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Drawing Tests to Evaluate the Cognitive Traits of People from Different Backgrounds

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This paper aims to examine how environmental or cultural differences are reflected in drawings by conducting drawing tests with people from different backgrounds. To determine the cognitive traits affecting the processes of representation and symbolization, it is important to design drawing tests appropriate for comparison. We will introduce our former studies that used stimulus figures or set tasks to illuminate basic cognitive functions in drawing from the aspect of development and evolution. The first study compared the drawing behavior of chimpanzees with that of human children and revealed that the imagination was essential for the emergence of representational drawing. The second study focused on orientation-indifferent representation in human children and discussed how representational schema are reflected in their drawings. Since childhood, we tend to draw objects symbolically reflecting the schema of objects; this conversely causes difficulty in drawing objects realistically. As drawings reflect the cognitive traits and schema of the drawer, they can provide clues to understand how ancient people recognized objects through their processes of representation and symbolization.

Este artículo tiene como objetivo examinar cómo las diferencias ambientales o culturales se reflejan en los dibujos mediante la realización de pruebas de dibujo a personas de diferentes orígenes. Para determinar los rasgos cognitivos que afectan los procesos de representación y simbolización, es importante diseñar pruebas de dibujo adecuadas para la comparación. Presentaremos nuestros estudios anteriores en los que utilizamos figuras de estímulo o tareas establecidas para enfocar las funciones cognitivas básicas en el dibujo desde el aspecto del desarrollo y la evolución. El primer estudio comparó el comportamiento con respecto al dibujo en los chimpancés con el de los niños y reveló que la imaginación era esencial para el surgimiento del dibujo representativo. El segundo estudio se centró en la representación indiferente a la orientación del dibujo en niños y se discutió acerca de cómo el esquema de representación se refleja en sus dibujos. Desde la infancia, tendemos a dibujar objetos que reflejan simbólicamente el esquema de los objetos; esto, por el contrario, causa dificultad para dibujar objetos de manera realista. Dado que los dibujos reflejan los rasgos cognitivos y el esquema del dibujante, pueden proporcionar pistas para comprender cómo los pueblos antiguos reconocían los objetos a través de sus procesos de representación y simbolización.

Humans have produced drawings, paintings, sculptures, or body paintings in most cultures through different eras, at least since the Upper Paleolithic. What makes humans create visual art and what brings out diversity and universality in their expressions? This project aims to examine how environmental or cultural differences are reflected in drawings by conducting drawing tests with people from different backgrounds. To determine the cognitive traits affecting the process of representation or symbolization, it is important to design drawing tests appropriate for comparison. We will introduce our former studies that used stimulus figures or set tasks to illuminate the basic cognitive function in drawing from the aspect of development and evolution.

Why Do Chimpanzees Not Draw Representational Figures?

Chimpanzees (*Pan troglodytes*) are the closest living relative of humans and are able to manipulate pens or brushes to draw/paint without any training or food rewards. While their drawings are similar to the abstract paintings or scribbles of young children, they display their own style, allowing us to distinguish individual chimpanzees from their work. However, despite their manipulative skills to trace the model lines, chimpanzees do not draw representational figures. We designed several drawing tests to clarify why chimpanzees do not draw representational figures as compared to young human children (Saito et al., 2014).

A free-drawing experiment involving incomplete facial stimuli revealed a remarkable difference between the two species. Humans over 2.5 years in age tended to complete the missing parts even with immature motor-control, whereas chimpanzees never completed the missing parts and instead marked the existing parts or traced the outlines with fine motor control (Figure 12.1). Human children sometimes drew representations spontaneously inspired by even simple abstract figures. Figures on a paper may trigger imagination in humans and lead them to complete the missing parts, and this cognitive tendency may be absent in chimpanzees.

Imagination can be described as perceiving a percept as "something" and categorizing lower-level visual information into the concept of "something" by associating it with a symbol otherwise represented in the mind. This symbolic cognitive system is further evident in the case of human language and is indeed the premise behind it. Humans tend to imagine something even in response

Figure 12.1.

Drawing Task Using Incomplete Facial Stimuli in Chimpanzees and Human Children.

Note. Observing free drawing on incomplete facial stimuli (left), one of the chimpanzees traced the outlines (central) and a 3-year-old human filled in the missing parts (right) (Saito et al., 2014).

to ambiguous figures. There is significant evidence in Paleolithic rock art that ancient people also used their imagination to draw animals on the ambiguous rock surface.

Why Do Children Draw Orientation-Indifferent Representations?

