Preschoolers Acquire Emotion Categories Gradually

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Abstract

This study tested the idea that emotion categories -- *happiness*, *fear*, *anger*, and *sadness* -- narrow over the preschool years gradually. Acquisition of the corresponding label (e.g., *happy, scared*, etc.) does *not* mark an abrupt change. Children (N = 162, 2 to 5 years) were first given an opportunity to use emotion labels spontaneously for prototypical facial expressions of emotion. Next, the children was shown a box and asked to put all the, for example, scared people in it. Prior to spontaneous use of the label *scared*, children had already begun to exclude negative (e.g., anger) faces from the fear category: Narrowing began before the label was acquired but was far from complete. After the spontaneous use *scared*, children nevertheless continued to include anger faces in the box: Narrowing continued to be gradual; 'errors' decreased only gradually.

Introduction

Psychologists write of children 'acquiring' a word or concept, implying an either-or situation – as if 4-year-olds' use of the word *sacred* marks the acquisition of the concept of 'fear.'

- For example, in **fast mapping**, preschoolers are thought to acquire a word and its meaning after only a brief exposure (e.g., Carey & Bartlett, 1978; Heibeck & Markman, 1987; Markson & Bloom, 1997). Harris, Olthof, Meerum Terwogt, and Hardman (1987) proposed that children fast map the meaning of emotion labels.
  - Children begin using emotion labels before their second birthday (e.g., Ridgeway, Waters, Kuczaj, 1985), and their emotion vocabulary and spontaneous production increase through the preschool years (Wellman, Harris, Banerjee, & Sinclair, 1995).
- It may seem reasonable to assume that when children begin using an emotion label, they know what it means. But our thesis is that the label's meaning comes gradually, and that use of the label does not mark a transition from not knowing to knowing that meaning.
  - By *gradual*, we mean spread over a period of several years.

Experimental studies most commonly report only children's 'correct' responses – those that conformed to the experimenter's expectations – ignoring nonconforming responses as if they are meaningless or random.

We propose that children's nonconforming responses ('errors') are systematic and reveal the nature and breadth of their emotion categories:

- Analyses of 'errors' has revealed that children's early emotion categories are initially broader than adults', and narrow with experience (e.g., Bullock & Russell, 1986; Widen & Russell, 2003).
  - Thus, young preschoolers' have a category for feeling bad that they may label as 'angry,' but includes all negative emotions (e.g.,

anger, disgust, fear, sadness, etc.). For young children, *angry* has a much broader, more inclusive definition than it does for adults.

- With time and experience, this broad category narrows and other categories are acquired, until the adult taxonomy is achieved.

- ***The appearance of the concept's label in preschoolers' speech thus does not mark the acquisition of the concept, which started well before and continues long after.***

The Study

In this study, children (2 to 4 years) were given an opportunity to use emotion labels (they were shown prototypical facial expressions of the emotions, which for this age should be a potent cue to use of the appropriate label). They were then presented with a categorization task: They were shown a box, and told that only people who feel a certain way (e.g., happy) could go into the box. They were then shown eight facial expressions, one at a time, and asked to decide whether each face should go into (i.e., was a member of the target category), or stay out, of the box.

- The question of interest was whether using a particular label in the labeling task was a predictor of children's subsequent categorization.
  - If label use indicates that that children have acquired that emotion concept, then children who use, for example, *scared* in labeling should include all and only fear faces in the scared box, and scared faces should be excluded from all other boxes.
  - If label use is just one step on the way to acquiring the fear concept, then use of *scared* might not result in an abrupt exclusion of the fear face from the anger box, for example. Instead, the fear face should be gradually excluded from the anger box as children's concept of 'fear' becomes more complete.

Method

Participants

The participants were 162 (78 boys, 84 girls) children enrolled in daycares in the Greater Boston, MA area. All children were fluent in English.

Materials

There were three sets of materials. First, there were three color photographs of animals (one each of a cat, a dog, and a rabbit). Second, there were two sets of 5 black and white 5 x 7" photographs (one set posed by a boy, one set by a girl) of prototypical facial expressions of emotion (happiness, sadness, anger, fear, surprise, disgust). The original photographs were provided by Dr. Linda Camras (Camras, Grow, & Ribordy, 1983). Third, there were four sets of 8 facial expressions (surprise, excitement, happiness, contentment, sadness, disgust, anger, fear). Twenty-three of these facial expressions were selected from Ekman and Friesen's (1976) Pictures of Facial Affect; four from Matsumoto & Ekman's (1988) JACFEE collection; and five from our own collection.

