Development and Emotions: To what Extent Does the Valence of Emotions Felt in Art Appreciation Affect the Semiotic Strategies Used by Children to Appreciate and Interact with Art

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Abstract

Introduction: This study investigated the question of how children interact with art on cognitive and emotional levels. The first hypothesis predicted positive valence of emotion would be more associated with the semiotic strategy of perception. The second hypothesis predicted age would have a positive correlation with picking an emotionally mixed object. The third hypothesis predicted the number of semiotic strategies used when interacting with a single meaningful object would increase with age. Methods: 54 participants were recruited in pairs (65% female, 35% male). The study employed a mixed-methods, repeated-measures design. Participants were split into the Children group and the Teenagers group for some analyses. Participants were asked to choose a meaningful object to talk about with their peer. The experiment consisted of a pre-questionnaire phase, a conversation phase, and a post-questionnaire phase. Data analyzed was collected from the pre-questionnaire. Results: Positive valence of emotion had positive correlations with all semantic strategies, although the strongest and only statistically significant correlation was with imagination ($r = 0.548, p = .023$). Age was found to have a statistically significant correlation with experiencing negative emotions regarding the selected artwork ($r = 0.276, p = .044$) and a nonsignificant positive association with choosing an object that elicits negative emotions ($r = 0.197, p = .154$). Only participants in the Teenagers group exhibited a statistically positive association between their age and the number of cognitive strategies they used when engaging with their peers' object ($r = 0.507, p = .032$). Conclusions: Development plays an active role in how children approach and interact with meaningful objects in their lives.

Keywords: semiotic strategies, art appreciation, development, emotional valence, aesthetics

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"Humans make and enjoy art because it allows them to attribute form and meaning to their experience of life" (van Heusden, 2015)

Art is a crucial element through which people can give meaning to their experiences and explore their ideas on any subject, no matter how grand or menial (Gielen, 2015; van Dorsten, 2015; van Heusden, 2015). How people approach and construct meaning through art has been studied for centuries, across multiple disciplines, ranging from philosophy to cognitive sciences and psychology (Gielen, 2015; van Heusden, 2015, Pelowski et al., 2016). Pascal Gielen (2015) gives special distinction to the role of art education in children as particularly instrumental to their social development. Meaning-making and social cognition skills aid children in developing and understanding their social identity and is thus a crucial element of cultural education (Gielen, 2015). Gielen identifies art and play as the conduits through which humans construct and test the rules of their society. He connects art to human play behaviors, positing that both can be used as tools to help children grow into adaptable members of an ever-changing society. He believes art and culture education teachers are in the unique position in which they can "play the avant-garde artist", using art to teach children how to observe rules within society, to understand, stretch, and potentially break them (Gielen, 2015). Thus, it can be argued that the way children approach and respond to art, both cognitively and emotionally is of significant importance.

Research has been done about children's opinions on originality, intent, aesthetics, and evaluative judgements of art (see Goldstein, 2020 for a comprehensive literature review).

Nevertheless, little is known about whether and how children approach art that provokes negative emotions, or how those emotions affect their interactions with it. Although research shows children exhibit a steady growth in understanding and identifying emotions portrayed across art forms (Dalla Bella, 2001; Pouliou et al., 2018), Goldstein (2020) suggests that "It may not be that children have a maturational or inherent progression from less to more emotional understanding and comprehension from art, but rather they are simply learning the facts of their culture" (p. 778). This possibility exhibits the dearth of knowledge in the domain of children's artistic appreciation and their emotional understanding of art. Many models exist for the operationalization of an artistic experience, or art appreciation, but it can broadly be understood as an interaction between the person and the art object, in which characteristics of both the person (e.g. knowledge, preferences) and the artwork (e.g. style, content) interact to form the resulting evaluative judgements and emotions (Chamberlain, 2022).

Goldenstein's explanation of cultural growth deepening children's emotional understanding of art is one that is similar to the idea of *cognitive schemas for representation*, described by Menninghaus and colleagues in their *Distancing-Embracing Model of the Enjoyment of Negative Emotions in Art Reception* (2017). This model includes representation schemas as a factor enabling positive interactions with artworks which elicit negative emotions. The cultural facts children amass as they age form schemas, which in turn inform their expectations regarding cultural artifacts like film, literature and music. It is through the concept of cultural schemas that the Distancing-Embracing Model can be linked to van Heusden's theory of cultural cognition (van Heusden, 2015). This model introduces cognitive strategies that are each built on a foundation of acquired knowledge and underlie how humans interpret their reality (van Heusden, 2015). Each strategy is centered around the recognition, manipulation, or creation

of schemas. If schemas are built from memory and adapted as our knowledge grows, their development in children could impact how they form expectations of art, how they react to it emotionally, and how they think about it. This paper aims to make use of both of these models in order to explore the relationships between artwork-elicited emotions and the cognitive strategies children apply to make sense of them.

The Distancing-Embracing Model

Many models were developed to structure and understand how people interact with art. They accounted for affective, cognitive and physiological responses, for meaning-making and evaluative judgements, but most view negative affect resulting from art as an inherently negative outcome of the interaction with art, as something undesirable, a failure of processing or of understanding or a lack of synchrony between the artwork and the recipient of it (Pelowski et al., 2016). But if negative affect was truly an undesirable result of art engagement, then the enjoyment of genres of tragedy or horror would be seen as much more fringe than it is. The Distancing-Embracing Model was developed in response to the apparent paradox seen in people seeking out and engaging with artworks that provoke negative emotions for the apparent hedonic enjoyment of it (Menninghaus et al., 2017). Gielen describes this paradox using the example of the British rock group *Joy Division*, a band that linked "joyful" music with "depressing" lyrics and references to horrific parts of Europe's history (Gielen, 2015). He uses the group's music to illustrate a paradoxical "merging" of "acts and states of mind that were previously considered irreconcilable" (Gielen, 2015, p. 140). Historically, it was believed that it is the expectation of good feelings that drove the motivation to engage with the arts (Menninghaus, 2017). Current research suggests that our affective, that is, good or bad emotional reactions, inform our decision

making with regards to whether a particular stimulus is harmful or helpful and whether it is useful to approach it (Norris et at., 2010).

Norris and colleagues propose that the "dimensions of positivity and negativity are at least partially functionally separable" and should not be thought of as just two ends of a single bipolar spectrum (Norris et al., 2010). Many factors besides beauty can govern the observer's evaluations of both of these dimensions. Processing fluency, for example, has been theorized to be linked to hedonic liking and evaluative judgements (Reber et al., 1998; Westerman & Lanska, 2015; Winkielman et al., 2003). Winkielman and colleagues state that it is one of the first things our brains notice and therefore one of the first factors contributing to evaluative judgements (Winkielman et al., 2003). A series of experiments done by Landwehr & Eckmann (2020) demonstrate that processing fluency can both amplify existing judgements and skew judgements toward the positive end. The effect of processing fluency has been observed in children as well: "[...] as young as 6 months of age, infants already show stable preferences, preferring consonance over dissonance, infant-directed music, and music accompanied by synchronous movement" (Goldstein, 2020). Menninghaus and his colleagues attempt to solve the apparent paradox that is the hedonistic enjoyment of negative emotions in art reception with their Distancing-Embracing model (Menninghaus et al., 2017). Negative emotions have been shown time and again to have a positive effect on problem solving, attention, and memory (Menninghaus et al., 2017., Schmitt, 2020).