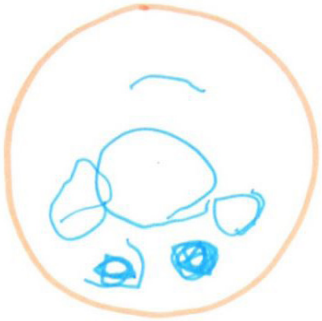
From a longitudinal observation of children, we reported the phenomenon of orientation-indifferent representation that arises in the early representational period, where children draw a figure in an inverted or horizontal orientation (Figure 12.2) (Saito et al., 2011). This phenomenon could be induced by presenting stimulus figures, such as illustrations of the ears of a cat, in different orientations. Some younger children drew facial parts in a rotated orientation on rotated stimuli and in an upright orientation on upright stimuli. It seems that younger children are indifferent to the orientation of the face on the drawing plane. Because they may know the relative order of the facial parts in the whole face, they show no difficulty drawing the rotated face in a given orientation. In contrast, older children always drew facial parts in an upright orientation; they reoriented the sheet into the upright position before they started drawing (Figure 12.3).. These age differences in reaction to inverted stimulus figures indicate a relationship between the production and development of the facial symbol.

Symbolic systems in humans are much more prevalent and reflected in representational drawings by children. As representational drawings by children are very symbolic, as opposed to being a copy of the real object, they might directly reflect the development of knowledge as their conception of objects as symbols is expanding.

Children draw what they know, not what they see, such as the representational schema of an object: For example, "a face = a circle (contour) + eye + eye + nose + mouth"

Figure 12.2.

Inverted face drawn by a child.



Note. After an experimenter drew a large circle, a 3-year-old child filled in the facial parts in inverted orientation (Saito et al., 2011).

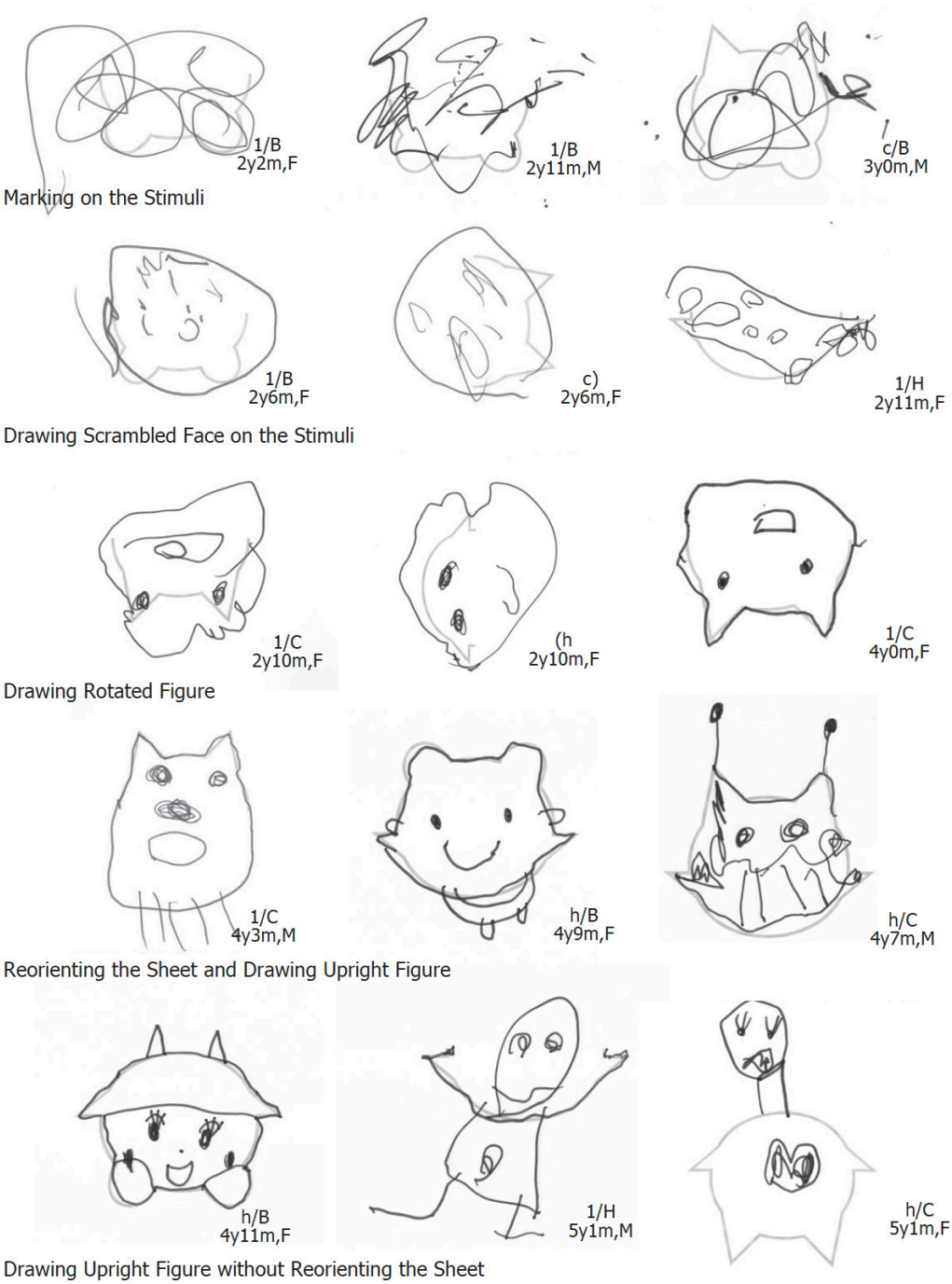
(Figure 12.4). The well-known phenomenon "tadpole man" also arises during the development process of the schema of a human image. Young children add arms or legs directly to a face—a torso is only added later as it is a more complicated schema (Figure 12.5).

