

5<sup>th</sup> World Conference on Educational Sciences - WCES 2013

## Emotion comprehension and divergent thinking: what's their relationship in developmental age?

Elisabetta Sagone <sup>a</sup>\*, Maria Elvira De Caroli <sup>a</sup>

<sup>a</sup>*Department of Educational Sciences, via Casa Nutrizione, 95124 Catania, Sicily (Italy)*

---

### Abstract

The aim of this study was to explore the relationship between emotion comprehension and divergent thinking in a group of Italian primary school children. We used the Test of emotion comprehension (Albanese & Molina, 2008) and Test of creative thinking (Williams, 1994). Results indicated that factors of divergent thinking had a negative impact on the components of emotion comprehension and, specifically, on those included in external and reflexive levels. Future research could deepen the role of creativity on other processes related to the emotions, such as empathy and prosocial behavior in developmental age.

© 2013 The Authors. Published by Elsevier Ltd.

Selection and/or peer-review under responsibility of Academic World Education and Research Center.

*Keywords:* Divergent thinking, emotion comprehension, developmental age;

---

### 1. Introduction

Creativity is one of the most salient process involved on the production of novelty and uniqueness (see Guilford, 1962; Torrance, 1974; Amabile, 1983; Sternberg & Lubart, 1999; Dacey & Lennon, 2000; Mumford, 2003; Sternberg, 2006; Runco, 2007). The framework of the present study for the analysis of divergent thinking is constituted by the Williams' model (1966), based on the description of four cognitive factors of divergent thinking (that is, fluency, flexibility, originality, and elaboration). Fluency is termed as the generation of wide number of ideas and production of meaningful responses; flexibility is linked to changing ideas passing from one category to another; originality is defined as the capacity to produce rare and infrequent ideas; finally, elaboration is considered as the capacity to develop, embellish, and enrich ideas with details.

The paradigm of Williams has been widely used to measure the factors of divergent thinking in Italian children and adolescents (De Caroli & Sagone, 2009) and in relation to mental synthesis process (also in learning disabled children: De Caroli & Sagone, 2010; in socio-cultural disadvantaged children: Sagone & De Caroli, 2011), shape collection (De Caroli, Licciardello & Sagone, 2011), personality factors (De Caroli & Sagone, 2009) and so on; however, little empirical evidences were found about the relationship between divergent thinking and components linked to emotion comprehension, that is considered one of the main aspects of development of emotional competence in children (Denham, 1998; Dunn, 2000; Hughes & Dunn, 1998; Saarni, 1999). Emotion understanding is the ability to identify the emotions of others from facial expressions and behaviours and to understand what emotions are likely to be elicited by common social situations (Hall, Geher & Brackett, 2004). This competence is articulated in expressiveness, knowledge, and regulation of emotions in relation to a given circumstance (Denham et al., 2003; Colwell & Hart, 2006). These competences are defined as the abilities to understand that certain situations

---

\* Corresponding Elisabetta Sagone. Tel.: +39-095-7466313

*E-mail address:* [esagone@unict.it](mailto:esagone@unict.it)

are connected with specific emotions represented by particular facial expressions to discern one's own and others' emotional states, and to be aware of one's own feelings, monitoring them and modifying them when necessary, so that emotions support coping in varying situations (Harris, 1994; Bartsch & Wellman, 1995; Harris et al., 1986). Emotion understanding begins to emerge in the preschool years and serves as the basis for social competence. Pons, Harris and de Rosnay (2004) proposed a hierarchical model to analyze the development of emotion comprehension in children from 3 to 10 years old. In external level (I phase), as from 3 years, children acquire the ability to recognize the facial expressions linked to happiness, sadness, fear, and anger, to understand the impact of external circumstances on expressed emotions and the role of desire in emotions. In mental level (II phase), around 5 years, children learn the role of beliefs and reminders on emotions, and the inconsistency between felt and externally expressed emotions; children understand that individuals can internally experience emotions that differ from those they intentionally display. Finally, in reflexive level (III phase), around 8-9 years, children develop the understanding that negative emotions arise from morally reprehensible behaviours while positive emotions derive from appreciable actions; they attain the mastery of the regulation of emotions (using adequate coping strategies) and the co-presence of mixed emotions in a given circumstance.

According to the developmental perspective, the main purpose of the current study was to examine the effects of age on divergent thinking and emotion comprehension and to analyze the possible relationships between the two aspects in Italian children.

## 2. Metodology

### 2.1. Participants

The sample of this study was constituted by 60 Italian children (30 boys and 30 girls) from 6 to 11 years (equally distributed in three age groups: 6-7 years, 8-9 years, and 10-11 years) and randomly recruited from two Public Primary Schools in Catania, Sicily (Italy). Parental consent was obtained before the start of investigation.

