



FEATS Problem-Solving Scale in PPAT of children aged 5–6.5 as related to their executive functions and motivation



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ABSTRACT

The present study analyzed whether scores on the FEATS Problem-Solving Scale (Gantt & Tabone, 1998) in PPAT drawings of 126 children ages 5–6.5 years old were related to executive functions (EFs) and motivation. In addition, the drawings were rated with an innovative scale, the Children's Picking Process Scale (CPPS), which focuses on how, in their drawings, children represent the person in the action of picking. The CPPS was found to be a reliable scale highly correlated with the FEATS problem solving scale. Validity was tested in regard to executive functions that were scored by the children's kindergarten teachers using the BRIEF (Gioia, Isquith, Guy, & Kenworthy, 2000); their motivation was rated by their parents using the Children's Motivation Scale – CMS (Gerring et al., 1996). Results indicate low significant correlations between the FEATS Problem-Solving Scale and the CPPS regarding two EFs: initiating, and planning and organizing. Interestingly, motivation was found to be correlated with the FEATS Problem-Solving Scale but not with the CPPS. Results are discussed in terms of the developmental perspective, expressions of EFs in PPAT, and clinical implications. Study limitations and future research are also discussed.

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The purpose of the present study is to contribute to the further validation of an art-therapy-instrument rating scale originally developed for adults. Specifically, the main objective was to statistically validate the FEATS Problem-Solving Scale with external criteria – children's executive functions and motivation. In addition to scoring the solutions arrived at by children in their drawings with the FEATS Problem-Solving Scale (Gantt & Tabone, 1998) in PPAT (Gantt, 1990; Lowenfeld, 1939), we analyzed the manner in which the children drew a person in action, and developed a scale scoring how the children represented a person in the act of picking. The rationale for this was children's difficulties in depicting action and movement in their drawings. In contrast to the FEATS Problem-Solving Scale, in this scale, called CPPS: Children's Picking Process Scale, only the picking process itself is rated, without scoring the picking success (that is, holding the apple in hand was not relevant). Since the problem-solving aspects in PPAT and the ability to draw a person in action are presumably abilities that depend heavily on the development of cognitive abilities, the present study will address these.

Executive functions (EFs)

Executive functions are cognitive abilities involved in a broad range of cognitive and behavioral processes, and are drawn upon when encountering novel problems or directed activities (Anderson, 2008). It is generally accepted that EFs are higher-level functions that integrate and control more basic cognitive processes, and that they are crucial to children's academic achievement (Bull & Scerif, 2001; St. Clair-Thompson & Gathercole, 2006).

Several EFs are required for performing a challenging task: (a) Motivation is defined as a process of initiating and sustaining goal-directed behavior (Bandura, 1997; Schunk, Pintrich, & Meece, 2008); (b) Planning refers to the ability to view future events, set goals, or refine a longed-for situation and determine the best way to achieve the goal, sometimes through the use of pre-planning stages (Gioia et al., 2000); (c) Organizing refers to the ability to organize information and distinguish central ideas; (d) Executing an intentional program: an overall process of active initiation and then retention of a program in the memory while performing a task (working memory); (e) Effective performance: the ability to function, evaluate, fix, and monitor different aspects of execution (Gioia, Isquith, Retzlaff, & Espy, 2002; Lezak, 1995).

To recap, EFs are crucial cognitive abilities for solving problems, and thus can be reflected through the PPAT assignment,

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specifically through the FEATS Problem-Solving Scale (Gantt & Tabone, 1998).

FEATS (Gantt & Tabone, 1998)

FEATS – Formal Elements of Art Therapy Scales (Gantt & Tabone, 1998) is one of the most central and known art therapy rating scales in use to date (e.g., Bucciarelli, 2011; Munley, 2002). FEATS was originally developed for rating and scoring the PPAT (Person Picking an Apple from a Tree: Gantt, 1990; Lowenfeld, 1939) of an adult population (Gantt, 1990; Gantt, 2001). It is comprised of 14 five-point Likert scales ranging between 0 and 5, 0 indicating the drawing cannot be rated, 1 indicating the phenomenon is poorly present, and 5 indicating the phenomenon was fully present. FEATS has an elaborate rating manual that could support high interrater reliabilities, an important feature that was found consistently high in many studies (e.g., Bucciarelli, 2011), including in cross-cultural drawings (e.g., Nan & Hinz, 2012).

FEATS has also been applied to children's PPAT, discriminating between children with AD/HD and normative samples (Munley, 2002), and between children with asthma symptoms who had participated in an art-therapy group and a control group (Beebe & Bender, 2010). From a preliminary study by Tabone, who rated 322 children's drawings from preschoolers through sixth graders, some FEATS scales (prominence of color, color fit, integration, logic, developmental level, details, line quality, and person) were found to have mean scores that gradually increased with age, with the scores assuming a normal distribution around the third grade (Gantt, 2001). The present study focused on one scale – the Problem-Solving Scale – that could be affected notably by age, specifically by cognitive developmental characteristics.