How Can Realistic Drawings Be Difficult?

As it is hard to sketch objects realistically, there are many people, excluding young children, who do not like drawing. What makes it hard to sketch realistically? Due to our cognitive traits, it seems that we tend to draw things symbolically reflecting the schema that we have held since childhood. We recorded the drawing process and eye movements of art experts and compared them with those of non-experts while they were copying figures. We also analyzed the influence of bias in perception and cognition by creating drawing tasks that applied stimulus figures with optical illusions. When people drew an ambiguous figure, the same shape was drawn in different proportions depending on the emphasized meaning. The

Figure 12.3.

Examples of the drawing of children (black) on the rotated/conflict stimuli (gray).



Note. The attached text refers to the type of stimuli, age (y = years; m = months), and sex (F = female; M = male) (Saito et al., 2011).

experts seemed to be able to modulate this cognitive bias but were still affected by perceptual biases. Thus, in order to draw realistically, we need to cancel the cognitive bias and become free from the schema of symbolic drawing.

Areas for Future Research

As drawings reflect the cognitive traits and schema of the drawer, they can provide clues to understand how the person recognizes objects through their process of representation and symbolization. Future research will focus on the representative drawings/paintings in archaeological contexts that remain unclear regarding what they actually represented or what their purpose was by comparing them with the representational drawings of modern people.

Additional research involves designing drawing tasks to compare the cognitive traits of people from different backgrounds to illuminate the universality and diversity of human representation or symbolization in art production. Imaginative drawing tasks on abstract figures may illuminate the process of how shapes reconstruct into representations reflecting the individual schema of objects. Test participants will copy figures to illuminate how people extract visual information and channel it into drawing figures. We would like to establish these new approaches in order to understand the minds of ancient people not only through archaeological objects but also through the conducting of simulative drawing tasks with living people.

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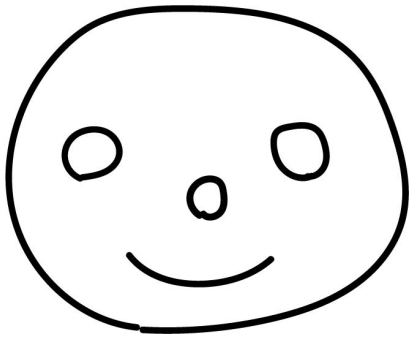
Figure 12.4.

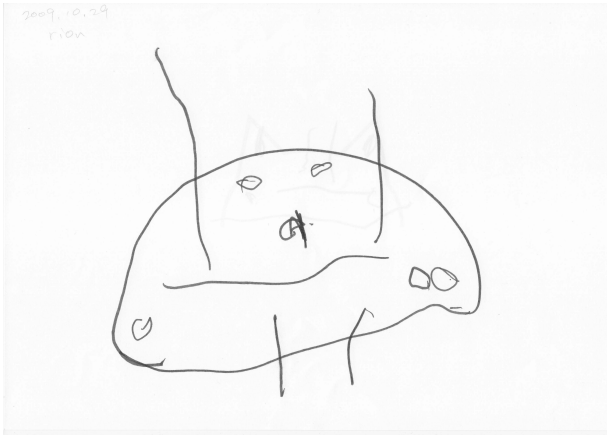
A typical face drawing.



Note. Children draw what they know, not what they see, as reflected in the schema of a face consisting of “a circle (contour) + eye + eye + nose + mouth”.

Figure 12.5.

“Tadpole man” .



Note. “Tadpole man”, the well-known phenomenon seen in young children’s drawings, suggests that the human schema held by children comprises “a face + arms + legs”, but not a “torso” yet.

References

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