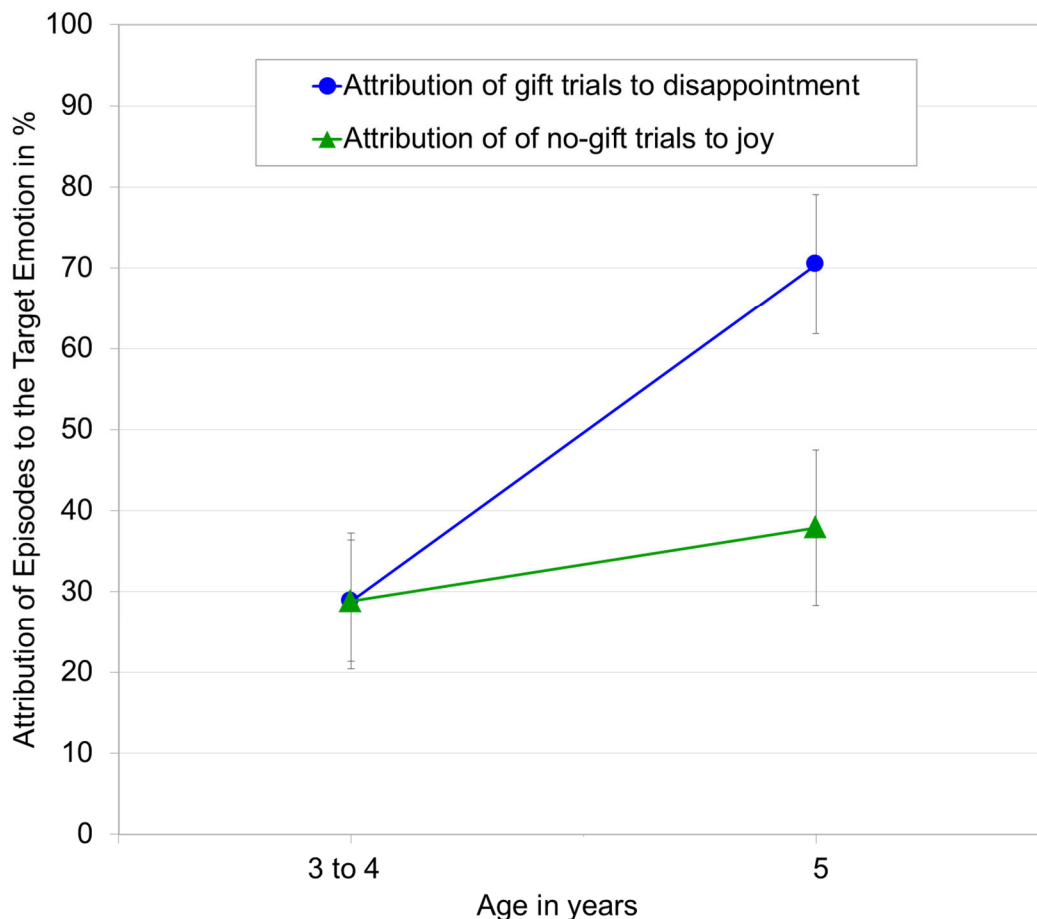
Source: Own representation.

In order to indicate a successful reflective emotion regulation of expression, one-sample one-tailed t-tests were conducted for each combination of instructional modality, emotional valence, and age group as to whether observer attribution rates to the respective target emotion were significantly higher than a hit rate that would be expected by chance (33% at one hit out of three alternatives: disappointed, neutral, happy). This analysis showed that, as expected, 3- to 4-year-olds were not able to mask neither their felt joy nor their felt disappointment since naïve observers attributed the respective target emotion to all four trials only below chance level (see Table 1 for p-value levels). In contrast, 5-year-olds successfully masked their joy by displaying a convincing expression of disappointment in gift-trials, leading to attribution rates to disappointment above chance level. In no-gift trials, however, even 5-year-olds were not able to successfully mask their disappointment, as naïve observers categorized their expression as happy only on chance level.

