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BACKGROUND

Embodied cognition gives a powerful theoretical framework for the understanding of interaction between cognitive development and digital devices. According to this approach, cognitive development is conceived as depending on the specifics of the genetic, physical and contextual environment in which a child is situated (Wilson, 2002). As a matter of fact, some researches demonstrated that video games, by inducing a simulation of the whole body in action, enhanced adolescent's creativity (Guilbert, Jouen, Lehalle & Molina, 2013; Jackson & al., 2012), defined as the "capacity to realize a production which is new and adapted to the context in which it comes out (Lubart, Mouchiroud, Tordjman & Zenasni, 2003).

RESEARCH QUESTION

The raised question in the present experiment is to evaluate whether creativity enhancement could as well be observed in digital device for which motricity is reduced to fine motor skills.

METHOD

Twenty-four adolescents aged from 13 to 14 (*mean age* = 13 years, 7 months; *SD* = .47).

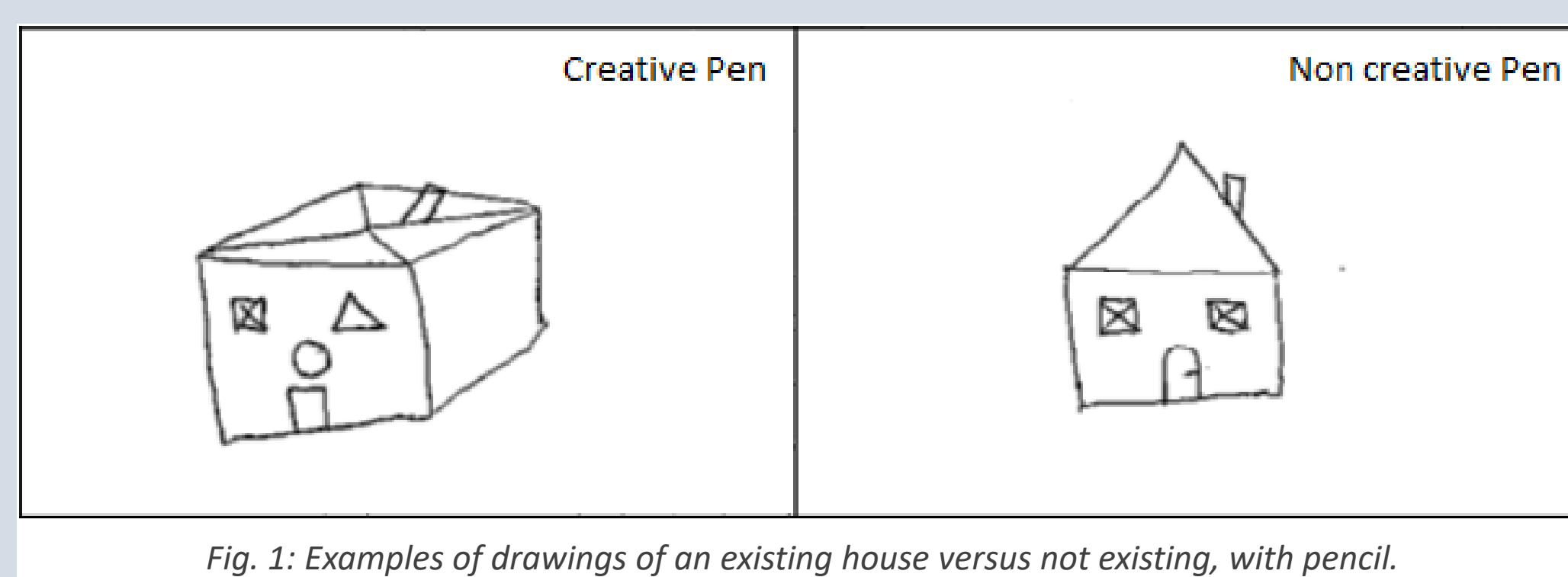


Fig. 1: Examples of drawings of an existing house versus not existing, with pencil.

They had to "draw a house" and "draw a house that does not exist" (Karmiloff-Smith, 1990) (Fig. 1.) on a touch-screen device with their finger and with a stylus, and on paper using a pencil.