Distancing factors

The Distancing-Embracing Model's first group of factors is a collection of elements that all contribute to a cognitive distance between the observer and the observed. These are the elements of art experience that limit the power of a negative emotion on the psyche. They provide

emotional distance from the felt emotion and a feeling of control over it. Distancing factors can include very simple things, such as the fact that a person is choosing to engage with negatively-charged artwork of their own volition. A study by Andersen and colleagues (2020), for example, found that the factor most predictive of people's enjoyment in participating in a 'Haunted House' attraction was whether or not they attended on their own volition or were invited or pressured to participate by their family or friends. Other factors can include knowledge of representational schema, rules which tend to govern objects representing something in the real world, or fiction schema, which help people make predictions and form expectations on what they can reasonably experience when engaging with a certain art form.

Embracing factors

The second group of factors is one that makes negative emotions more appealing in and of themselves. These factors encourage seeking out art that provokes negative feelings with the goal of enhancing the experience. The ability to regulate emotions and experience mixed positive and negative emotions can greatly enhance the overall experience of art appreciation (Menninghaus, 2017). Another embracing factor are the pure aesthetic virtues of a piece, which have been shown to be positively correlated with both the enjoyment of an artwork and positive and negative valence ratings of it (Jakobson, 1960; Obermeier et al., 2016). Lastly, meaning-making is a powerful embracing factor as finding meaning in art can make the emotional experience more intense and fulfilling, regardless of valence (Menninghaus et al., 2017).

Van Heusden's Semiotic Strategies

Using the collective knowledge of human history, evolution, and development, van Heusden developed a model of semiotic, or sense-making, strategies that people use when

appraising art and cultural artifacts. This model will serve as foundation for the theoretical framework of this thesis, which will examine the extent to which the valence of emotions felt in art appreciation affect the semiotic strategies used by children. The Distancing-Embracing model, developed by Menninghaus and colleagues (2017), will be used to provide additional background to the emotion-directed approach chosen for this paper.

"Art is not an empirical quality of objects, (…) but of the cognitive activity that human beings can undertake with these objects" (van Heusden, 2015, p. 154). According to van Heusden (2015), art is made through interaction and interpretation, not any intrinsic physical properties. It is these cognitive abilities that underpin the workings of our culture and make up his framework of cultural cognition. These skills are organized according to two dimensions: the Piagetian categories of assimilation and accommodation (1954) and two types of memory: the concrete and the abstract (van Heusden, 2015). Piaget (1954) describes accommodation and assimilation as opposite ends of a spectrum which dictate how a person interacts with the world. "Culture, in the sense of cognition, is the basis for conscious human action. We need self-consciousness - a self-image, self-imagination, conceptualization and analysis - in order to act." (van Heusden, 2015). In his article *Arts education 'after the end of art'* (2015), van Heusden claims there are four basic strategies through which we make sense of human experience of the world, of the self and culture – of which art is a medium of expression. Namely, perception, imagination, conceptualization and analysis. And our human self-consciousness is constructed from these four strategies applied to the self.

Perception

Distinguishing current reality from past memory and using memory to guide interaction with reality. employing our senses to see, feel, hear, and otherwise become aware of an object, and our memories to identify it. We can recognize it, reflexively, based on its various features. Van Heusden classified it as an accommodative cultural skill, as it is our perception that accommodates perceived reality.

Imagination

Evolving from perception, imagination allows us to transpose an object into a new environment, a new state. putting the object in different contexts within one's mind, imagining new uses for it, new environments it would fit in and what it could do there. It is categorized under assimilation, as it takes an object in our environment and transposes it into a new, self-directed context, becomes used for our own purposes.

Conceptualization

This skill decides how the perceived object is fitted into an existing schema of the world. This strategy enables the perceiver to contrast and compare the object to other, similar objects. Once a person develops this strategy, it further allows them to make judgements on the value of an object based on its characteristics as compared to others of its kind. One can become aware of the many functions the object can serve in various contexts. This skill is categorized as assimilatory.

Analysis

The most abstract of the four strategies, this is the process through which people can think about how or why an object was made. It concerns the author's intentions behind their creations. Conclusions and ideas formed through analysis can then affect how people perceive the world around them, in turn, making the four semiotic strategies a recursive process that informs itself and grows in complexity with each recursion.

The present study

The present study will attempt to outline the connections between the two models (Figure 1), by studying the correlations between age, semiotic strategies and emotional responses exhibited by children. To this effect, this study employed a multi-method approach to investigate the following three hypotheses:

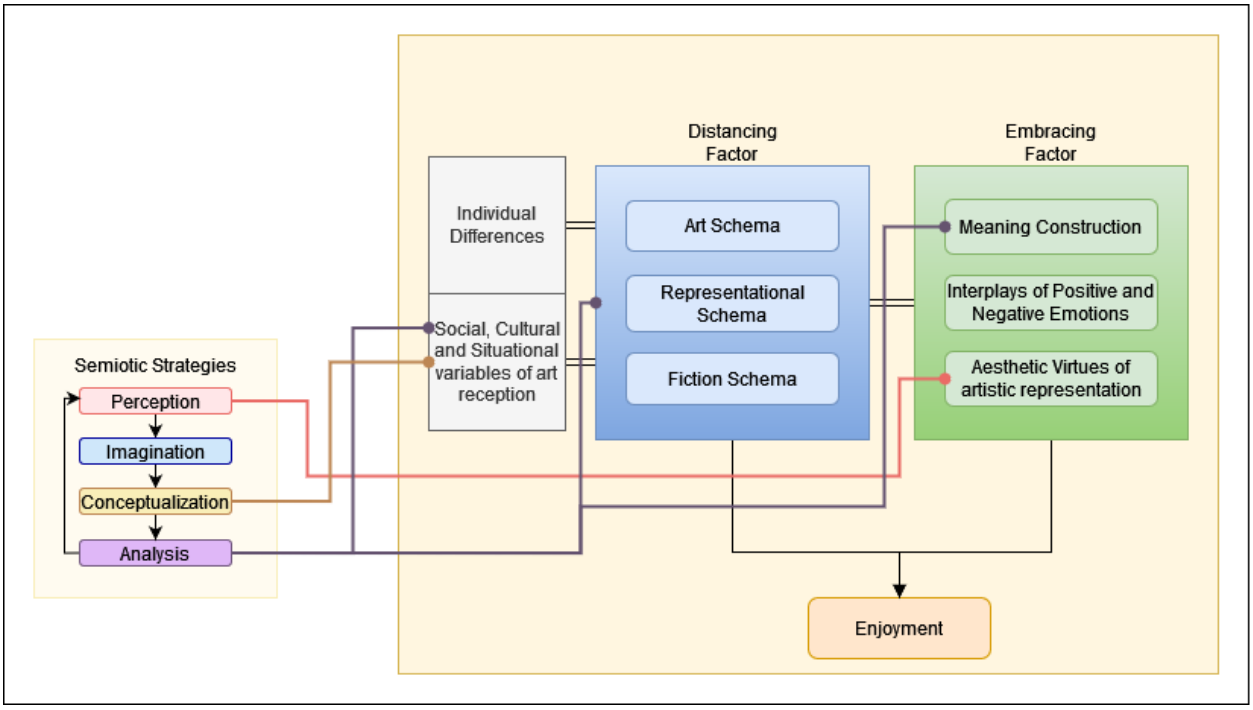
- **Hypothesis 1.** Positive emotions will be more strongly associated with Perceptual processing strategies than with any other semiotic strategy. As the least complex of the strategies, I expect situations where it is most salient will co-occur with emotions of a more positive valence. This is because the simplicity of an experience tends to lend itself to more favorable evaluative judgements of liking and pleasure (Landwehr & Eckmann, 2020; Menninghaus et al., 2019).
- **Hypothesis 2.** Younger children will be more likely to choose an object which elicits purely positive emotions. Younger children will have a weaker grasp on the more complex semiotic strategies (especially conceptualization and analysis) and more limited representational schema of art or genre. This will affect how well they can distance themselves from a work of art and, in turn, their ability to enjoy negative emotions in the