### 2.2. Measures and procedure

The Italian version of Test of Creative Thinking (TCT: Williams, 1994) was a protocol with 12 frames, containing incomplete graphic stimuli shown to children who were asked to draw a picture in order to complete each stimulus as they preferred. Four factors were measured in this test: fluency, flexibility, originality, and elaboration. The "fluency" score corresponded to the total number of meaningful pictures (range: 1-12 points). The "flexibility" score was calculated with the number of changes of ideas from one category to a different one (range: 1-11 points). The "originality" score was represented by the total number of pictures drawn inside or outside each stimulus (range: 1-36 points): one point was assigned to each picture drawn outside the stimuli, two points to each picture drawn inside the stimuli, and three points to each picture drawn both inside and outside the stimuli. The "elaboration" score was the number of asymmetric pictures drawn by children (range: 1-36 points): zero points were assigned to the symmetrical pictures, one point to the asymmetric pictures drawn outside the stimuli, two points to the asymmetric pictures inside the stimuli, and three points to the asymmetric pictures drawn both inside and outside the stimuli.

The Italian version of Test of Emotion Comprehension (TEC: Pons & Harris, 2000; Albanese & Molina, 2008) was used to evaluate the nine components of emotion understanding grouped in the three following levels: external (including *recognition*, *external causes*, and *reminders*), mental (including *beliefs*, *desires*, and *hiding*), and reflexive level (including *regulation*, *mixed emotions*, and *morality*). This test was composed by 23 cartoon scenarios for each of which children were asked to point to the facial expressions of the characters (consistently with sex of children) of short stories: they had the possibility to choose among four different emotional expressions (happy, angry, sad, and scared faces) and one neutral (just alright face). The nine components were presented in fixed order of difficulty, associated each with different cartoon scenarios.

- (I) *Recognition*: e.g., "Let's look at these four pictures and point to the girl (or boy) who feels happiness".

- (II) *External causes*: e.g., “This girl (or boy) is being chased by a monster. How is this boy (or girl) feeling?”.
- (III) *Desire*: e.g., “Christian likes Pringles while John hates Pringles. They found out that there is a pack of Pringles in a box. How is Christian feeling? Is he happy, sad, just alright, or scared? And how is John feeling? Is he happy, sad, just alright, or scared?”.
- (IV) *Beliefs*: e.g., “This is Alice’s rabbit and this is a fox willing to eat the rabbit. The fox is hidden behind the bushes by means of the flap; does Alice’s rabbit know that the fox is hiding behind the bushes? How is the rabbit feeling? Is he happy, just alright, angry or scared?”.
- (V) *Reminders*: e.g., “Alice is very sad because her rabbit was eaten by the fox. In the next day, Alice is looking at a photo of her friend Helen. How is Alice feeling? Is she happy, sad, just alright, or scared? And now Alice is looking at the photo of her rabbit. How is Alice feeling? Is she happy, sad, just alright, or scared?”.
- (VI) *Regulation*: e.g., “Alice is sad for the loss of her rabbit. What is the best way to stop sadness?”.
- (VII) *Hiding*: e.g., “Tom has lots of marbles while Daniel doesn’t have any. Daniel is smiling because he doesn’t want to show Tom how he is feeling inside. How is the really inside Daniel feeling? Is he happy, just alright, angry, or scared?”.
- (VIII) *Mixed emotions*: e.g., “Mary is looking at her new bicycle, but she thinks that she might hurt herself because she has never ridden a bicycle before. How is Mary feeling? Is she happy, sad and scared, happy and scared, or only scared?”.
- (IX) *Morality*: e.g., “George took chocolate biscuits without the permission of his friend’s mother and he decided to never confess this misdemeanor. How does George feel about that?”.

### 3. Results

*Factors of divergent thinking.* A 4 (factors of divergent thinking) X 3 (age groups) analysis of variance showed that the older children scored higher on originality and elaboration than the younger ones (Table 1). Pearson’s linear correlations among the factors of divergent thinking were analyzed for age groups: at 6-7 years, the more the children scored high on originality the more they obtained high scores on elaboration ( $r_{(20)}=.58, p=.008$ ); at 8-9 years, the more the children scored high on flexibility the more they scored high on originality ( $r_{(20)}=.56, p=.011$ ) and elaboration ( $r_{(20)}=.81, p<.001$ ) and, in addition, the more the children were original the more they were elaborative ( $r_{(20)}=.84, p<.001$ ); finally, at 10-11 years, the more the children obtained high scores on originality the more they scored high on elaboration ( $r_{(20)}=.69, p=.001$ ).