Each drawing was rated with a creativity scale based on the ones initially proposed by Karmiloff-Smith (1990) and Picard, Martin & Tsao (2014).

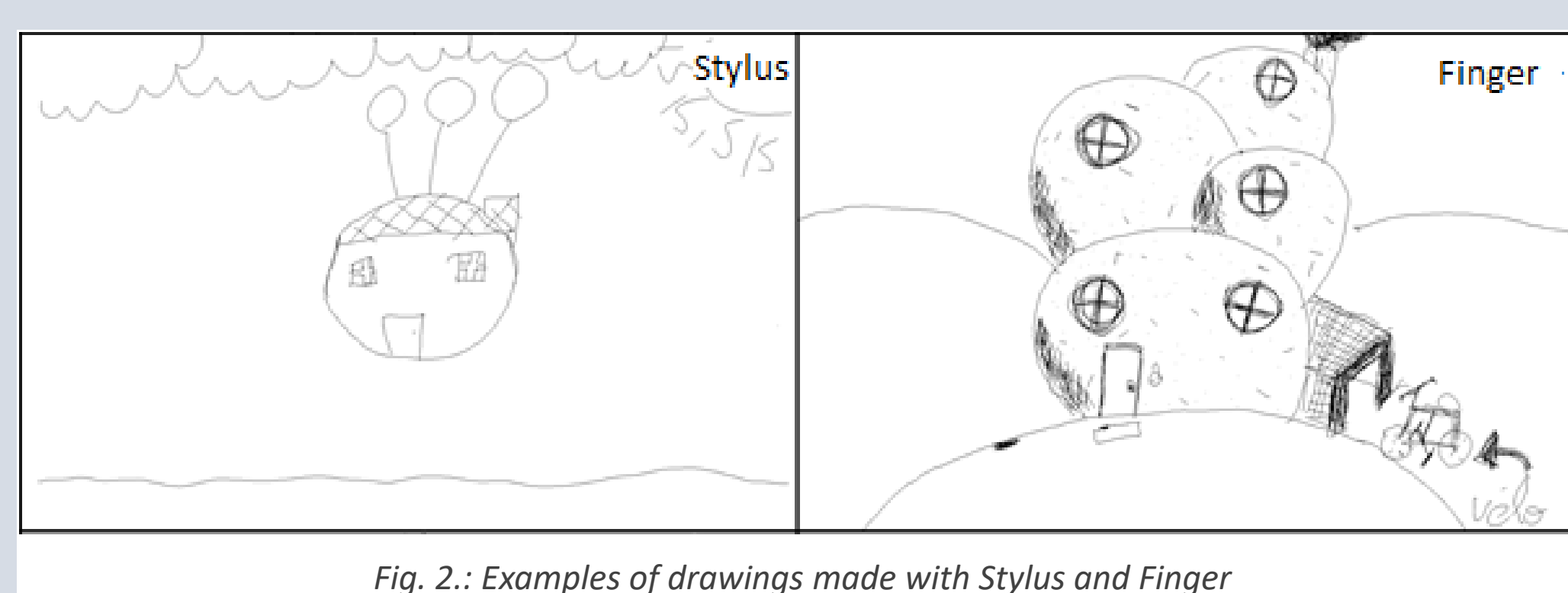