3.2 Authentic Emotional Expressions in Congruent Trials

As revealed by one-sample one-tailed t-tests, observers' attribution rates of gift trials to joy and of no-gift trials to disappointment in congruent trials were significantly higher than the hit rate of 33% that would be expected by chance (gift trials: $M = 61.96\%$, $SD = 33.69$, $t(22) = 4.12$, $p < .001$; no-gift trials: $M = 72.83\%$, $SD = 32.20$, $t(22) = 5.93$, $p < .001$). Thus, the children authentically expressed joy and disappointment in congruent trials that required no masking.

3.3 Manipulation Check

In masking trials, 82 % of the children reported having felt slightly or very happy at the sight of a gift when instructed iconically and 87 % when instructed verbally. In contrast, only 57 % of the children reported having felt slightly or very sad at the sight of no gift when instructed iconically and 70% when instructed verbally. In congruent trials, 91% of the children reported having felt slightly or very happy at the sight of a gift and 78% reported having felt slightly or very sad at the sight of no gift. Thus, almost all children stated to feel the emotion which was intended to be elicited (i.e. joy in the gift trials and disappointment in the no-gift trials).

One-sample one-tailed t-tests were conducted as to whether children's reported emotions significantly differed from a neutral emotional state (i.e. the scale mean zero). In masking trials, children's self-reports of emotions were significantly higher than zero in both gift trials, but they were significantly lower than zero in both no-gift trials only for 5-year-olds (for means, standard deviations and p-value levels, see Table 2). In congruent trials, children's self-reports of emotions were significantly higher than zero in the gift trial ($M = +1.83$, $SD = 0.58$, $t(22) = 15.20$, $p < .001$) and significantly lower than zero in the no-gift trial ($M = -1.38$, $SD = 1.02$, $t(20) = -6.18$, $p < .001$).

Table 2: Children's Self-Report of Felt Emotion for Masking Trials, Depending on Children's Age, Modality of Instruction and Valence of Masked Emotion

| Modality of instruction | Age | n | Masked emotion[a] | | | |
| | | | Joy | | Disappointment | |
			M	SD	M	SD
Iconic	3 to 4 years	13	1.38***	1.04	0.00	1.64
	5 years	9	1.67***	0.71	−1.22***	0.83
Verbal	3 to 4 years	13	1.62***	1.12	−0.62	1.56
	5 years	9	1.78***	0.67	−1.00**	0.87

Note. p-values are based on one-sample *t*-tests examining whether the mean self-reports are significantly different from 0 (*neutral*). * *p* < .05. ** *p* < .01. *** *p* < .001.
[a]The scale ranged from –2 (*very sad*) to 0 (*neutral*) to +2 (*very happy*).

Source: Own representation.

4 Discussion

The applied experimental and analytical design revealed an impact of instructional modality on children's reflective emotion regulation of expression, confirming hypothesis 1 (more successful masking after an iconic than after a verbal instruction). In addition, an interaction between emotional valence and age was found, suggesting a differential effect of emotional valence depending on children's age and thus corroborating hypothesis 2 (effect of emotional valence) and, in parts, hypothesis 3 (continuous improvement in the reflective emotion regulation of expression). Hypothesis 4, concerning children's authentic emotional expressions (attribution rates of gift-trials to joy and of no-gift trials to disappointment above the chance level of 33%), was confirmed by the analysis of congruent trials.