Table 1. Factors of divergent thinking: differences for age groups

Factors	Age groups	Means	Stand. Deviat.	F	Sig.
Originality	6-7 years	18.4	2.6	15.57	.000
	8-9 years	23.9	4.7		
	10-11 years	25.0	4.3		
Elaboration	6-7 years	8.2	2.1	10.70	.000
	8-9 years	13.3	6.5		
	10-11 years	15.7	5.8		

*Components of emotion comprehension.* A 3 (levels of emotion comprehension) X 3 (age groups) analysis of variance demonstrated that children were more able with the increase of age on external and reflexive levels (Table 2). Specifically, the older children scored higher than the younger ones on the components of reminders, mixed emotions, and morality. Pearson’s linear correlations were computed among levels of emotion comprehension in total sample: external level was correlated with reflexive one ( $r_{(60)}=.43, p=.001$ ). For age groups, data showed that, at 6-7 years, external level was correlated with reflexive one ( $r_{(20)}=.55, p=.011$ ) and, at 10-11 years, mental level was correlated with reflexive one ( $r_{(20)}=.49, p=.030$ ).

Table 2. Components of emotion comprehension: differences for age groups

Components	Age groups	Means	Stand. Deviat.	F	Sig.
Reminders	6-7 years	.50	.51	8.80	.000
	8-9 years	1.00	.00		
	10-11 years	.80	.41		
Mixed emotions	6-7 years	.20	.41	16.11	.000
	8-9 years	.70	.47		
	10-11 years	.90	.31		
Morality	6-7 years	.80	.41	3.21	.040
	8-9 years	.60	.50		
	10-11 years	.95	.39		
External level	6-7 years	2.30	.80	6.85	.002
	8-9 years	2.90	.31		
	10-11 years	2.80	.41		
Reflexive level	6-7 years	1.45	.51	18.76	.000
	8-9 years	1.75	.44		
	10-11 years	2.55	.76		

*Relationships between divergent thinking and emotion comprehension.* Pearson's linear correlations were analyzed between factors of divergent thinking and components of emotion comprehension. Results showed that, at 6-7 years, the more the children were flexible ( $r_{(20)} = -.51, p = .023$ ) and original ( $r_{(20)} = -.50, p = .03$ ), the less they were able on external level, and the more the children were fluent ( $r_{(20)} = -.46, p = .04$ ) and flexible ( $r_{(20)} = -.73, p < .001$ ), the less they were able on reflexive level; at 8-9 years, the more the children were elaborative ( $r_{(20)} = -.45, p = .04$ ), the less they were able on reflexive level. The deepening of these relationships, carried out by means of multiple hierarchical regressions with enter method, showed that flexibility negatively predicted external level ( $\beta = -.29, t = -2.38, p = .021$ ) with significant effects of age groups ( $\beta = .33, t = 2.21, p = .03$ ) ( $R = .47; R^2 = .22; F_{(5,59)} = 3.08, p = .02$ ); additionally, flexibility ( $\beta = -.19, t = -2.27, p = .03$ ) and originality ( $\beta = -.86, t = -5.98, p < .001$ ) negatively predicted reflexive level and elaboration ( $\beta = .57, t = 4.50, p < .001$ ) positively predicted reflexive level, with significant effects of age groups ( $\beta = .82, t = 8.42, p < .001$ ) ( $R = .82; R^2 = .66; F_{(5,59)} = 21.39, p < .001$ ).

#### 4. Conclusion

The purposes of this investigation were to examine the incidence of age on divergent thinking and emotion comprehension and the relationship between divergent thinking and emotion understanding in Italian schoolchildren. In relation to the first aim, results showed that, with the increasing of age, there was an improvement in the emotion understanding as previously found in Albanese and Molina's research (2008), Pons and colleagues' original study (2004), and in the performances linked to divergent thinking, as reported by De Caroli (2009), and Sagone and De Caroli (*in press*). In relation to the second aim, results demonstrated the significant and negative impact of divergent thinking on almost all components of emotion comprehension, specifically on the external and reflexive levels. This datum could be explained with the nature of the two tasks: the TEC required a convergent solution (that is, correct or wrong responses to the stimuli focused on the recognition of adequate emotions to a given situation), while the TCT assumed that the responses should be divergent and unfamiliar in relation to unstructured stimuli. This assumption could constitute the possible motive of the negative sign of the relationship between the two processes.

The findings of the current study suggested to replicate the analysis of this relationship in preschoolers and adolescents, using different measures of emotion understanding.