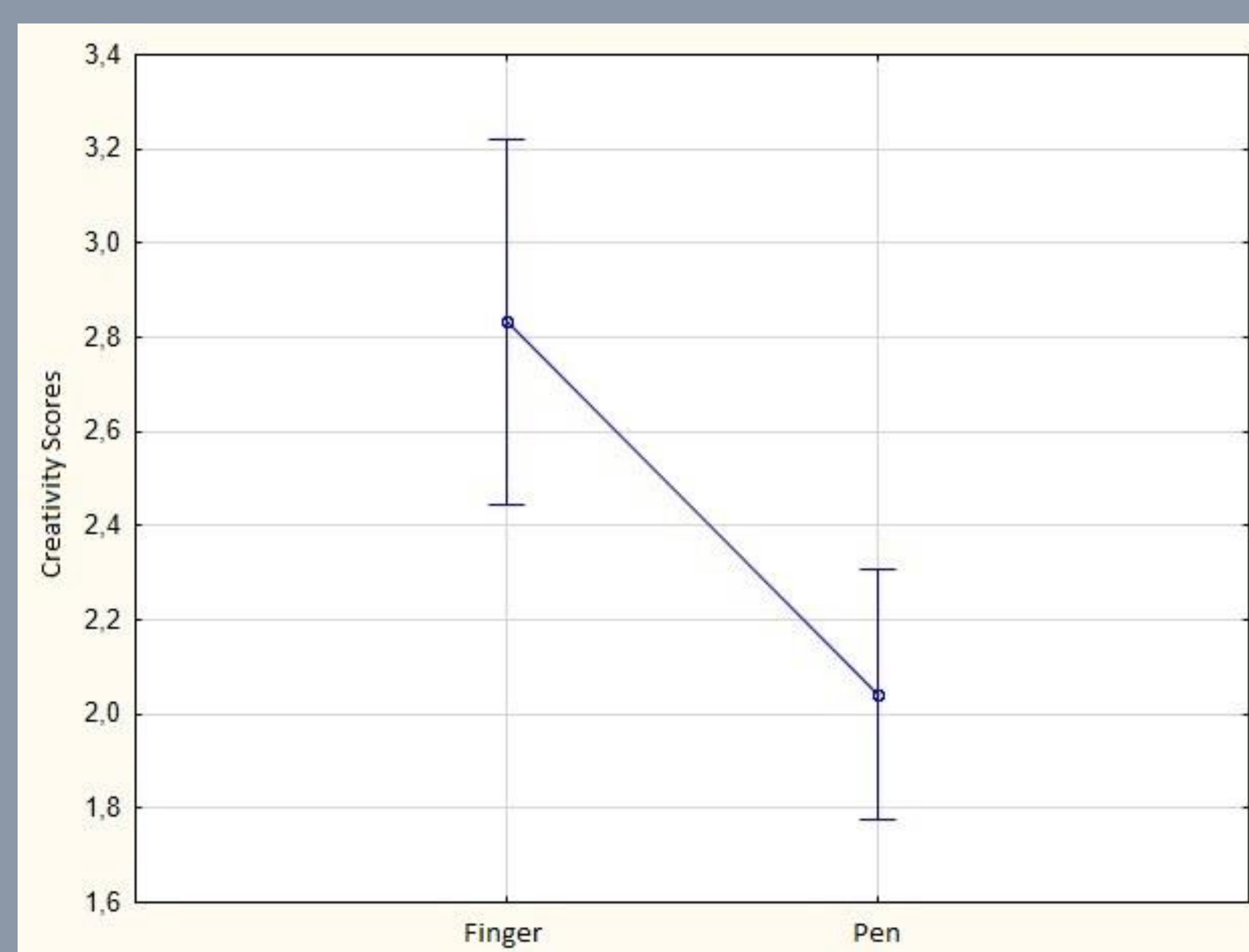
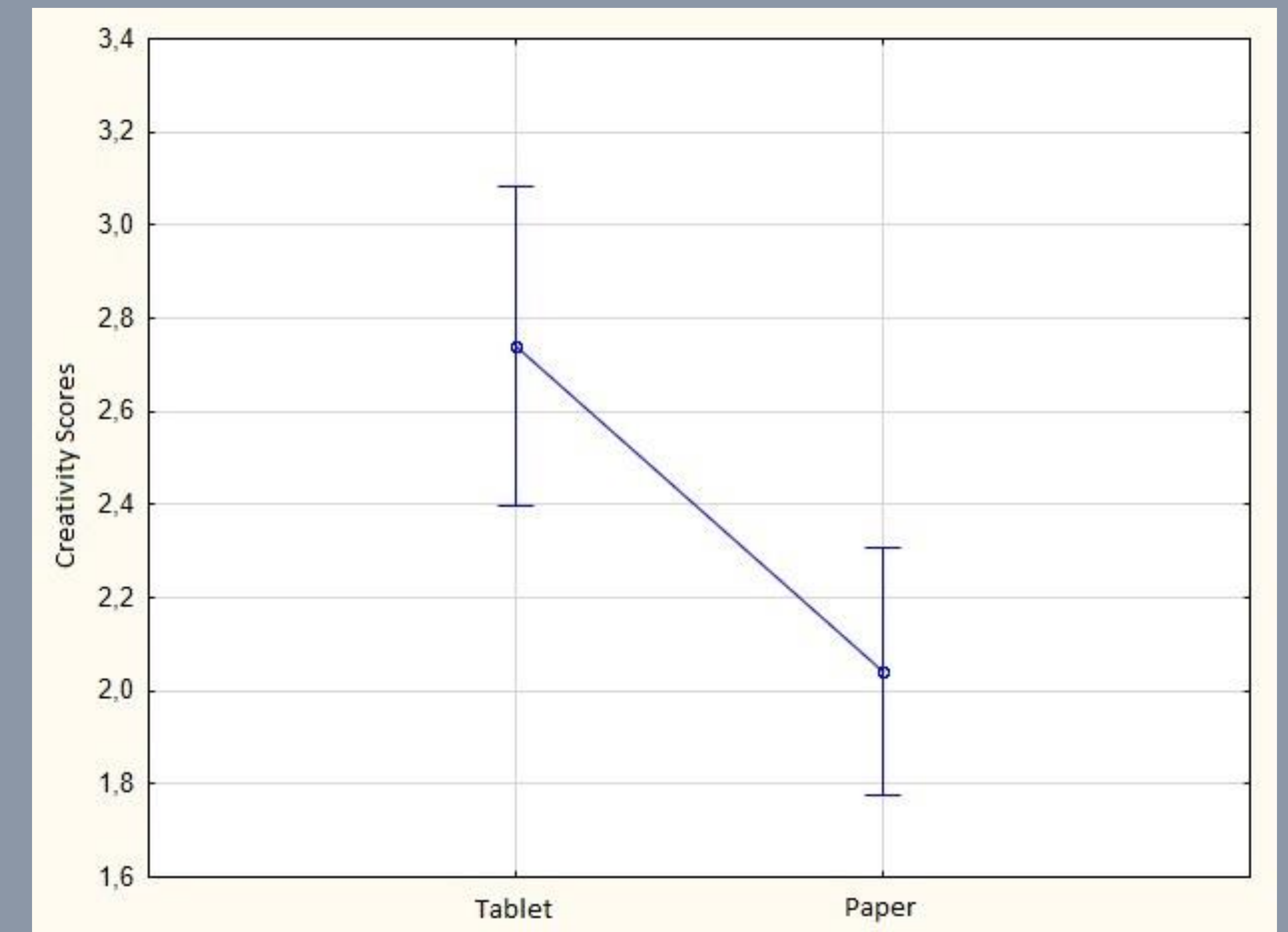