4.1 Impact of Instructional Modality in Masking Trials

As predicted by hypothesis 1, an iconic instruction improved children's ability to mask their felt emotion in comparison to a verbal instruction. When instructed iconically by means of photographed emotional expressions, children were more successful in misleading naïve observers about their actually felt emotion by convincingly showing an opposed expression than when instructed verbally by means of an emotional label. These findings are consistent with the study of Field/Walden (1982) on the simulation of emotional expression and confirm the benefits of an iconic instruction for the reflective emotion regulation of expression. With regard to the underlying mechanisms, two alternative explanations are possible. On the one hand, following Peirce's *sign theory* (1903), an iconic instruction provides children with a picture of the target facial expression with which they can immediately match their own expression, while a verbal instruction requires a mental translation from a symbolic code into an iconic code of expression (Holodynski 2006: 63–64). On the other hand, according to the concept of emotional contagion and spontaneous motor mimicry of expression (Hatfield et al. 1994; Lundqvist/Dimberg 1995), it may be assumed that the presented photographed emo-

tional expressions elicited an emotional contagion to a greater extent than the presented audio recording of a female voice speaking verbal labels of emotions, resulting in an emotional experience corresponding to the presented target emotion. In consequence, previous studies on the reflective emotion regulation of expression (e.g. Davis 1995; Kromm et al. 2015) might have underestimated children's ability to mask their emotion with an opposed emotional expression, using verbal instructions only. However, bearing in mind the rather small sample size of the present study, this finding should be further examined in future studies.

4.2   Impact of Emotional Valence in Masking Trials

With regard to an impact of emotional valence (hypothesis 2), an interaction of age and valence was revealed. Five-year-olds were able to mask their felt joy by showing an expression of disappointment more successfully than their felt disappointment by an expression of joy. However, this was not the case for 3- to 4-year-olds, who were not able to mask neither their joy nor their disappointment successfully. This seems to contradict the findings of previous literature on the simulation of emotional expression (Buck 1975; Field/Walden 1982; Gosselin et al. 2011; Odom/Lemond 1972) that positive expressions seem to be easier to simulate for preschool children than negative ones. However, as described above, the reflective regulation of emotional expression requires a simultaneous inhibition of the expression corresponding to the actually felt emotion, so that results on the simulation of emotional expression cannot be directly transferred to masking processes. According to the findings of the present study, the masking of disappointment by joy seems to be more difficult than the masking of joy by disappointment for 5-year-olds, while 3- to 4-year-olds are equally unsuccessful in masking both emotional valences. Beyond the difficulty of masking, the results of the 5-year-olds alternatively might be due to the analysis design applied in the present study, namely the impression analysis of naïve observers. Judging children's emotional expression, naïve adults might have an implicit attribution bias by taking young children's expressions of disappointment, namely a pout (that most of the 5-year-olds displayed), more seriously and authentically than expressions of joy, namely a smile. Therefore, when confronted with mixed expression signs of joy and disappointment in gift trials, the naïve observers might have trusted the signs of disappointment more than the signs of joy, thus being misleaded by the 5-year-olds. In no-gift trials, in contrast, that bias resulted in a successful detection of the felt disappointment. Three- to 4-year-olds, on the other hand, apparently were not able to display a requested target emotion at will, resulting in a quite unequivocal authentic expression of their felt emotion independent of the actual emotional valence. This bias may be beneficial in a psychological sense, making sure that children's negative expressions have a strong appeal on adults who feel obliged to take care of the "sad" child to protect him or her against potential threats. However, whether the revealed interaction of age and emotional valence should be ascribed to the children or to the naïve observers remains unclear. Further analyses of children's expressions by means of objective coding systems, such as the FACS (Ekman/Friesen 1978) as well as detailed interviews of the raters concerning the basis of their judgements, could shed further light on this matter.

4.3 Impact of Age in Masking Trials

Hypothesis 3, suggesting an improvement in the masking of emotional expression in the course of preschool age, was corroborated only in parts. Five-year-olds were indeed able to mask their felt joy by showing an expression of disappointment more successfully than 3- to 4-year-olds. However, whether this is due to an improvement in the simulation of disappointment or to that in the inhibition of joy, or even to a bias in naïve observers' perception of disappointment, cannot be answered with the present experimental and analytical design. There was no age effect for the masking of disappointment, with attribution rates of no-gift trials to the target emotion joy not differing significantly from chance level for both age groups. Thus, even older preschool children seem to experience difficulties when it comes to mask their disappointment and the respective development seems to take place at an older age. At first glance, this finding is not consistent with previous studies on the reflective emotion regulation of expression that applied the disappointing gift paradigm of Saarni (1984) or modified versions thereof and reported age-related trends for the masking of disappointment in the course of preschool (e.g. Carlson/Wang 2007; Kromm et al. 2015). However, while Carlson/Wang (2007) based their analysis of expression on the FACS by Ekman/Friesen (1978), the children in the study of Kromm et al. (2015) were older than those included in the present study, so that results are not directly comparable.