#### References

- Albanese, O., & Molina, P. (eds.). *Lo sviluppo della comprensione delle emozioni e la sua valutazione*. Milano: Unicopli, 2008.  
 Amabile, T. M. (1983). *The social psychology of creativity*. New York: Springer-Verlag.  
 Bartsch, K., & Wellman, H. M. (1995). *Children talk about the mind*. New York: Oxford University Press.

- Colwell, M., & Hart, S. (2006). Emotion framing: does it relate to children's emotion knowledge and social behavior?. *Early Child Development and Care*, 176, 591-603.
- Dacey, J., & Lennon, K. (2000). *Understanding creativity: the interplay of biological, psychological and social factors*. Buffalo, NY: Creative Education Foundation.
- De Caroli, M. E. (2009). *Pensare, essere, fare ... creativamente*. Milano: FrancoAngeli.
- De Caroli, M. E., Licciardello, O., & Sagone, E. (2011). Divergent Thinking and Shape Collections in Developmental Age. In O. Licciardello, S. Lombardo & V. Petrov (Eds.). *Experimental Art: Influence of Artistic Theory on Art Itself* (pp.401-408). Moscow: State Institute for Art Studies.
- De Caroli, M.E., & Sagone, E. (2010). Mental synthesis and creative thinking in learning disabled children. In G. Perez-Bustamante, K. Phusavat, & F. Ferreira (Eds.). *Proceedings presented to the IASK International Conference on Teaching and Learning 2010* (pp.272-279). Seville, Spain: IASK–International Association for Scientific Knowledge.
- Denham, S. A. (1998). *Emotional development in young children*. New York: Guilford Press.
- Denham, S. A., Blair, K. A., DeMulder, E., Levitas, J., Sawyer, K., Auerbach-Major, S., & Queenan, P. (2003). Preschool emotional competence: Pathway to social competence?. *Child Development*, 74, 238-256.
- Dunn, J. (2000). Mind-reading, emotion understanding, and relationship. *International Journal of Behavioral Development*, 24, 142-144.
- Guilford, J. P. (1962). Creativity: Its measurement and development. In J. J. Parnes and H. F. Harding (Eds.). *A source book for creative thinking* (pp.151-167). New York: Charles Scribners & Sons.
- Hall, S. E. K., Geher, G., & Brackett, M. A. (2004). The measurement of emotional intelligence in children: The case of reactive attachment disorder. In G. Geher. (Ed.). *Measurement of emotional intelligence* (pp.195-214). Hauppauge, NY: Nova Science Publishers.
- Harris, P.L. (2004). Pretending to be someone else. In L.A. Leavitt & D.M.B. Hall (Eds.). *Social and moral development: Emerging evidence on the toddler years* (pp.185-199). Johnson & Johnson Pediatric Institute.
- Harris, P. L., Donnelly, K., Guz, G. R., & Pitt-Watson, R. (1986). Children's understanding of the distinction between real and apparent emotion. *Child Development*, 57, 895-909.
- Hughes, C., & Dunn, J. (1998). Understanding mind and emotion: Longitudinal association with mental-state talk between young friends. *Developmental Psychology*, 34, 1026-1037.
- Mumford, M. D. (2003). Where have we been, where are we going? Taking stock in creativity research. *Creativity Research Journal*, 15, 107-120.
- Pons, F., & Harris, P. L. (2000). *Test of Emotion Comprehension*. Oxford: Oxford University Press.
- Pons, F., Harris, P. L., & de Rosnay, M. (2004). Emotion comprehension between 3 and 11 years: Developmental periods and hierarchical organization. *European Journal of Developmental Psychology*, 1, 127-152.
- Runco, M. A. (2007). *Creativity. Theories and Themes: Research, Development and Practice*. Amsterdam: Elsevier.
- Saarni C. (1999). *The development of emotional competence*. Guilford Press.
- Sagone, E., & De Caroli, M. E. (in press). The relationship between emotion comprehension and mental synthesis in developmental age. *Procedia – Social and Behavioral Sciences*.
- Sternberg, R. J. (2006). The nature of creativity. *Creativity Research Journal*, 18, 87-98.
- Sternberg, R. J., & Lubart, T. I. (1999). The concept of creativity: Prospects and Paradigms. In R.J. Sternberg (Ed.). *Handbook of Creativity* (pp. 3-16). London: Cambridge University Press.
- Torrance, E. P. (1974). *The Torrance Tests of Creative Thinking-Norms-Technical Manual Research, Edition-Verbal Tests, Forms A and B-Figural Tests, Forms A and B*. Princeton, NJ: Personnel Press.
- Williams, F.E. (1994). *Test della creatività e del pensiero divergente*. Trento: Centro Studi Erickson.