Fig. 2: Examples of drawings made with Stylus and Finger

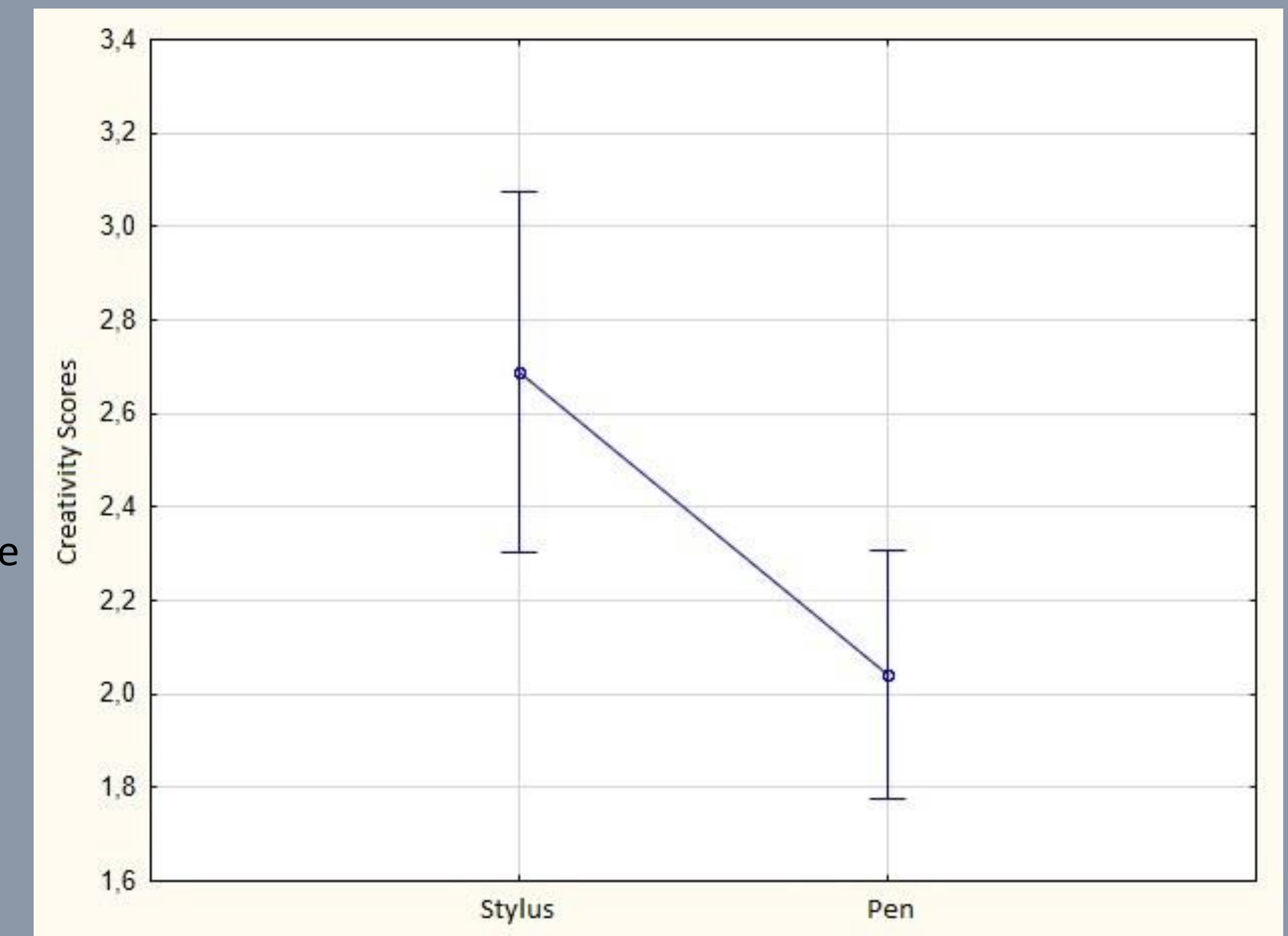
RESULTS

ANOVA performed on creative score, reveals that drawings performed on the touch-screen device lead to higher creative score ($M = 2.76$; $SD = 1.66$) compared to drawings performed on paper ($M = 2.04$, $SD = 1.30$), $F(1,23) = 5.9207$; $p = .023$, $np^2 = .20$.



Planned comparisons revealed that drawing performed on the touch-screen with the finger ($M = 2.83$, $SD = 1.90$) gives higher creative scores than for drawings performed with a pencil on paper ($M = 2.04$, $SD = 1.30$), $F(1,23) = 5.09$; $p = .03$, $np^2 = .18$.

The comparison between creative scores obtained from stylus and from pencil reveals a tendency for the stylus drawings to be more creative than for the pencil drawings, $F(1,23) = 3.45$, $p = .076$, $np^2 = .13$.



However, no significant differences were observed between creative scores in finger and stylus conditions $F(1,23) = .15$, $p = .69$ ns.

DISCUSSION

Taken together, these results allow to conclude for a benefit of the touch-screen interface on creativity, but only when the hand interacts with it. Interacting on the touchscreen with a stylus reduces the benefit of the touch screen. What make adolescents to be more creative with this support is to directly interact with their fingers. This result converges with the conclusion of authors for which Hand is THE creative tool. Hand can be thought of as the most basic interface for interacting in our environment (Treadaway, 2009), allowing to feel afferent and efferent information during exploration (Lederman & Klatzky, 1987), and that makes, according to embodied cognition, a core tool for cognitive development.

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