Procedure Phase 1: Spontaneous Label Use

The study had two phases. In Phase 1, the experimenter first initiated a brief conversation about emotions in which each of the target emotion labels was introduced. The child was then invited to free labeled three animals, followed by two sets of six facial expressions (happiness, sadness, anger, fear, surprise, disgust). Children's responses to the facial expressions established their Labeling Level. The procedure for this Phase is described in Widen & Russell (2003). Labeling Level is an index of the number of different emotion labels that the child uses spontaneously in this task. Previous results show that children who use one label use *happy*; two labels *happy* plus either *angry* or *sad*; three labels *happy, sad,* and *angry*; and so on, as shown in Figure 1.

Procedure Phase 2: Categorization Task

Each child participated in four categorization trials, one each for happiness, sadness, anger, and fear. The trials were presented in different

random orders. The category was defined as a box into which only people who feel a certain way may go. On each trial, the child was shown a different set of eight facial expressions: one each of excitement, happiness, contentment, sadness, anger, fear, surprise, and disgust, presented in a random order. For example, on the happy trial, experimenter explained, "This is a special box. It is only for happy people, and only happy people can go in the box. All the other people go out here [pointing to spot on the table beside the box]." The experimenter then showed the child eight test photographs, one at a time in random order. For each test expression, the experimenter asked, "Is this person happy? Does she go in the happy box?" If the child did not answer both questions consistently (e.g., that a fear expression was *not* happy and should *not* go in the box), he or she was reminded of the rules, and the questions were repeated. Incorrect categorization was not corrected; all answers were mildly praised. A different box was used for each trial.

Labeling Level

To establish Labeling Level, we sorted all children, irrespective of age, by the number of labels they used. The order in which emotion labels were added to a child's labeling vocabulary followed a systematic order (as hypothesized by Widen & Russell, 2003) (see Figure 1). This model accounted for 77.8% of the sample

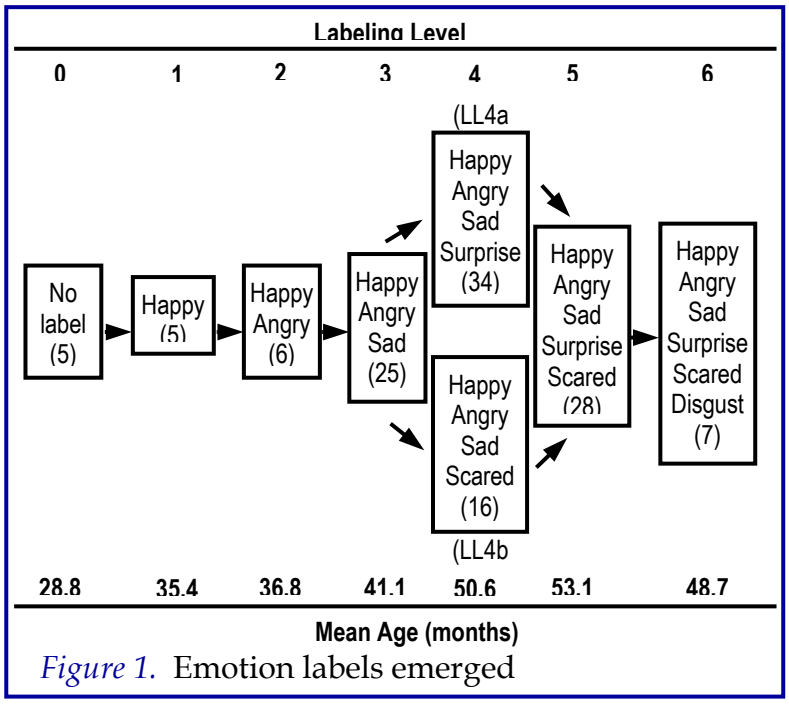

Figure 1. Emotion labels emerged

– a proportion significantly greater ($p < .001$) than the percentage expected by chance. (If, as the number of labels that children used increased, any label was as likely to be added as any other, then 22.1% would fit this pattern.) Within the model, the number of emotion labels used defines "Labeling Level." Widen & Russell (2003) hypothesized that Labeling Level was a measure of emotion understanding: Children at higher Labeling Levels are assumed to have a better understanding of emotion than children at lower Labeling Levels.

Results

Categorization

Narrowing. Four parallel multiple regressions (alpha = .05) were calculated. Labeling Level predicted performance on each box/category: Happy box, b = .43, $p < .001$; angry box, b = .60, $p < .001$; sad box, b = .41, $p < .001$; scared box, b = .49, $p < .001$. This result confirms two hypotheses: First, Labeling Level is a measure of children's level of emotion understanding. Second, emotion categories narrow as Labeling Level increases (see Figures 2, 3, and 4), and, by corollary, emotion categories narrow as emotion understanding improves.