context of art. Their judgement of liking will be more determined by which objects make them feel good through what they represent and the meaning attached to them, rather than how the object was made or how well it represents its subject matter (Machotka, 1966).

- **Hypothesis 3.** The number of semiotic strategies used when interacting with a single meaningful object increases with age. Building on from the second hypothesis, a child's age is predicted to have an additive effect on the number of strategies they can employ, as evaluations of style, technique, and artistic intention, among others, have been shown to be predicated on development (Goldstein, 2020; Machotka, 1966).

Figure 1

The Distancing-Embracing Model (shortened) and the Four Semiotic Strategies



Methods

Participants

The sample consisted of 54 participants (27 dyads). Nineteen participants were male (35%) and 35 female (65%). Ages ranged from 6 to 17 (M = 10.65, SD = 3.33). Fifty-two participants spoke Dutch as a first language; two spoke English. A portion of the participants was recruited through convenience sampling within the network of the research group. Participants could also sign up through links provided on flyers and brochures distributed by the research team in schools and other educational and cultural institutions, as well as advertisements posted on various websites (e.g. Facebook, Instagram, LinkedIn). All prospective participants were asked to invite a peer, or a "buddy", to participate with them. Recruitment methods included advertisement through the Zpannend Zernike festival, as well as directly contacting parents and collaborating with both primary and secondary schools in the northern Netherlands, particularly Groningen. An incentive to participate was given in the form of a Pimm voucher of 10 euros offered to the participant. Participants were also given the choice to donate the money to a participating school instead.

Procedure

The study was approved by the Ethics Committee Behavioural and Social Sciences of the University of Groningen (PSY-2223-S-0252) and is in line with the Dutch ethical standards for scientific research. Before the experiment started, the participants (or their parents, if the child was younger than 16 years old) were asked to give their informed consent via the registration form, the survey was created using Qualtrics (https://www.qualtrics.com). The registration form asked for basic demographic information such as the participant's name, the name of their buddy as well as their relation to each other, and the language spoken. Included in the registration form was an instruction to indicate whether the participant preferred to participate in the experiment in the laboratory of the Ambulatorium of the University of Groningen, or in their home. In the cases

where participants were recruited through a collaborating school, the experimental setup was organized in a selected classroom. The laboratory was divided into two rooms: the experimental room, where the conversations were carried out, supervised by at least one researcher, and the control room, in which one researcher would oversee the recording, as well as troubleshoot any technical problems. When conducting the experiment off-site, the setup of the room mirrored that of the laboratory as closely as possible, with separation between the conversation space and the control station. The recording equipment was set up in such a way that no personal materials in the environment would be caught in the frame. The procedure can be divided into the preparation phase and the experimental phase (see Figure 1 for a brief overview of the phases).

Preparation Phase

As mentioned above, all prospective participants were required to participate in a dyad with a peer. Before the experiment, they were asked to choose an item with significant personal meaning (SI) and share a picture of said item (if applicable) with the researchers prior to the experiment, as well as to refrain from sharing what they chose with their partner. Once they finished the registration procedure, the participants, or their parents where appropriate, were provided with materials to help them conceptualize the reasons for their choice of significant item.

Figure 1

Summary of The Preparatory and Experimental Phases

Preparation	Experiment
1. invite a peer	1. First Questionnaire
2. choose a meaningful item	2. Conversation
3. Determine reasons behind the choice	3. Second Questionnaire

Experimental Phase

The experiment consisted of three parts: a pre-questionnaire, a recorded conversation between each dyad, and a post-questionnaire. The first section of the pre-questionnaire included questions on participant demographics (age, sex, relationship to the partner) as well as questions about their day-to-day interactions with various media (drawing, movies, dance, etc.). The following series of questions regarded the significant object. In order to prevent order effects, the order in which participants interacted with their own and their partner's items was manipulated. Participants were randomly assigned to group 1 (interacting with their own object first) or group 2 (interacting with their partner's object first) (Jhangiani et al., 2019). In this section, the participants were asked to first spend at least 30 seconds familiarizing themselves with the object in front of them (viewing, listening, manipulating it, etc.) before continuing with the questionnaire. Depending on their reading proficiency, the researcher provided assistance in filling out the questionnaire. The participants then exchanged their items and filled out the item-

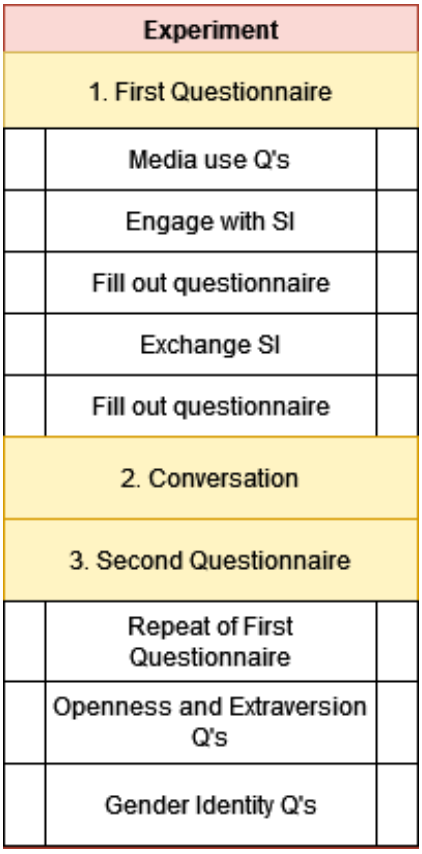
related questions again, this time with the other object in mind. The participants were then invited to the recording area of the room for the conversation phase.

In the conversation phase, participants were asked to talk about their chosen objects. A slideshow with a compilation of 11 conversation prompts was presented to foster the discussion (see Appendix A for the list). Each prompt had a window of two minutes for a discussion. Once the participants had settled for the conversation, the recording was started. When the conversation concluded, the participants completed the post-questionnaire.

The post-questionnaire repeated the object-related questions from the pre-questionnaire pertaining to both significant objects. They were followed by questions selected from the Big Five Questionnaire for Children (Muris, Meesters & Diederen, 2005), specifically those pertaining to the personality traits of Extraversion and Openness to Experience. Questions about the children's gender identity concluded the post-questionnaire part of the experiment phase. The data this paper is concerned with will be drawn from the pre-questionnaire, the first part of the experimental phase. For a graphic overview of the experimental phase, see Figure 2.