4.4 Authentic Emotional Expressions in Congruent Trials

As predicted by hypothesis 4, naïve observers attributed gift trials to joy and no-gift trials to disappointment above chance level when felt and target emotion were congruent. This indicates that, for one thing, children were able to express joy respectively disappointment to a sufficient degree in order to be recognized as such. For another, that implicates that naïve observers were able to recognize children's joy respectively disappointment successfully as such when displayed authentically in congruent trials of the dice game "Masquerade". In consequence, results concerning children's expressions in masking trials may be assumed as being valid.

4.5 Manipulation Check

In congruent trials, children reported having felt joy at the sight of a gift and disappointment at the sight of no gift at an intensity level significantly different from neutral. In masking trials, however, while children of both age groups reported a significantly intense joy at the sight of a gift, only 5-year-olds reported a significantly intense disappointment at the sight of no gift. In consequence, it can be assumed that gift episodes of the dice game "Masquerade" validly elicited joy and that thus masking gift trials indeed required the masking of an emotion. The same assumption, however, cannot be made for no-gift masking episodes without qualification. However, as some 3- to 4-year-olds even reported having felt slightly or very happy at the sight of no gift, it seems that the self-report of felt emotion had been influenced by the presentation of the respective target emotion. This may be due to a limited differentiation between emotion and expression in 4-year-olds (Cole 1986; Gross/Harris 1988; Josephs 1994; Pons et al. 2004; Rottleuthner-Lutter 1987), who might have linked the self-report to the expression that they had just shown rather than to their actually felt emotion. This effect has been ob-

served before in studies on the *facial feedback theory* with adults (McIntosh 1996; Soussignan 2002). Displaying an expression that opposed the actually felt emotion led to a diminished self-reported intensity of the felt emotion compared to a condition where no masking was required (ib.). Additionally, a limited capacity of children's working memory might have led to the unexpected self-reports due to the *recency effect* (Purves et al. 2008: 342–343) in a way that the target emotion "overwrote" the actually felt emotion, above all in younger children.

Overall, children reported a more intense joy in gift trials than disappointment in no-gift trials. The circumstance that positive emotions are induced with more intensity than negative ones seems to be a general effect that has been reported before (e.g. Holodynski 2004; Kortas-Hartmann 2013). In addition, as Kromm et al. (2015: 592) argued, an intense disappointment would rather be unexpected since the task applied does not aim at an extremely intense disappointment for ethical reasons.

4.6   Conclusions and Outlook

The findings from the present study make several contributions to the empirical state of research on the reflective regulation of emotional expression. First, a new experimental design has been shown to validly assess the reflective regulation of emotional expression in preschool children. Second, an impact of instructional modality was revealed, with children masking their actually felt emotion more effectively when instructed iconically than when instructed verbally beforehand. Third, an interaction of emotional valence and age was found, reflecting a more difficult masking of disappointment than that of joy for older preschool children. However, this study also raises some questions that require further investigation. With regard to the impacts of instructional modality and emotional valence, the analysis of the mechanisms underlying these effects needs further investigations. In addition, as the sample size of the present study was rather small, the experiment described in this study should be replicated, bearing in mind the new-risen questions and the suggestions as to how to answer them. Furthermore, as gender effects have been reported before in some studies on the spontaneous control of emotional expression (Baaken 2005; Cole 1986; Davis 1995; Garrett-Peters/Fox 2007), the potential influence of gender on the impacts of instructional modality and emotional valence should be addressed in future studies with larger sample sizes and a balanced proportion of girls and boys.

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