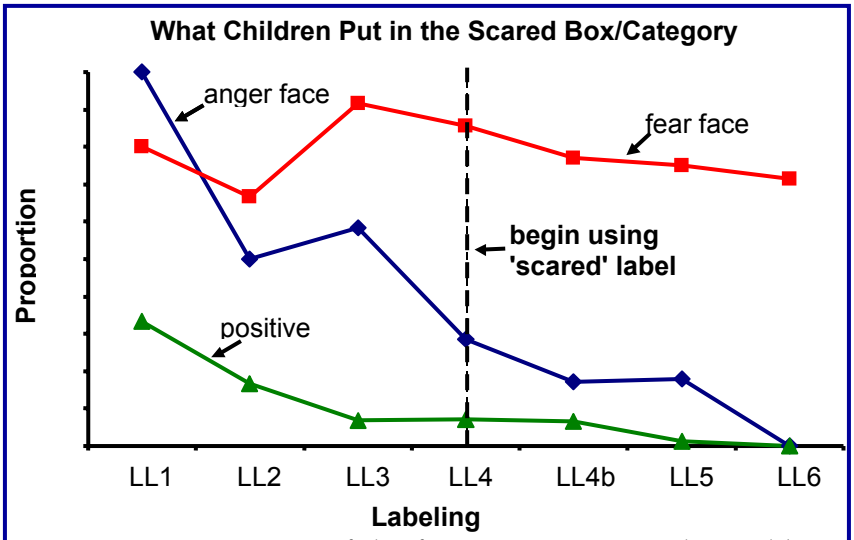

Figure 2. Narrowing of the fear category as indicated by the proportion of children at each labeling level who included the fear, anger and the positive faces in the scared box.

Effects of Spontaneous use of an Emotion Label. Consider the example of the word *scared*. Prior to the use of *scared* in labeling at Labeling Level 4, children's fear category was already narrowing (Figure 2). The proportion who included the anger face in the scared box decreased from 100% to 50%; and the proportion of children who included positive faces in the scared box decreased from 33% to 7%.

➢Does using *scared* result in the exclusion of all other faces from the scared box? Contrary to the fast mapping hypothesis, gradual narrowing continued when children began to use *scared* at Labeling Level 4 and higher. There was no abrupt exclusion of the anger face from the scared box. Indeed, not until Labeling Level 6 did all the children successfully exclude the anger face from the scared box.

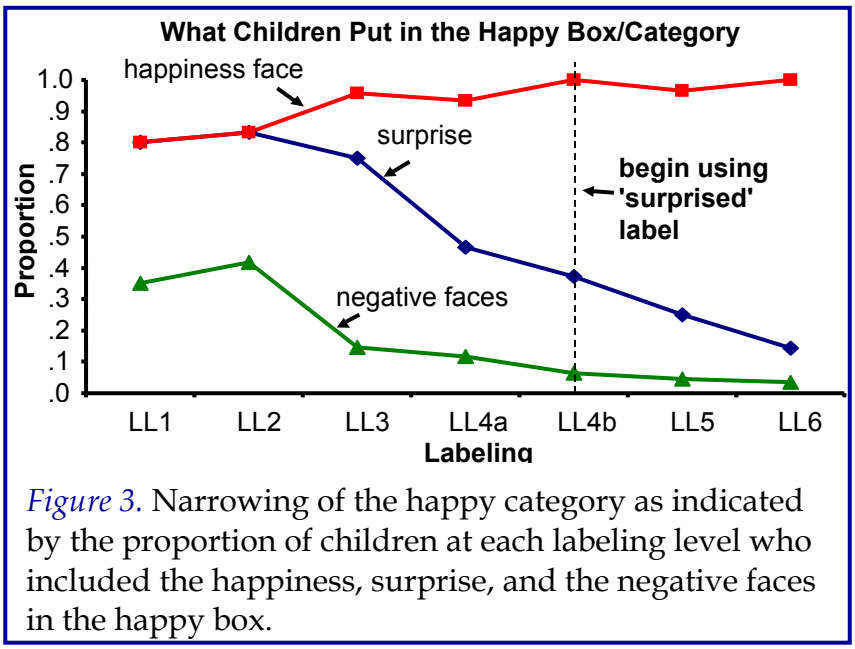

Figure 3. Narrowing of the happy category as indicated by the proportion of children at each labeling level who included the happiness, surprise, and the negative faces in the happy box.