Figure 2

Summary of The Experimental Phase of the Study



Measures

Strategies

The four semiotic strategies were measured using ten questions, with complexity and wording adapted for each age bracket and graded using a Likert scale that varied between 1 (‘not at all’) to 3 ('very much’) in the children’s version of the questionnaire and 1-6 in the adolescent version. Media use preferences were recorder using eight internally-developed items.

The conversation phase was recorded via a 2-Logitech BRIO webcam. Video and audio file were synchronized with the main computer via Lab Streaming Layer technology (LSL). The audio recordings of the dyadic interactions were coded using the principles of Cognitive Discourse Analysis (Tenbrink, 2015). Based on the speech data transcript, the use of semiotic strategies (perception, imagination, conceptualization, analysis). Since the conversations were conducted using both English and Dutch, all transcripts were translated so that every conversation was available for analysis in either language.

Emotions

To better understand emotions with regard to artistic experiences, an adapted, age-appropriate Geneva Emotion Wheel (Scherer, 2005) was used, where participants could click on the emoji most representative of their emotion. Two selections could be made on a single emotion wheel. These selections would then be converted into measures of emotional valence, intensity and arousal. Embodiment of emotions was measured using the Body Sensation Maps (Schino et al., 2021).

Results

Questionnaire items regarding the use of semiotic strategies were adapted to fit the age of our participants. As such, the sample was split into two age groups: participants between the ages of six to eleven were assigned to the Children group ($n = 35$) and participants between the ages of twelve and seventeen were assigned to the Teenagers group ($n = 19$). All hypotheses regarding semiotic strategy use were tested separately using these groups. See Tables B1.1 and B1.2 in Appendix B for the descriptive statistics of each group's semiotic strategy choices.

Hypothesis 1

The first hypothesis predicted positive emotions to be more strongly associated with perceptual processing strategies while negative emotions to be more strongly associated with the other three strategies. It was tested using Pearson's correlation. No significant correlations were found in the Children sample. Emotional valence had a weak to moderate positive correlation with the number of strategies used ($r = 0.254, p = .147$), as did emotional intensity ($r = 0.321, p = .064$). Emotional valence was associated positively with all semiotic strategies, but most strongly with conceptualization ($r = 0.233, p = .191$), followed by perception ($r = 0.189, p = .183$) (Table 1).

When interacting with others' objects, no correlation was found between teenagers' emotion valence and the number of strategies they used ($r = 0.008, p = .975$). Intensity of emotions showed a weak nonsignificant correlation with strategy use ($r = 0.136, p = .592$). In contrast, when interacting with their own objects, both emotional valence and intensity had a moderate, though still nonsignificant, positive association with the number of strategies used ($r = 0.39, p = .109$ and $r = 0.399, p = .101$, respectively), as well as a moderate effect size ($z = 0.412$ and $z = 0.423$). Among teenagers, emotional valence was most strongly correlated with imagination ($r = 0.548, p = .023$), followed by perception ($r = 0.319, p = .267$) (Table 2). In both groups, scores in all semantic strategies were positively associated with emotional valence, and although the association between perception and emotional valence was second strongest in both groups, this data is sufficient grounds to reject the first hypothesis.

Table 1

Correlation: Children's Emotional Valence x Semiotic Strategy Scores (Own Object)

Variable		Valence
1. Valence	Pearson's r	—
	p-value	—
	Effect size (Fisher's z)	—
	SE Effect size	—
2. Perceptual	Pearson's r	0.189
	p-value	0.293
	Effect size (Fisher's z)	0.191
	SE Effect size	0.183
3. Imagination	Pearson's r	0.177
	p-value	0.323
	Effect size (Fisher's z)	0.179
	SE Effect size	0.183
4. Conceptualization	Pearson's r	0.233
	p-value	0.191
	Effect size (Fisher's z)	0.238
	SE Effect size	0.183
5. Analytical	Pearson's r	0.174
	p-value	0.334
	Effect size (Fisher's z)	0.175
	SE Effect size	0.183

Note: Conditioned on variables: Age

Table 2

Correlation Teenager's Emotional Valence x Semiotic Strategy Scores (Own Object)

Variable		Self_Valence
1. Valence	Pearson's r	—
	p-value	—
	Effect size (Fisher's z)	—
	SE Effect size	—
2. Perceptual	Pearson's r	0.319
	p-value	0.212
	Effect size (Fisher's z)	0.330
	SE Effect size	0.267
3. Imagination	Pearson's r	0.548*
	p-value	0.023
	Effect size (Fisher's z)	0.616
	SE Effect size	0.267
4. Conceptualization	Pearson's r	0.278
	p-value	0.280
	Effect size (Fisher's z)	0.286
	SE Effect size	0.267
5. Analytical	Pearson's r	0.315
	p-value	0.218
	Effect size (Fisher's z)	0.326
	SE Effect size	0.267

Note: Conditioned on variables: Age
** $p < .05$*

Hypothesis 2

Hypothesis 2 predicted older children were more likely to select objects that elicit negative emotions in them. Across both groups, a total of 106 emotions were reported before the

conversation phase of the study. Art-elicited negative emotions were reported 18 times of those 106 (16.98%). A correlation analysis revealed a weak, but statistically significant association between age and a negative emotional response to an artwork before objects were exchanged for the first time ($r = 0.276, p = .044$), as well as a weaker positive association between age and negative feelings felt in response to a participant's own object ($r = 0.197, p = .154$) (Table 3). A visual inspection of the scatter plots of these associations reveals the fragility of this association due to the limited number of data points (Figure 4).

Table 3

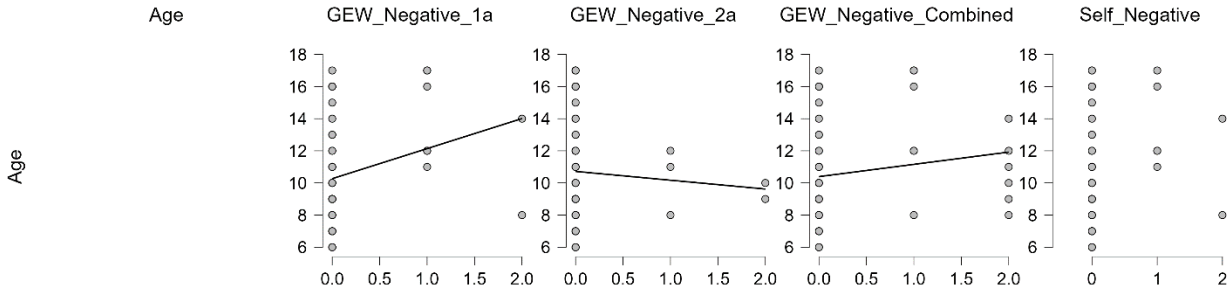
Correlation All: Age x GEW Negative emoticon selection