The FEATS Problem-Solving Scale measures the degree to which the artist shows the drawn person actually getting the apple out of the tree. Drawing a person picking an apple combines two distinct abilities: the ability to understand the challenge bound to the concept of a person picking a fruit from a tree, that is, a higher object; and children's ability to draw a person in action. To date there is scarce research regarding the ability of children to draw a person in action. Goodnow (1978) asked 320 children aged 4–10 years to draw a person picking up a ball from the floor, and found an increasing use of a figure bending over with age. Most of the kindergarten children in Goodnow's study drew "juxtaposition": the ball simply placed near the person; however, Goodnow's analysis of the solutions children provided to indicate movement did not differentiate between non-realistic solutions (such as the ball raised to allow contact) and realistic ones; the FEATS Problem-Solving Scale does so.

According to theories of children's drawing development, young children draw what they know, while older children draw what they see (e.g. Goodenough, 1928). It could be thus speculated that this aspect is affected heavily by cognitive development.

The present study is based on large-scale validating research of the PPAT of normative Israeli children aged 5–6.5 years, before their first year in school. Three central research questions were asked: (a) What characterizes children's solutions in the FEATS Problem-Solving Scale in PPAT drawings? The answer to this question is basically the establishment of norms in the FEATS Problem-Solving Scale for children in this age group; (b) How do children in this age group graphically represent a person during the picking process? A phenomenological observation of this aspect will be needed for developing a specific scale measuring the picking process as detached from picking success. (c) Are the solutions provided by children in the PPAT (as measured by the FEATS Problem-Solving Scale and the CPPS children's picking process scale) related to their EFs, as measured by validated tools?

Two hypotheses were delineated:

1. There would be significant correlations between the FEATS problem-solving scores and the CPPS children's picking process scale.
2. Significant relations are expected between the FEATS Problem-Solving Scale and the CPPS regarding EFs scores.

Method

Participants

Children (aged 5–6.5 years) were recruited from 14 Israeli kindergartens. In total, 126 preschool children participated in this study (M age = 5.6214; SD = 0.499); gender distribution of the children was equal. All children in the present study drew the PPAT individually with a researcher. The children's teachers answered the four scales of the BRIEF questionnaire (Gioia et al., 2000) for each participant, and the children's parent completed the Children's Motivation Scale (Gerring et al., 1996). The participants were all students randomly selected, mainly from the north of Israel.

Instruments

PPAT – Person Picking an Apple from a Tree (Gantt, 1990)

Participants were given white drawing paper (21 cm × 29.5 cm) and 12 scented Sanford Mr. Sketch watercolors: red, orange, blue, turquoise, green, dark green, hot pink, magenta, purple, brown, yellow, and black. Participants were individually asked to draw a person picking an apple from a tree; no time limitation was set. The PPAT drawings were rated according to the FEATS (Gantt & Tabone, 1998) by two independent raters. In addition, the drawings were classified according to systematic phenomenological observation focusing on the way the children drew the person during the picking process (CPPS). Table 1 presents the classification of each category illustrated by the drawings. It is important to stress here that while in each category the person may or may not have an apple in hand, this is not the focus of the classification.

Four scales of the BRIEF Questionnaire (Gioia et al., 2000), a measurement for cognitive abilities (executive functions)

The children's kindergarten teachers rated 49 items on a three-point scale (N = never, S = Sometimes, O = Often) regarding each child's functioning within a time frame of 3 weeks before and after the child's PPAT drawing. Teachers' ratings yielded four scores: initiating (e.g., "Needs to be told to begin a task even when willing."), planning and organizing (e.g., "Has trouble concentrating on chores, schoolwork, etc."), monitoring (e.g., "Has good ideas but cannot get them on paper."), and working memory (e.g., "When given three things to do, remembers only the first or last."). These scales have high internal credibility (Cronbach α = .90–.93) and validity ($p < .001$) (Gioia et al., 2000).

Children's Motivation Scale – CMS (Gerring et al., 1996)

A 16-item scale care-provider-report form reflecting behavioral, cognitive, and emotional concomitants of motivations (12 positive items – e.g., "Is interested in things, for instance, new TV shows, new toys, new clothes, new books.") or their absence (4 negative items – e.g., "Has to be told what to do in his/her free time, for instance, playing with a toy or a game or making a phone call to a friend."). Temporal stability was demonstrated in a two-week test-retest design in the normative sample ($n = 75$, $r = .88$, $p < .001$). Internal consistency was obtained by calculating a split-half reliability coefficient; the Spearman Brown coefficient was .79. Construct validity was found through the scale's convergence with measures of similar traits, for instance with scores tapping

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