Effect of Spontaneous Use of 'Surprised.' In parallel fashion, prior to the use of *surprised*, children had already begun to exclude the surprise face from the happy box/category: 25% and 53% of children at Labeling Level 3 and 4, respectively, excluded the surprise face (Figure 3). More than 85% of the children at these Labeling Levels excluded the negative faces – exclusion of surprise faces from the happiness category lags behind exclusion of negative faces, but has nonetheless begun.

➢ Does using *surprised* result in children recognizing that this face does not belong in the happiness category? At Labeling Level 4.5 when children do use *surprised*, more children (63%) excluded the surprise face, but still far fewer than excluded the negative faces. Exclusion of the surprise face from the happiness category was incomplete at Labeling Level 4.5, but continued at higher Levels.

Similar effects were observed for other faces and in the other boxes, with one exception: There was no evidence that children were excluding the disgust face from the anger category prior to using the *disgust* label (Figure 4). As illustrated by their increasing exclusion of the fear face, both prior to using *scared* in labeling and after, their anger category was narrowing gradually in regards to other faces. Indeed, the anger and disgust faces were treated similarly in the sad and scared boxes/categories as well, further suggesting that children treat these two faces as expressing the same emotion.

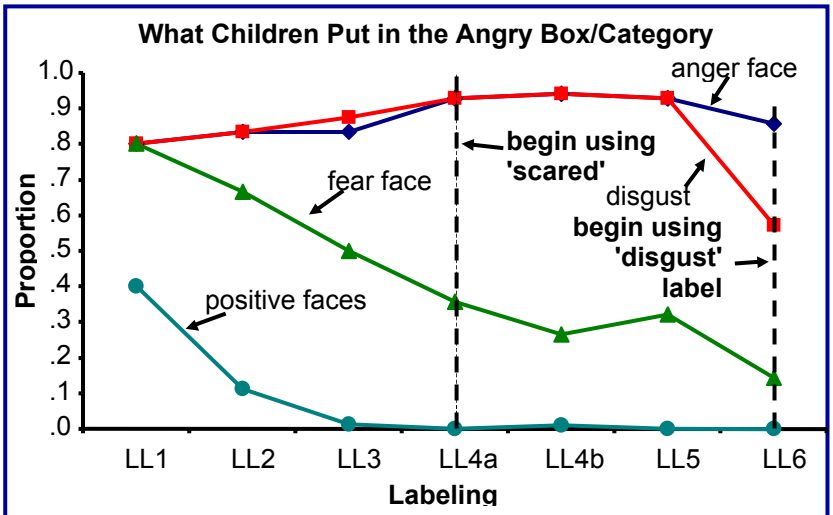

Figure 4. Narrowing of the anger category as indicated by the proportion of children at each labeling level who included the anger, fear, and the positive faces in the angry box. Children do not begin to exclude the disgust face until they begin to use the *disgusted* label. *Note*. Children at LL4a added *scared*; at LL4b, they added *surprised*.

Conclusions

This study demonstrated two important, counterintuitive, points about the development of children's emotion categories:

- Narrowing of emotion categories was gradual and began prior to label use.
- More surprisingly, given the fast mapping hypothesis, narrowing of emotion categories continued to be gradual even after an emotion label was acquired.

Spontaneous label use is but one step on the way to concept acquisition in two ways:

- Fist, acquisition of the target category label (e.g., *scared* on the fear trial) did not result in the abrupt exclusion of other faces (e.g., anger face) from the box/category.
- Second, acquisition of other emotion labels (e.g., *surprised* on the happiness trial) did not result the abrupt exclusion of the corresponding face (i.e., surprise face) from a nontarget box/category.

The one exception to this overall pattern of gradual narrowing was for the disgust face in the angry box/category: Children treated this face as an anger expression prior to Labeling Level 6, when they began using *disgusted*. After spontaneous use of disgusted, children still continued to place the disgust face in the anger box more often than not.

- This result could be an artifact of the cue to emotion that we used: Perhaps the disgust facial expression is more difficult to differentiate from the anger face than are other negative expressions, but children's understanding of other aspects of disgust (e.g., causes, consequences, behaviors etc.) may precede their recognition of this facial expression.
- On the other hand, the disgust category may emerge late-, as reflected by children's use of this label and categorization of the disgust face. Thus,

disgust would remain a part of the anger category longer than other negative emotions.

This is the first study to use Labeling Level as a predictor of children's performance on another emotion task. We relied on faces as the cue to emotion in the current study, on the grounds that 2- and 3-year-olds are most likely to understand and label facial expressions. Clearly, the results require replication and extension with other stimuli (e.g., stories) and other methods.

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