Variable		Age
1. Age	Pearson's r	—
	p-value	—
	Effect size (Fisher's z)	—
	SE Effect size	—
2. GEW_Negative_1a	Pearson's r	0.276 *
	p-value	0.044
	Effect size (Fisher's z)	0.283
	SE Effect size	0.140
3. GEW_Negative_2a	Pearson's r	-0.072
	p-value	0.606
	Effect size (Fisher's z)	-0.072
	SE Effect size	0.140
4. GEW_Negative_Combined	Pearson's r	0.154
	p-value	0.265
	Effect size (Fisher's z)	0.156
	SE Effect size	0.140
5. Self_Negative	Pearson's r	0.197
	p-value	0.154
	Effect size (Fisher's z)	0.199
	SE Effect size	0.140

** $p < .05$*

Figure 4

Correlation Scatterplots All: Age x GEW Negative emoticon selection



Further investigation of this relationship using Chi square distribution returned $\chi^2(2, N = 54) = 5.196, p = .074$ (see Table 4 for the contingency table). On the basis of these results, the second hypothesis cannot be rejected. It is important to note that, due to insufficient counts in certain cells of the contingency table below (Table 4), the conditions for a reliable Chi-square test may not be met (Agresti, 2018). Taking into account both the scatter plot data and the results of the Chi-square test, a more robust study with a larger sample size is needed to gather conclusive evidence in support of the second hypothesis.

Table 4

Contingency Tables: Age on Selecting a Negative Object

	Age Category		
Self_Negative	Child	Teen	Total
0	33	14	47
1	1	4	5
2	1	1	2
Total	35	19	54

Hypothesis 3

The third hypothesis predicted the use of strategies when interacting with a meaningful object would increase with age. Strategy use was measured by summing the scores on each strategy question, regardless of strategy type, into a cumulative score, ranging from 10 to 30 in children and 10 to 50 in teenagers. This score was recorded in two variables, indicating whether the strategies were used when interacting with the participant's own object (Self_Strategies_Total) or that of their partner (Other_Strategies_Total).

The mean score in the Children group was 20.14, with a standard deviation of 4.44 when interacting with their own objects. When interacting with their partner's object, mean of strategy use was 18.28, with a standard deviation of 4.03. The Teenage group produced a mean of 32.72, with a standard deviation of 9.66 (Self_Strategies_Total), and 29.44, with a standard deviation of 6.96 (Other_Strategies_Total) (see Tables B3.1 and B3.2 in Appendix B for a full descriptive analysis). The Shapiro-Wilk test of normality revealed no significant deviations from normality in either group (see Tables B3.1 and B3.2 in Appendix B for a full descriptive analysis). A correlation analysis was performed for both groups. The Children group revealed very weak positive associations between age and strategy use in both the own-object and other's-object scenarios ($r = 0.023, p = .893,\ r = 0.056, p = .747$ respectively), neither statistically significant. The Teenagers group returned moderately strong, positive associations between the same variables: a correlation of $r = 0.419, p = .084$ between age and strategy use for their own object and $r = 0.507, p = .032$ between age and strategy use for their partner's object (see Tables 5 and 6).

Table 5

Correlation Children Age x Strategies (Self) x Strategies (Other)

Variable		Age
1. Age	Pearson's r	—
	p-value	—
	Effect size (Fisher's z)	—
	SE Effect size	—
2. Strategies (Self)	Pearson's r	0.023
	p-value	0.893
	Effect size (Fisher's z)	0.023
	SE Effect size	0.174
3. Strategies (Other)	Pearson's r	0.056
	p-value	0.747
	Effect size (Fisher's z)	0.056
	SE Effect size	0.174

Table 6

Correlation Teenagers Age x Strategies (Self) x Strategies (Other)

Variable		Age
1. Age	Pearson's r	—
	p-value	—
	Effect size (Fisher's z)	—
	SE Effect size	—
2. Strategies (Self)	Pearson's r	0.419
	p-value	0.084
	Effect size (Fisher's z)	0.446
	SE Effect size	0.258
3. Strategies (Other)	Pearson's r	0.507*
	p-value	0.032
	Effect size (Fisher's z)	0.559
	SE Effect size	0.258

** $p < .05$*

Following these tests, a linear regression analysis was conducted in both the Children and Teenagers groups. Each group was further split into two categories: data of the participant's strategy use regarding their own objects (Own Object) and data of the participant's strategy use regarding the object brought in by their "buddy" (Other's Object). Strategy use (Own or Other's) was set as the dependent variable. Age was used as the independent variable in both conditions. Tables seven and eight concern interactions with the participants' own objects, while tables nine and ten concern interactions with the partners' objects.

No significant change to the null model was found in the Children's group in either analysis (Table 7, Table 9). In both Children groups, a 95% confidence interval of the coefficient *Age* included zero, further confirming the lack of association between the two variables (Table 8,

Table 10). The F value and R^2-change statistic give no indication that age has any effect on strategy use in this group, discrediting the third hypothesis.

Table 7

Model Summary, Children: Age on Strategies (Own Object)

Model	R	R^2	Adjusted R^2	RMSE	R^2 Change	F Change	df1	df2	p
H_0	0.000	0.000	0.000	4.441	0.000		0	35	
H_1	0.023	0.001	-0.029	4.505	0.001	0.018	1	34	0.893

Table 8

Coefficients, Children: Age on Strategies (Own Object)

							95% CI	
Model		Unstandardized	Standard Error	Standardized	t	p	Lower	Upper
H_0	(Intercept)	20.139	0.740		27.208	< .001	18.636	21.642
H_1	(Intercept)	19.584	4.163		4.704	< .001	11.123	28.044
	Age	0.064	0.474	0.023	0.136	0.893	-0.899	1.028

Table 9

Model Summary, Children: Age on Strategies (Other's Object)

Model	R	R^2	Adjusted R^2	RMSE	R^2 Change	F Change	df1	df2	p
H_0	0.000	0.000	0.000	4.026	0.000		0	35	
H_1	0.056	0.003	-0.026	4.078	0.003	0.106	1	34	0.747

Table 10

Coefficients, Children: Age on Strategies (Other's Object)

Model		Unstandardized	Standard Error	Standardized	t	p	95% CI Lower	95% CI Upper
H_0	(Intercept)	18.278	0.671		27.242	< .001	16.916	19.640
H_1	(Intercept)	17.071	3.769		4.529	< .001	9.412	24.731
	Age	0.140	0.429	0.056	0.325	0.747	-0.732	1.012

In the Teenager group, linear regression analysis with Self_Strategies_Total as the dependent variable and Age as the covariate yielded an F-value of $F(1,16) = 3.405, p = .084$. The R^2-change statistic was 0.175, suggesting age accounted for a small amount of explained variance (Table 13), although the result was not statistically significant. Residuals showed a normal distribution on a Q-Q plot and no pattern on a residual plot. No outliers were detected using Cook's distance of 1 or correlation scatterplots. When the dependent variable was changed to Other_Strategies_Total, the results yielded a statistically significant value of $F(1,16) = 5.541, p = .032$, with R^2-change statistic of 0.257 (Table 14). This implies age explained a larger proportion of variance in the sample when teenagers were appraising their peer's objects. No violations of assumptions were detected. Thus, in the Teenagers group, there is some support for the hypothesis that age and incidence of semiotic strategies have a positive association with each other, on the condition that the object is not the participant's own.

Table 13

Model Summary, Teenagers: Age on Strategies (Own Object)

Model	R	R^2	Adjusted R^2	RMSE	R^2 Change	F Change	df1	df2	p
H_0	0.000	0.000	0.000	9.658	0.000		0	17	
H_1	0.419	0.175	0.124	9.040	0.175	3.405	1	16	0.084

Table 14

Model Summary, Teenagers: Age on Strategies (Other's Object)

Model	R	R^2	Adjusted R^2	RMSE	R^2 Change	F Change	df1	df2	p
H_0	0.000	0.000	0.000	6.964	0.000		0	17	
H_1	0.507	0.257	0.211	6.187	0.257	5.541	1	16	0.032

Additionally, a matched pairs t-test was conducted to determine whether there was a difference between the number of strategies used for one's own object and for the object of one's partner. The first mean was Self_Strategy_Total, the second mean was Other_Strategy_Total and the alternative hypothesis was $Ha: x_1 > x_2$. Violation of the normality assumption was tested for both groups using the Shapiro-Wilk test of normality ($W = 0.946, p = .371$ in the Teenager group and $W = 0.943, p = .061$ in the Children group). Among the teenagers of our sample, there was a higher endorsement of various semantic strategies for one's own object than that of one's partner ($t(17) = 2.394, p = .014$). The same phenomenon occurred in the Children group (Figure 5 and Figure 6), similarly significant ($t(35) = 2.771, p = 0.004$). Another set of matched pairs t-tests revealed that while the children group seemed robust against order effects,

the number of strategies used by the teenagers in our sample increased significantly after the items were switched and the questions were repeated (Figures 7 and 8).

Figure 5

Difference in means: Children Self_Strategy - Other_Strategy

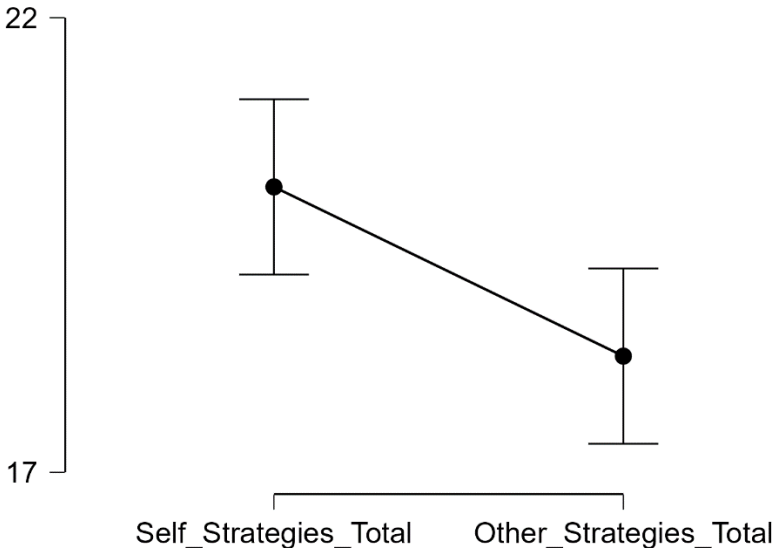


Figure 6

Difference in means: Teenagers Self_Strategy_Total - Other_Strategy_Total

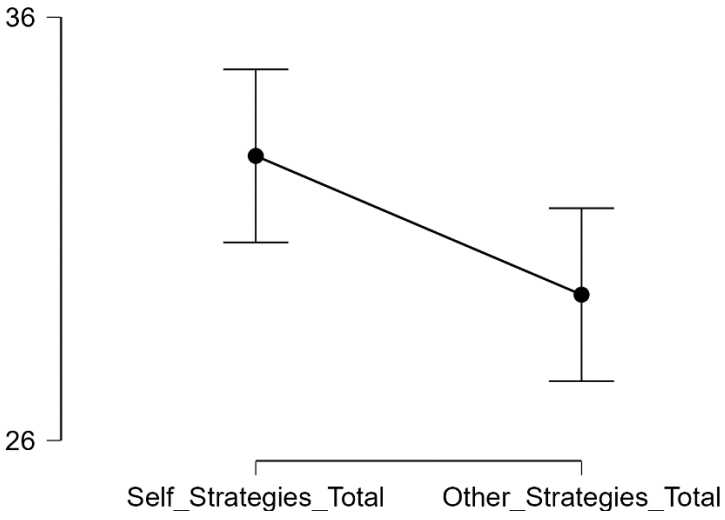


Figure 7

Difference in means: Children Strategy Use Pre- and Post-Object Switch

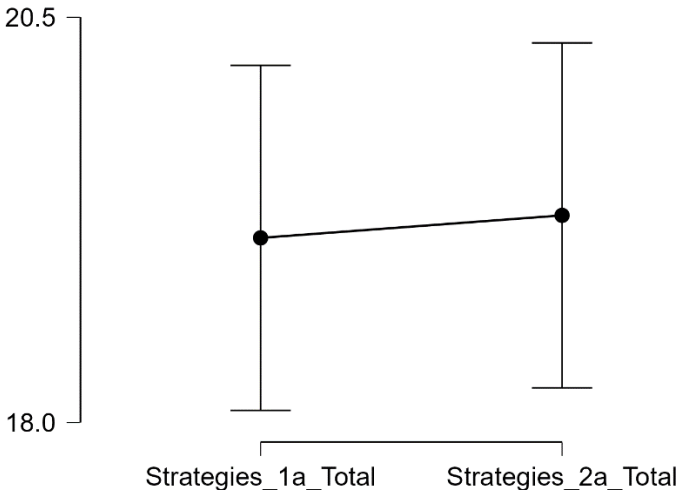
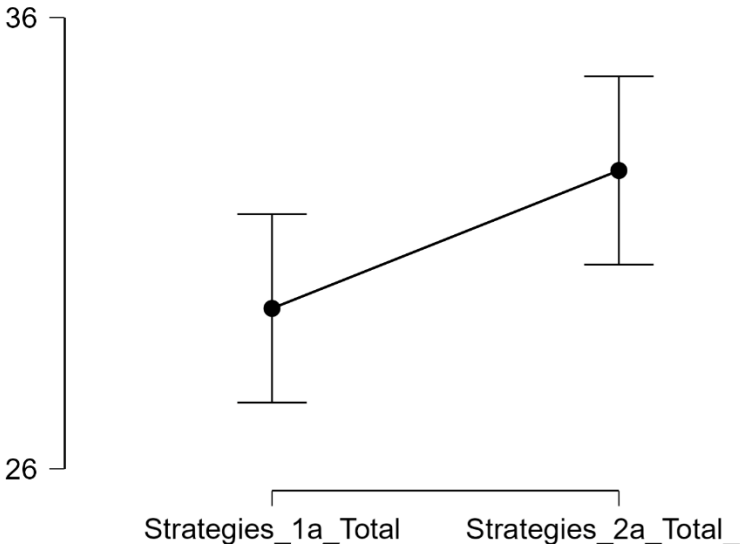


Figure 8

Difference in means: Teenagers Strategy Use Pre- and Post-Object Switch



Discussion

This study tested three hypotheses.

1. Emotional valence was expected to have the strongest positive association with perceptual strategies and weaker, or even negative associations with the other strategies.
2. Older participants were expected to be more likely to choose to bring an item that stirred in them negative emotions.
3. Age was predicted to have a positive effect on the number of strategies exhibited by the participants in the course of the study.

The first hypothesis was rejected. Some support was gathered for the second hypothesis, though not enough to make a firm conclusion. Lastly, and most surprisingly, conclusions regarding the third hypothesis varied wildly between the Children group and the Teenagers group.

Emotional valence and intensity had a positive correlation with all perceptual strategies. No causality can be established, but it does not go with the established theories of negative emotions using more cognitive resources (Menninghaus et al., 2017). The association between emotions and strategy use being present in the children sample, but not the teenager sample is interesting, too. It implies that with age, emotions play a smaller role in semantic processing of art and the choice of semantic strategies.

Older children were more likely to indicate experiencing negative emotions from considering each object, though all except one indicated they liked their own and their partner's objects. The higher incidence of negative emotions in this age group is in line with previous research, which confirms that teenagers do tend to experience negative emotions at a higher rate than younger children (Riediger et al., 2014). Developing the ability to enjoy these emotions is also compatible with research displaying how children develop better emotion regulation skills

as they age (Larsen et al., 2007; Sigelman & Rider, 2017). Younger children are more likely to recognize positive emotional expressions in abstract art than negative, though those abilities develop at a younger age than that of our sample and only increase with age (Pouliou et al., 2018).

The results pertaining to the third hypothesis were the most surprising. There were significant differences between the Children and Teenagers groups in how their strategy choices were impacted by possible order effects. Children's responses showed no signs of being impacted by the order in which they interacted with their objects. Teenagers, meanwhile, exhibited a significantly increased use of cognitive strategies after they had switched objects, regardless of whether the second object was theirs of their partner's. This could indicate a potential order effect in the Teenager sample. On top of that, the effect of age on strategy use was stronger for the first object than the second (see Tables B3.3 and B3.4 in Appendix B for the correlations). No such effect exists in the Children group. One of the possible explanations could be the time-of-day data collection took place. Most of the teenaged participants volunteered through the collaborating schools and as such were scheduled to participate early during a school day, as opposed to children who tended to participate in the afternoon and evening. Teenagers' shorter sleep durations and consequent daytime sleepiness as well as issues with information processing and attention have been well-documented (Carskadon et al., 1998; National Research Council (US) and Institute of Medicine (US) Forum on Adolescence, 2000). The earlier start to the data collection could have impacted teenaged participants' initial alertness and effort levels, an effect that could have decreased as the questions progressed.

Another difference between the two groups was the effect of age on strategy choice. Teenagers showed strong correlations between their age and strategy use, while the children's

age had seemingly no bearing on their strategy choices. A visual inspection of the scatterplots suggests that the difference in the sample sizes of the two groups could be behind such a stark difference in correlations (see Figures B3.1 and B3.2 in Appendix B). Less data points in the Teenagers group could facilitate the emergence of a seemingly strong correlation. The strength and significance of the correlation in the teenaged sample, however, lends support to the framework established in the introduction, with age allowing for more complex interactions with the artwork presented. It is possible that children replied to the questionnaire more instinctively, without thinking about their answers as much. Dual process theories could go towards explaining this occurrence, as it could be posited that children answered more instinctively and therefore more quickly, utilizing the faster System 1, rather than the more effortful System 2 (Barrouliet & Gauffroy, 2013). This could be tested by comparing the average reading rates per age group with the average completion time of the pre-questionnaire in both the Children and Teenagers groups, determining whether children took more or less time answering the questions. The effect of age on participant strategy use was strengthened when the object evaluated was not theirs. In the cases where the object is unfamiliar to the participant, or they are seeing it in a new light, age seems to play a more important role in determining the amount of attention teenagers allot to the object. On the other hand, when the object is familiar (and their own), both children *and* teenagers seem willing to appraise it in more depth, regardless of age. The Distancing-Embracing model takes meaning into account as a powerful embracing factor incentivizing interactions with artwork, which is perfectly supported by the results of this study.

Strengths

The mixed method approach allowed for a detailed analysis, informed by behavioral observations and conversation content. Changing the order in which participants interacted with

the chosen objects gave the results safeguarded against potential order effects and revealed an unexpected pattern to the data in the teenaged sample. The wide age range of the participants made a developmental perspective to the data analysis possible, revealing the many differences found between the two groups of participants. Having the participants select meaningful objects on their own ensured sincere emotional responses in a safe and ethical manner and invited the kind of originality to the selections that adult researchers could not have come up with.

Limitations

Some data loss was occurred due to a lack of familiarity with the equipment by the research team, resulting in a smaller sample size. Some patterns in the results could be explained by an inconsistent interview schedule, as teenagers were more likely to be interviewed during the school day, while many of the child participants were interviewed early in the morning or late in the evening. This could have caused differences in energy levels and engagement in the study. Future studies should take into account how time of day can impact children and teenagers' attention span and work to schedule data collection accordingly. Some of the younger children showed clear signs of fatigue and boredom during the second questionnaire portion of the experiment, which could have impacted their answers and resulted in response styles, which would severely limit the power of the study (Osborne & Blanchard, 2011). Although this paper analyzes only the data before the conversation portion of the experiment, it nevertheless remains pertinent to ensure the right level of complexity for each age group to minimize random response styles born of boredom or inattention. With the two groups of participants put together, as in the case of the testing of the second hypothesis, the distribution of the sample was skewed toward younger age, with children aged six to twelve outnumbering teenagers nearly two-to-one. This limits the generalizability of the results, especially those pertaining to the second hypothesis.

Another factor limiting generalizability, though to a lesser degree, was the nationality of our sample; all but two participants were Dutch. Future studies could examine whether these results can be replicated with a sample of a different nationality, or in a more international setting (e.g. an international school). Although the focus of this study was on how the valence of emotions interacted with cognitive strategy choices, the overwhelming incidence of positive valence reported on the questionnaire reveals a need for a more targeted approach towards procuring data with a more even distribution of emotional valence. The manner through which emotional valence, intensity and arousal were measured and quantified brought each two-emoji response closer to a neutral value, resulting in a "mixed" value of valence. In practice, this meant that should a participant select one sad emotion and one happy one, their valence was combined into a single, more neutral valence score, reducing the "intensity" of both selections. Future studies could devise a method that allows for an analysis of mixed emotions that does not reduce the intensity of either emotion's valence.

Implications

When working with younger populations, time of day should be taken into account. The shorter sleep duration and higher propensity towards sleep deprivation in teenagers means that one must pay attention to the effort exhibited during data collection. This paper exemplified how children, especially those under 12 years old, are most likely to select significant objects based on what makes them happy or excited, so future studies examining should take a more direct approach to guiding object selection. Seeing as children's preferences in art can be highly variable as they age (Goldstein, 2020) studies examining how the Distancing-Embracing Model can be applied to a younger demographic should consider employing a longitudinal approach, with a stable time of day determined for data collection.

Conclusions

Children's emotional and cognitive development are intricately interconnected. This study takes a step towards exploring from a new perspective how children interact with and approach meaningful objects in their life. Children and teenagers were found to approach item selection somewhat differently and the semiotic strategies they favored also varied, however, they all utilized all semiotic strategies to some degree. Their positive emotions amplified their semiotic interactions with the objects. Few chose objects that provoked mixed feelings in them, but all that did showed sense of meaning was attacked to their choice. The mixed-method approach gives rise to many new possible avenues of study, focusing on how negative emotions could interact with semiotic strategy use or how the meaning of an object can affect its interpretation by those who created it versus those who are just interacting with it for the first time.

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Appendix A: Conversation Prompts

- “Why did you bring these objects/artworks?”
- “What do you notice about these objects/artworks?”
- “Do you think these objects are beautiful?”
- “What can you do with these objects/artworks?”
- “What would you like others to know about your objects/artworks?”
- “What can you learn from these objects/artworks?”
- “How do you think your buddy thinks about his/her art object?”
- “What do you think your buddy thinks about your art object?”
- “What do you think about your art object?”
- “Why do you think your buddy brought that art object?”
- “What do you think the artist wants you to feel with his art?”

Appendix B: Tables and Figures

Hypothesis 1

Table B1.1

Descriptive Statistics: Children's Strategy Use

	Perceptual	Imagination	Conceptualization	Analytical
Valid	36	36	36	36
Missing	0	0	0	0
Mean	4.667	5.833	5.833	3.806
Std. Deviation	1.121	1.665	1.781	1.327
Minimum	3.000	3.000	3.000	2.000
Maximum	6.000	9.000	9.000	6.000

Table B1.2

Descriptive Statistics: Children's Strategy Use

	Perceptual	Imagination	Conceptualization	alytical
Valid	18	18	18	18
Missing	0	0	0	0
Mean	7.222	9.389	9.944	6.167
Std. Deviation	2.340	3.648	2.689	3.167
Minimum	2.000	3.000	3.000	2.000
Maximum	10.000	15.000	14.000	10.000

Hypothesis 3

Table B3.1

Descriptive Statistics: Children's Semiotic Strategies (Own vs Other's Object)

	Strategies (Self)	Strategies (Other)
Valid	36	36
Missing	0	0
Mean	20.139	18.278
Std. Deviation	4.441	4.026
Skewness	-0.172	0.547
Std. Error of Skewness	0.393	0.393
Kurtosis	-1.147	0.169
Std. Error of Kurtosis	0.768	0.768
Shapiro-Wilk	0.941	0.964
P-value of Shapiro-Wilk	0.053	0.291

Table B3.2

Descriptive Statistics: Teenagers' Semiotic Strategies (Own vs Other's Object)

	Strategies (Self)	Strategies (Other)
Valid	18	18
Missing	0	0
Mean	32.722	29.444
Std. Deviation	9.658	6.964
Skewness	-0.119	-0.446
Std. Error of Skewness	0.536	0.536
Kurtosis	-1.127	-0.418
Std. Error of Kurtosis	1.038	1.038
Shapiro-Wilk	0.960	0.959
P-value of Shapiro-Wilk	0.596	0.578

Figure B3.1

Scatterplot Correlation Children Age x Self_Strategies x Other_Strategies

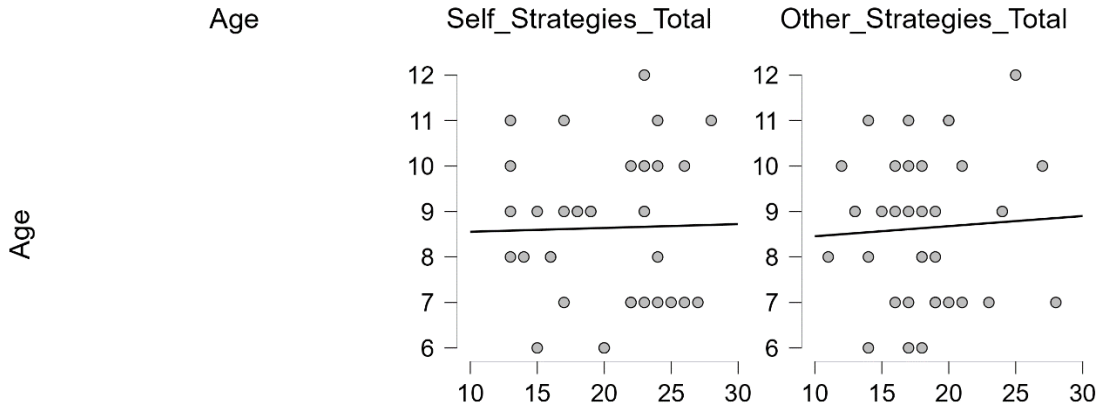

Figure B3.2

Scatterplot Correlation Teenagers Age x Self_Strategies x Other_Strategies

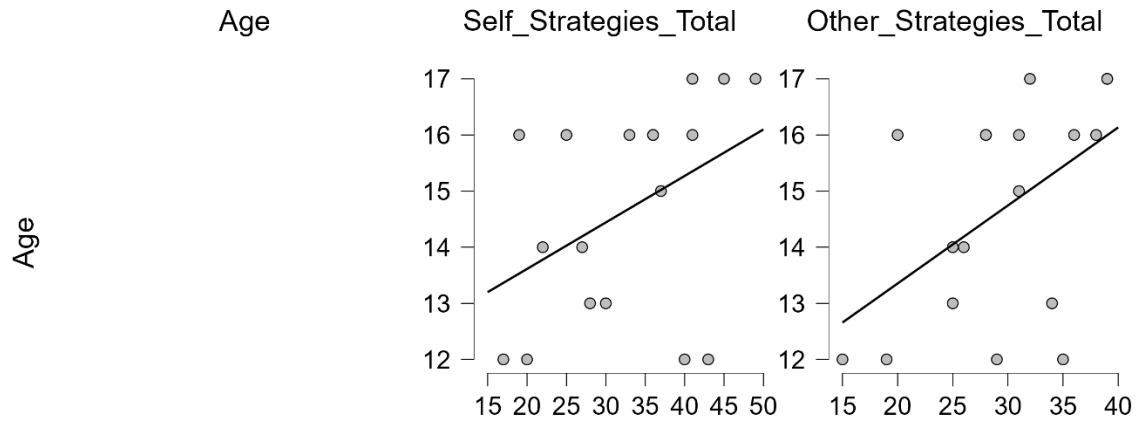

Table B3.3

Correlation Children Age x Strategies Pre and Post Object Switch

Variable		Age
1. Age	Pearson's r	—
	p-value	—
	Effect size (Fisher's z)	—
	SE Effect size	—
2. Strategies 1a	Pearson's r	0.043
	p-value	0.802
	Effect size (Fisher's z)	0.043
	SE Effect size	0.174
3. Strategies 2a	Pearson's r	0.033
	p-value	0.848
	Effect size (Fisher's z)	0.033
	SE Effect size	0.174

Table B3.4

Correlation Teenagers Age x Strategies Pre and Post Object Switch

Variable		Age
1. Age	Pearson's r	—
	p-value	—
	Effect size (Fisher's z)	—
	SE Effect size	—
2. Strategies 1a	Pearson's r	0.562 *
	p-value	0.015
	Effect size (Fisher's z)	0.636
	SE Effect size	0.258
3. Strategies 2a	Pearson's r	0.356
	p-value	0.147
	Effect size (Fisher's z)	0.373
	SE Effect size	0.258

* $p < .05$